(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 236 660 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.08.2023 Bulletin 2023/35

(21) Application number: **23157910.3**

(22) Date of filing: **22.02.2023**

(51) International Patent Classification (IPC):
H10K 85/60 *(2023.01)* ***H10K 85/30*** *(2023.01)*

(52) Cooperative Patent Classification (CPC):
H10K 85/633; H10K 85/342; H10K 85/615; H10K 85/6572; H10K 50/11; H10K 50/156; H10K 50/18; H10K 2101/10; H10K 2101/90

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **25.02.2022 KR 20220025499**

(71) Applicant: **Samsung Electronics Co., Ltd.**
Suwon-si, Gyeonggi-do 16677 (KR)

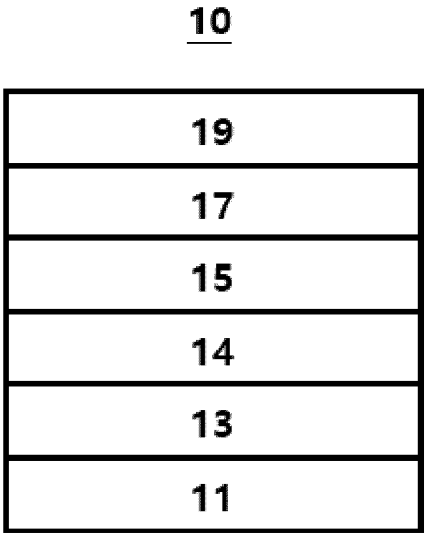
(72) Inventors:
- **KIM, Hyungjun**
  16678 Suwon-si (KR)
- **KANG, Byungjoon**
  16678 Suwon-si (KR)
- **KWAK, Seungyeon**
  16678 Suwon-si (KR)
- **KIM, Sungmin**
  16678 Suwon-si (KR)
- **MOON, Juhee**
  16678 Suwon-si (KR)
- **LEE, Sunghun**
  16678 Suwon-si (KR)
- **ISHIHARA, Shingo**
  16678 Suwon-si (KR)
- **CHOI, Byoungki**
  16678 Suwon-si (KR)

(74) Representative: **Elkington and Fife LLP**
Prospect House
8 Pembroke Road
Sevenoaks, Kent TN13 1XR (GB)

(54) **LIGHT-EMITTING DEVICE AND ELECTRONIC APPARATUS INCLUDING THE SAME**

(57) Provided are a light-emitting device and an electronic apparatus including the light-emitting device, the light-emitting device including: a first electrode; a second electrode; an emission layer arranged between the first electrode and the second electrode; and a buffer layer arranged between the first electrode and the emission layer, wherein the buffer layer is in direct contact with the emission layer, the emission layer includes a first compound represented by Formula 1, and the buffer layer includes a second compound represented by Formula 5. The first compound and the second compound are respectively the same as those described in the present specification.

FIGURE



EP 4 236 660 A1

Description

FIELD OF THE INVENTION

[0001] The present disclosure relates to a light-emitting device and an electronic apparatus including the same.

BACKGROUND OF THE INVENTION

[0002] From among light-emitting devices, organic light-emitting devices are self-emissive devices, which have improved characteristics in terms of viewing angles, response time, luminance, driving voltage, and response speed, and produce full-color images.

[0003] In an example, an organic light-emitting device includes an anode, a cathode, and an organic layer arranged between the anode and the cathode, wherein the organic layer includes an emission layer. A hole transport region may be arranged between the anode and the emission layer, and an electron transport region may be arranged between the emission layer and the cathode. Holes provided from the anode may move toward the emission layer through the hole transport region, and electrons provided from the cathode may move toward the emission layer through the electron transport region. The holes and the electrons recombine in the emission layer to produce excitons. These excitons transition from an excited state to a ground state, thereby generating light.

SUMMARY OF THE INVENTION

[0004] Provided are a light-emitting device having excellent luminescence efficiency and lifespan characteristics at the same time and an apparatus including the light-emitting device.

[0005] Additional aspects will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the presented embodiments of the disclosure.

[0006] According to an aspect of an embodiment, a light-emitting device includes:

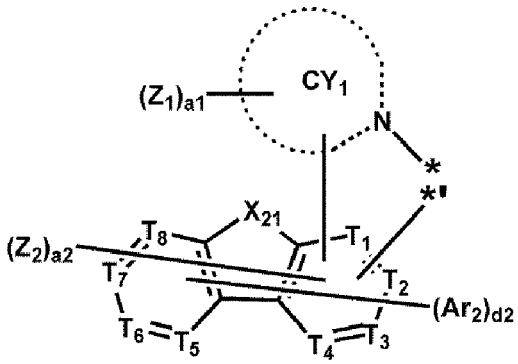
a first electrode;
a second electrode;
an emission layer arranged between the first electrode and the second electrode; and
a buffer layer arranged between the first electrode and the emission layer,
wherein the buffer layer is in direct contact with the emission layer,
the emission layer includes a first compound represented by Formula 1, and
the buffer layer includes a second compound represented by Formula 5:

Formula 1 $M(L_1)_{n1}(L_2)_{n2}$.

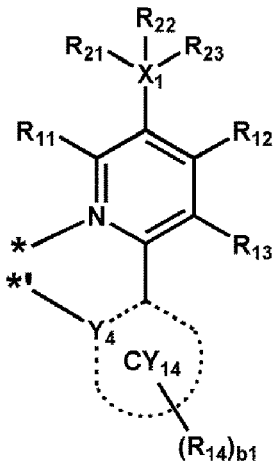
[0007] In Formula 1,

M is a transition metal,
L_1 is a ligand represented by Formula 2A,
L_2 is a ligand represented by Formula 2B,
n1 and n2 are each independently be 1 or 2, wherein, when n1 is 2, two of L_1(s) are identical to or different from each other, and when n2 is 2, two of L_2(s) are identical to or different from each other,
the sum of n1 and n2 is 2 or 3, and
L_1 and L_2 are different from each other,

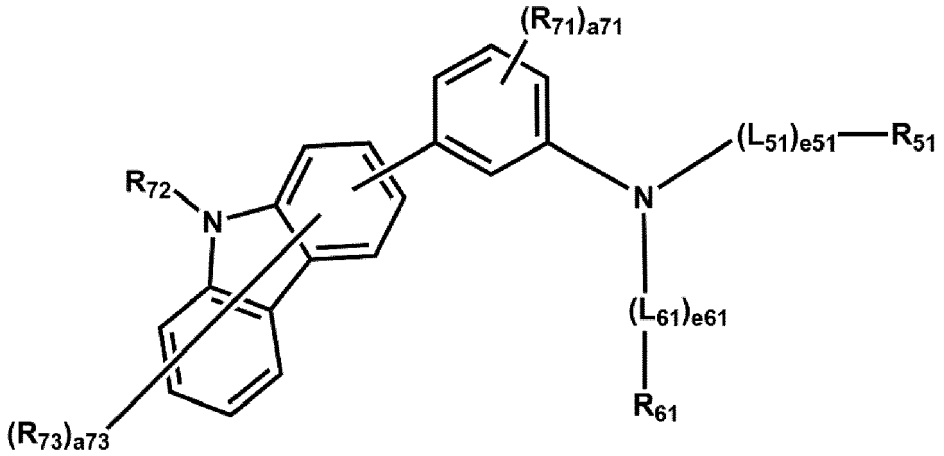
Formula 2A



Formula 2B



Formula 5



in Formulae 2A, 2B, and 5,

Y_4 is C or N,

X_1 is Si or Ge,

X_{21} is O, S, S(=O), $N(Z_{29})$, $C(Z_{29})(Z_{30})$, or $Si(Z_{29})(Z_{30})$,

T_1 to T_4 are each independently C, N, a carbon atom bonded to ring CY_1, or a carbon atom bonded to M in Formula 1, wherein one of T_1 to T_4 may be a carbon atom bonded to M in Formula 1, and one of the remaining T_1 to T_4 that is not bonded to M may be a carbon atom bonded to ring CY_1,

T_5 to T_8 are each independently C or N,

ring CY_1 and ring CY_{14} are each independently a C_5-C_{30} carbocyclic group or a C_1-C_{30} heterocyclic group,

Ar_2 are each a ring CY_2 unsubstituted or substituted with at least one Z_0, wherein ring CY_2 is an unsaturated C_5-C_{30} carbocyclic group or an unsaturated C_1-C_{30} heterocyclic group,

L_{51} and L_{61} are each independently a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a},

R_{21} to R_{23} are each independently a C_1-C_{60} alkyl group or a C_6-C_{60} aryl group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{20} alkyl group, a C_3-C_{10} cycloalkyl group, a phenyl group, or any combination thereof,

Z_0, Z_1, Z_2, Z_{29}, Z_{30}, R_{11} to R_{14}, R_{51}, R_{61}, and R_{71} to R_{73} are each independently hydrogen, deuterium, -F, -Cl, -Br, -I, $-SF_5$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a substituted or unsubstituted C_1-C_{60} alkyl group, a substituted or unsubstituted C_2-C_{60}

alkenyl group, a substituted or unsubstituted C_2-C_{60} alkynyl group, a substituted or unsubstituted C_1-C_{60} alkoxy group, a substituted or unsubstituted C_1-C_{60} alkylthio group, a substituted or unsubstituted C_3-C_{10} cycloalkyl group, a substituted or unsubstituted C_1-C_{10} heterocycloalkyl group, a substituted or unsubstituted C_3-C_{10} cycloalkenyl group, a substituted or unsubstituted C_2-C_{10} heterocycloalkenyl group, a substituted or unsubstituted C_6-C_{60} aryl group, a substituted or unsubstituted C_6-C_{60} aryloxy group, a substituted or unsubstituted C_6-C_{60} arylthio group, a substituted or unsubstituted C_1-C_{60} heteroaryl group, a substituted or unsubstituted monovalent non-aromatic condensed polycyclic group, a substituted or unsubstituted monovalent non-aromatic condensed heteropolycyclic group, - $N(Q_1)(Q_2)$, -$Si(Q_3)(Q_4)(Q_5)$, -$Ge(Q_3)(Q_4)(Q_5)$, -$B(Q_6)(Q_7)$, -$P(=O)(Q_8)(Q_9)$, or - $P(Q_8)(Q_9)$,

d2, e51, and e61 are each independently an integer from 1 to 6, wherein, when d2 is 2 or more, two or more of Ar_2(s) are identical to or different from each other, when e51 is 2 or more, two or more of L_{51}(s) are identical to or different from each other, and when e61 is 2 or more, two or more of L_{61}(s) are identical to or different from each other,

a1 and b1 are each independently an integer from 0 to 20, wherein, when a1 is 2 or more, two or more of Z_1(s) are identical to or different from each other, and when b1 is 2 or more, two or more of R_{14}(s) are identical to or different from each other,

a2 is an integer from 0 to 5, wherein, when a2 is 2 or more, two or more of Z_2(s) are identical to or different from each other,

a73 is an integer from 0 to 7, wherein, when a73 is 2 or more, two or more of R_{73}(s) are identical to or different from each other,

a71 is an integer from 0 to 4, wherein, when a71 is 2 or more, two or more of R_{71}(s) are identical to or different from each other,

each of: i) two or more of R_{21} to R_{23}; ii) two or more of a plurality of Z_1(s); iii) two or more of a plurality of Z_2(s); iv) R_{12} and R_{13}; v) two or more of a plurality of R_{14}(s); and vi) two or more of Z_0, Z_1, Z_2, Z_{29}, Z_{30}, and R_{11} to R_{14} may optionally be linked together to form a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a},

R_{10a} is the same as described in connection with R_{14},

* and *' in Formulae 2A and 2B each indicate a binding site to M in Formula 1,

at least one substituent of the substituted C_1-C_{60} alkyl group, the substituted C_2-C_{60} alkenyl group, the substituted C_2-C_{60} alkynyl group, the substituted C_1-C_{60} alkoxy group, the substituted C_1-C_{60} alkylthio group, the substituted C_3-C_{10} cycloalkyl group, the substituted C_1-C_{10} heterocycloalkyl group, the substituted C_3-C_{10} cycloalkenyl group, the substituted C_2-C_{10} heterocycloalkenyl group, the substituted C_6-C_{60} aryl group, the substituted C_6-C_{60} aryloxy group, the substituted C_6-C_{60} arylthio group, the substituted C_1-C_{60} heteroaryl group, the substituted monovalent non-aromatic condensed polycyclic group, and the substituted monovalent non-aromatic condensed heteropolycyclic group is:

deuterium, -F, -Cl, -Br, -I, -CD_3, -CD_2H, -CDH_2, -CF_3, -CF_2H, -CFH_2, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, or a C_1-C_{60} alkylthio group;

a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, or a C_1-C_{60} alkylthio group, each substituted with deuterium, -F, -Cl, -Br, -I, -CD_3, -CD_2H, -CDH_2, -CF_3, -CF_2H, -CFH_2, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, -$N(Q_{11})(Q_{12})$, - $Si(Q_{13})(Q_{14})(Q_{15})$, -$Ge(Q_{13})(Q_{14})(Q_{15})$, -$B(Q_{16})(Q_{17})$, -$P(=O)(Q_{13})(Q_{19})$, -$P(Q_{13})(Q_{19})$, or any combination thereof;

a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, or a monovalent non-aromatic condensed heteropolycyclic group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, -CD_3, -CD_2H, -CDH_2, -CF_3, -CF_2H, -CFH_2, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, a C_1-C_{60} alkylthio group, a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, -$N(Q_{21})(Q_{22})$, -$Si(Q_{23})(Q_{24})(Q_{25})$, -$Ge(Q_{23})(Q_{24})(Q_{25})$, - B(Q26)(Q27), -$P(=O)(Q_{28})(Q_{29})$, -$P(Q_{23})(Q_{29})$, or any combination thereof;

-$N(Q_{31})(Q_{32})$, -$Si(Q_{33})(Q_{34})(Q_{35})$, -$Ge(Q_{33})(Q_{34})(Q_{35})$, -$B(Q_{36})(Q_{37})$, - $P(=O)(Q_{38})(Q_{39})$, or -$P(Q_{33})(Q_{39})$; or

any combination thereof, and

Q_1 to Q_9, Q_{11} to Q_{19}, Q_{21} to Q_{29}, and Q_{31} to Q_{39} are each independently: hydrogen; deuterium; -F; -Cl; -Br; -I; a hydroxyl group; a cyano group; a nitro group; an amino group; an amidino group; a hydrazine group; a hydrazone group; a carboxylic acid group or a salt thereof; a sulfonic acid group or a salt thereof; a phosphoric acid group or a salt thereof; a C_1-C_{60} alkyl group unsubstituted or substituted with deuterium, a C_1-C_{60} alkyl group, a C_6-C_{60} aryl group, or any combination thereof; a C_2-C_{60} alkenyl group; a C_2-C_{60} alkynyl group; a C_1-C_{60} alkoxy group; a C_1-C_{60} alkylthio group; a C_3-C_{10} cycloalkyl group; a C_1-C_{10} heterocycloalkyl group; a C_3-C_{10} cycloalkenyl group; a C_2-C_{10} heterocycloalkenyl group; a C_6-C_{60} aryl group unsubstituted or substituted with deuterium, a C_1-C_{60} alkyl group, a C_6-C_{60} aryl group, or any combination thereof; a C_6-C_{60} aryloxy group; a C_6-C_{60} arylthio group; a C_1-C_{60} heteroaryl group; a monovalent non-aromatic condensed polycyclic group; or a monovalent non-aromatic condensed heteropolycyclic group.

[0008] According to an aspect of another embodiment, an electronic apparatus includes the light-emitting device.

BRIEF DESCRIPTION OF THE DRAWING

[0009] The above and other aspects, features, and advantages of certain embodiments of the disclosure will be more apparent from the following description taken in conjunction with FIGURE which shows a schematic cross-sectional view of a light-emitting device according to an embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0010] Reference will now be made in detail to embodiments, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. In this regard, the present embodiments may have different forms and should not be construed as being limited to the descriptions set forth herein. Accordingly, the embodiments are merely described below, by referring to the figures, to explain aspects. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. Expressions such as "at least one of," when preceding a list of elements, modify the entire list of elements and do not modify the individual elements of the list.

[0011] It will be understood that when an element is referred to as being "on" another element, it can be directly on the other element or intervening elements may be present therebetween. In contrast, when an element is referred to as being "directly on" another element, there are no intervening elements present

[0012] It will be understood that, although the terms "first," "second," "third" etc. may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms are only used to distinguish one element, component, region, layer or section from another element, component, region, layer or section. Thus, "a first element," "component," "region," "layer" or "section" discussed below could be termed a second element, component, region, layer or section without departing from the teachings herein.

[0013] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting. As used herein, "a," "an," "the," and "at least one" do not denote a limitation of quantity, and are intended to cover both the singular and plural, unless the context clearly indicates otherwise. For example, "an element" has the same meaning as "at least one element," unless the context clearly indicates otherwise.

[0014] "Or" means "and/or." As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. It will be further understood that the terms "comprises" and/or "comprising," or "includes" and/or "including" when used in this specification, specify the presence of stated features, regions, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, regions, integers, steps, operations, elements, components, and/or groups thereof.

[0015] Furthermore, relative terms, such as "lower" or "bottom" and "upper" or "top," may be used herein to describe one element's relationship to another element as illustrated in the Figures. It will be understood that relative terms are intended to encompass different orientations of the device in addition to the orientation depicted in the Figures. For example, if the device in one of the figures is turned over, elements described as being on the "lower" side of other elements would then be oriented on "upper" sides of the other elements. The exemplary term "lower," can therefore, encompasses both an orientation of "lower" and "upper," depending on the particular orientation of the figure. Similarly, if the device in one of the figures is turned over, elements described as "below" or "beneath" other elements would then be oriented "above" the other elements. The exemplary terms "below" or "beneath" can, therefore, encompass both an orientation of above and below.

[0016] "About" or "approximately" as used herein is inclusive of the stated value and means within an acceptable range of deviation for the particular value as determined by one of ordinary skill in the art, considering the measurement

in question and the error associated with measurement of the particular quantity (i.e., the limitations of the measurement system). For example, "about" can mean within one or more standard deviations, or within ± 30%, 20%, 10% or 5% of the stated value.

[0017] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and the present disclosure, and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0018] Exemplary embodiments are described herein with reference to cross section illustrations that are schematic illustrations of idealized embodiments. As such, variations from the shapes of the illustrations as a result, for example, of manufacturing techniques and/or tolerances, are to be expected. Thus, embodiments described herein should not be construed as limited to the particular shapes of regions as illustrated herein but are to include deviations in shapes that result, for example, from manufacturing. For example, a region illustrated or described as flat may, typically, have rough and/or nonlinear features. Moreover, sharp angles that are illustrated may be rounded. Thus, the regions illustrated in the figures are schematic in nature and their shapes are not intended to illustrate the precise shape of a region and are not intended to limit the scope of the present claims.

[0019] A light-emitting device according to an embodiment of the present disclosure may include: a first electrode; a second electrode; an emission layer arranged between the first electrode and the second electrode; and a buffer layer arranged between the first electrode and the emission layer.

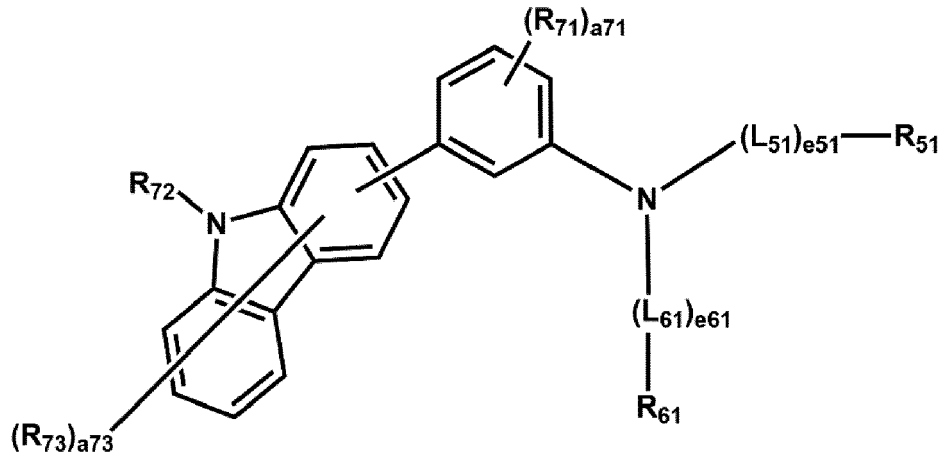
[0020] In an embodiment, the first electrode may be an anode (a hole injection electrode), and the second electrode may be a cathode (an electron injection electrode).

[0021] The buffer layer may be in direct contact with the emission layer. For example, an additional layer may not be arranged between the buffer layer and the emission layer.

[0022] The emission layer may include a first compound represented by Formula 1, and the buffer layer may include a second compound represented by Formula 5:

Formula 1 $M(L_1)_{n1}(L_2)_{n2}$

Formula 5



wherein, in Formula 1, M may be a transition metal.

[0023] For example, M may be a Period 1 transition metal, a Period 2 transition metal, or a Period 3 transition metal.

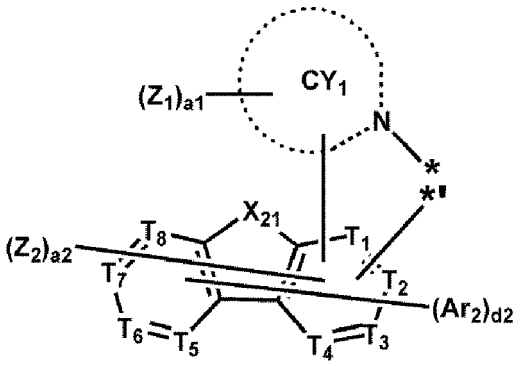
[0024] In one or more embodiments, M may be iridium (Ir), platinum (Pt), osmium (Os), titanium (Ti), zirconium (Zr), hafnium (Hf), europium (Eu), terbium (Tb), thulium (Tm), or rhodium (Rh).

[0025] In an embodiment, M may be Ir, Pt, Os, or Rh.

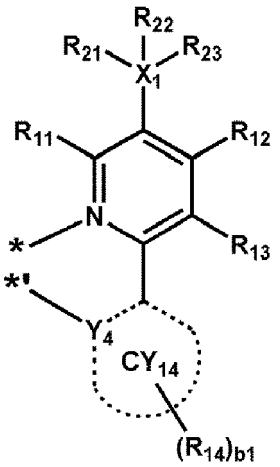
[0026] L_1 in Formula 1 may be a ligand represented by Formula 2A, and n1 in Formula 1 indicates the number of L_1(s) in Formula 1 and may be 1 or 2. When n1 is 2, two of L_1(s) may be identical to or different from each other.

[0027] L_2 in Formula 1 may be a ligand represented by Formula 2B, and n2 in Formula 1 indicates the number of L_2(s) in Formula 1 and may be 1 or 2. When n2 is 2, two of L_2(s) may be identical to or different from each other.

Formula 2A



Formula 2B



[0028] Formulae 2A and 2B will be described in detail later.

[0029] The sum of n1 and n2 in Formula 1 may be 2 or 3.

[0030] L_1 and L_2 in Formula 1 may be different from each other. That is, the first compound represented by Formula 1 may be a heteroleptic complex.

[0031] In an embodiment, M may be Ir, and the sum of n1 and n2 may be 3; or M may be Pt, and the sum of n1 and n2 may be 2.

[0032] In one or more embodiments, M may be Ir, and i) n1 may be 1 and n2 may be 2; or ii) n1 may be 2 and n2 may be 1.

[0033] Y_4 in Formula 2B may be C or N.

[0034] For example, Y_4 in Formula 2B may be C.

[0035] X_1 in Formula 2B may be Si or Ge.

[0036] In an embodiment, X_1 in Formula 2B may be Si.

[0037] In one or more embodiments, in Formula 2B, X_1 may be Si, and R_{12} may not be hydrogen, or R_{12} may not be hydrogen or a methyl group.

[0038] In one or more embodiments, in Formula 2B, X_1 may be Si, and R_{12} may be - CD_3, -CD_2H, or -CDH_2.

[0039] In one or more embodiments, in Formula 2B, X_1 may be Si, and the number of carbon atoms included in R_{12} may be 2 or more.

[0040] In one or more embodiments, X_1 in Formula 2B may be Ge.

[0041] In one or more embodiments, in Formula 2B, X_1 may be Ge, and R_{12} may not be hydrogen, or R_{12} may not be hydrogen or a methyl group.

[0042] In one or more embodiments, in Formula 2B, X_1 may be Ge, and R_{12} may be - CD_3, -CD_2H, or -CDH_2.

[0043] In one or more embodiments, in Formula 2B, X_1 may be Ge, and the number of carbon atoms included in R_{12} may be 2 or more.

[0044] X_{21} in Formula 2A may be O, S, S(=O), N(Z_{29}), C(Z_{29})(Z_{30}), or Si(Z_{29})(Z_{30}). Z_{29} and Z_{30} are respectively the same as those described herein.

[0045] For example, X_{21} in Formula 2A may be O or S.

[0046] In Formula 2A, T_1 to T_4 may each independently be C, N, a carbon atom bonded to ring CY_1, or a carbon atom bonded to M in Formula 1, one of T_1 to T_4 may be a carbon atom bonded to M in Formula 1, one of the remaining T_1 to T_4 that are not bonded to M may be a carbon atom bonded to ring CY_1, and T_5 to T_8 may each independently be C or N.

[0047] In an embodiment, the number of N(s) among T_1 to T_8 in Formula 2A may be 0, 1, 2, or 3.

[0048] In one or more embodiments, the number of N(s) among T_1 to T_8 in Formula 2A may be 0.

[0049] In one or more embodiments, T_8 in Formula 2A may be N.

[0050] Ring CY_1 and ring CY_{14} in Formulae 2A and 2B may each independently be a C_5-C_{30} carbocyclic group or a C_1-C_{30} heterocyclic group, Ar_2 in Formula 2A may be ring CY_2 unsubstituted or substituted with at least one Z_0, and ring CY_2 may be an unsaturated C_5-C_{30} carbocyclic group or an unsaturated C_1-C_{30} heterocyclic group. Z_0 is the same as Z_0 described herein.

[0051] In an embodiment, ring CY_1 and ring CY_{14} in Formulae 2A and 2B may each independently be a cyclopentane group, a cyclohexane group, a cycloheptane group, a cyclopentene group, a cyclohexene group, a cycloheptene group, a benzene group, a naphthalene group, an anthracene group, a phenanthrene group, a triphenylene group, a pyrene group, a chrysene group, a cyclopentadiene group, a 1,2,3,4-tetrahydronaphthalene group, a thiophene group, a furan group, a borole group, a phosphole group, a silole group, a germole group, a selenophene group, an indole group, a

benzoborole group, a benzophosphole group, an indene group, a benzosilole group, a benzogermole group, a benzothiophene group, a benzoselenophene group, a benzofuran group, a carbazole group, a dibenzoborole group, a dibenzophosphole group, a fluorene group, a dibenzosilole group, a dibenzogermole group, a dibenzothiophene group, a dibenzoselenophene group, a dibenzofuran group, a dibenzothiophene 5-oxide group, a 9H-fluoren-9-one group, a dibenzothiophene 5,5-dioxide group, an azaindole group, an azabenzoborole group, an azabenzophosphole group, an azaindene group, an azabenzosilole group, an azabenzogermole group, an azabenzothiophene group, an azabenzoselenophene group, an azabenzofuran group, an azacarbazole group, an azadibenzoborole group, an azadibenzophosphole group, an azafluorene group, an azadibenzosilole group, an azadibenzogermole group, an azadibenzothiophene group, an azadibenzoselenophene group, an azadibenzofuran group, an azadibenzothiophene 5-oxide group, an aza-9H-fluoren-9-one group, an azadibenzothiophene 5,5-dioxide group, a pyridine group, a pyrimidine group, a pyrazine group, a pyridazine group, a triazine group, a quinoline group, an isoquinoline group, a quinoxaline group, a quinazoline group, a phenanthroline group, a pyrrole group, a pyrazole group, an imidazole group, a triazole group, an oxazole group, an isoxazole group, a thiazole group, an isothiazole group, an oxadiazole group, a thiadiazole group, a benzopyrazole group, a benzimidazole group, a benzoxazole group, a benzothiazole group, a benzoxadiazole group, a benzothiadiazole group, a 5,6,7,8-tetrahydroisoquinoline group, a 5,6,7,8-tetrahydroquinoline group, an adamantane group, a norbornane group, or a norbornene group.

[0052] In one or more embodiments, ring CY_1 and ring CY_{14} may each independently be a benzene group, a naphthalene group, a 1 ,2,3,4-tetrahydronaphthalene group, a phenanthrene group, a pyridine group, a pyrimidine group, a pyrazine group, a triazine group, a benzofuran group, a benzothiophene group, a fluorene group, a carbazole group, a dibenzofuran group, a dibenzothiophene group, a dibenzosilole group, an azafluorene group, an azacarbazole group, an azadibenzofuran group, an azadibenzothiophene group, or an azadibenzosilole group.

[0053] In one or more embodiments, ring CY_1 in Formula 2A may be a pyridine group, a 5,6,7,8-tetrahydroisoquinoline group, or a 5,6,7,8-tetrahydroquinoline group.

[0054] In one or more embodiments, ring CY_{14} in Formula 2B may be a benzene group, a naphthalene group, a 1,2,3,4-tetrahydronaphthalene group, a phenanthrene group, a dibenzothiophene group, a dibenzofuran group, or a pyridine group.

[0055] In one or more embodiments, ring CY_2 may be a benzene group, a naphthalene group, an anthracene group, a phenanthrene group, a triphenylene group, a pyrene group, a chrysene group, a cyclopentadiene group, a 1,2,3,4-tetrahydronaphthalene group, a thiophene group, a furan group, a borole group, a phosphole group, a silole group, a germole group, a selenophene group, an indole group, a benzoborole group, a benzophosphole group, an indene group, a benzosilole group, a benzogermole group, a benzothiophene group, a benzoselenophene group, a benzofuran group, a carbazole group, a dibenzoborole group, a dibenzophosphole group, a fluorene group, a dibenzosilole group, a dibenzogermole group, a dibenzothiophene group, a dibenzoselenophene group, a dibenzofuran group, a dibenzothiophene 5-oxide group, a 9H-fluoren-9-one group, a dibenzothiophene 5,5-dioxide group, an azaindole group, an azabenzoborole group, an azabenzophosphole group, an azaindene group, an azabenzosilole group, an azabenzogermole group, an azabenzothiophene group, an azabenzoselenophene group, an azabenzofuran group, an azacarbazole group, an azadibenzoborole group, an azadibenzophosphole group, an azafluorene group, an azadibenzosilole group, an azadibenzogermole group, an azadibenzothiophene group, an azadibenzoselenophene group, an azadibenzofuran group, an azadibenzothiophene 5-oxide group, an aza-9H-fluoren-9-one group, an azadibenzothiophene 5,5-dioxide group, a pyridine group, a pyrimidine group, a pyrazine group, a pyridazine group, a triazine group, a quinoline group, an isoquinoline group, a quinoxaline group, a quinazoline group, a phenanthroline group, a pyrrole group, a pyrazole group, an imidazole group, a triazole group, an oxazole group, an isoxazole group, a thiazole group, an isothiazole group, an oxadiazole group, a thiadiazole group, a benzopyrazole group, a benzimidazole group, a benzoxazole group, a benzothiazole group, a benzoxadiazole group, a benzothiadiazole group, a 5,6,7,8-tetrahydroisoquinoline group, or a 5,6,7,8-tetrahydroquinoline group.

[0056] L_{51} and L_{61} in Formula 5 may each independently be a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a}.

[0057] For example, L_{51} and L_{61} in Formula 5 may each independently be a benzene group, a naphthalene group, an anthracene group, a phenanthrene group, a triphenylene group, a pyrene group, a chrysene group, a thiophene group, a furan group, a borole group, a silole group, an indole group, a benzoborole group, an indene group, a benzosilole group, a benzothiophene group, a benzofuran group, a carbazole group, a dibenzoborole group, a fluorene group, a dibenzosilole group, a dibenzothiophene group, a dibenzofuran group, a pyridine group, a naphthobenzofuran group, a naphthobenzothiophene group, a dinaphthofuran group, a dinaphthothiophene group, a spirobifluorene group, a benzofluorene group, or a dibenzofluorene group, each unsubstituted or substituted with at least one R_{10a}.

[0058] R_{21} to R_{23} in Formula 2B may each independently be a C_1-C_{60} alkyl group or a C_6-C_{60} aryl group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{20}

alkyl group, a C_3-C_{10} cycloalkyl group, a phenyl group, or any combination thereof.

[0059] For example, R_{21} to R_{23} in Formula 2B may each independently be a methyl group, an ethyl group, an n-propyl group, an isopropyl group, an n-butyl group, a sec-butyl group, an isobutyl group, a tert-butyl group, an n-pentyl group, a tert-pentyl group, a neopentyl group, an isopentyl group, a sec-pentyl group, a 3-pentyl group, a sec-isopentyl group, an n-hexyl group, an isohexyl group, a sec-hexyl group, a tert-hexyl group, an n-heptyl group, an isoheptyl group, a sec-heptyl group, a tert-heptyl group, an n-octyl group, an isooctyl group, a sec-octyl group, a tert-octyl group, an n-nonyl group, an isononyl group, a sec-nonyl group, a tert-nonyl group, an n-decyl group, an isodecyl group, a sec-decyl group, a tert-decyl group, a phenyl group, a biphenyl group, or a naphthyl group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{20} alkyl group, a C_3-C_{10} cycloalkyl group, a phenyl group, or any combination thereof.

[0060] In an embodiment, R_{21} to R_{23} in Formula 2B may each independently be $-CH_3$, $-CH_2CH_3$, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CH_2CD_3$, or $-CD_2CH_3$.

[0061] In one or more embodiments, R_{21} to R_{23} in Formula 2B may be identical to each other.

[0062] In one or more embodiments, two or more of R_{21} to R_{23} in Formula 2B may be different from each other.

[0063] Z_0, Z_1, Z_2, Z_{29}, Z_{30}, R_{11} to R_{14}, R_{51}, R_{61}, and R_{71} to R_{73} in Formulae 2A, 2B, and 5 may each independently be hydrogen, deuterium, -F, -Cl, -Br, -I, $-SF_5$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a substituted or unsubstituted C_1-C_{60} alkyl group, a substituted or unsubstituted C_2-C_{60} alkenyl group, a substituted or unsubstituted C_2-C_{60} alkynyl group, a substituted or unsubstituted C_1-C_{60} alkoxy group, a substituted or unsubstituted C_1-C_{60} alkylthio group, a substituted or unsubstituted C_3-C_{10} cycloalkyl group, a substituted or unsubstituted C_1-C_{10} heterocycloalkyl group, a substituted or unsubstituted C_3-C_{10} cycloalkenyl group, a substituted or unsubstituted C_2-C_{10} heterocycloalkenyl group, a substituted or unsubstituted C_6-C_{60} aryl group, a substituted or unsubstituted C_6-C_{60} aryloxy group, a substituted or unsubstituted C_6-C_{60} arylthio group, a substituted or unsubstituted C_1-C_{60} heteroaryl group, a substituted or unsubstituted monovalent non-aromatic condensed polycyclic group, a substituted or unsubstituted monovalent non-aromatic condensed heteropolycyclic group, $-N(Q_1)(Q_2)$, $-Si(Q_3)(Q_4)(Q_5)$, $-Ge(Q_3)(Q_4)(Q_5)$, $-B(Q_6)(Q_7)$, $-P(=O)(Q_8)(Q_9)$, or $-P(Q_8)(Q_9)$. Q_1 to Q_9 are respectively the same as those described herein.

[0064] d2, e51, and e61 in Formulae 2A and 5 indicate the numbers of Ar_2(s), L_{51}(s), and L_{61}(s), respectively, and may each independently be an integer from 1 to 6. When d2 is 2 or more, two or more of Ar_2(s) may be identical to or different from each other, when e51 is 2 or more, two or more of L_{51}(s) may be identical to or different from each other, and when e61 is 2 or more, two or more of L_{61}(s) may be identical to or different from each other. For example, d2, e51, and e61 may each independently be 1, 2, or 3. In an embodiment, d2, e51, and e61 may each independently be 1 or 2.

[0065] a1 and b1 in Formulae 2A and 2B indicate the numbers of Z_1(s) and R_{14}(s), respectively, and may each independently be an integer from 0 to 20. When a1 is 2 or more, two or more of Z_1(s) may be identical to or different from each other, and when b1 is 2 or more, two or more of R_{14}(s) may be identical to or different from each other. For example, a1 and b1 may each independently be an integer from 0 to 10.

[0066] a2 in Formula 2A indicates the number of Z_2(s), and may be an integer from 0 to 5. When a2 is 2 or more, two or more of Z_2(s) may be identical to or different from each other. For example, a2 may be 0, 1, 2, or 3.

[0067] a73 in Formula 5 indicates the numbers of R_{73}(s), and may be an integer from 0 to 7. When a73 is 2 or more, two or more of R_{73}(s) may be identical to or different from each other. a73 may be 0, 1, or 2.

[0068] a71 in Formula 5 indicates the number of R_{71}(s), and may be an integer from 0 to 4. When a71 is 2 or more, two or more of R_{71}(s) may be identical to or different from each other.

[0069] In an embodiment, Z_1 in Formula 2A and R_{11} to R_{13} in Formula 2B may each independently be:

hydrogen, deuterium, -F, or a cyano group;

a C_1-C_{20} alkyl group unsubstituted or substituted with deuterium, -F, a cyano group, a C_3-C_{10} cycloalkyl group, a deuterated C_3-C_{10} cycloalkyl group, a fluorinated C_3-C_{10} cycloalkyl group, a (C_1-C_{20} alkyl)C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a deuterated C_1-C_{10} heterocycloalkyl group, a fluorinated C_1-C_{10} heterocycloalkyl group, a (C_1-C_{20} alkyl)C_1-C_{10} heterocycloalkyl group, a phenyl group, a deuterated phenyl group, a fluorinated phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a deuterated biphenyl group, a fluorinated biphenyl group, a (C_1-C_{20} alkyl)biphenyl group, or any combination thereof; or

a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a phenyl group, or a biphenyl group, each unsubstituted or substituted with deuterium, -F, a cyano group, a C_1-C_{20} alkyl group, a deuterated C_1-C_{20} alkyl group, a fluorinated C_1-C_{20} alkyl group, a C_1-C_{20} alkoxy group, a deuterated C_1-C_{20} alkoxy group, a fluorinated C_1-C_{20} alkoxy group, a C_3-C_{10} cycloalkyl group, a deuterated C_3-C_{10} cycloalkyl group, a fluorinated C_3-C_{10} cycloalkyl group, a (C_1-C_{20} alkyl)C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a deuterated C_1-C_{10} heterocycloalkyl group, a fluor-

inated C_1-C_{10} heterocycloalkyl group, a (C_1-C_{20} alkyl)C_1-C_{10} heterocycloalkyl group, a phenyl group, a deuterated phenyl group, a fluorinated phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a deuterated biphenyl group, a fluorinated biphenyl group, a (C_1-C_{20} alkyl)biphenyl group, or any combination thereof.

[0070] In one or more embodiments, Z_1 in Formula 2A and R_{11} to R_{13} in Formula 2B may each independently be:

hydrogen or deuterium;
a C_1-C_{20} alkyl group unsubstituted or substituted with deuterium, a C_3-C_{10} cycloalkyl group, a deuterated C_3-C_{10} cycloalkyl group, a (C_1-C_{20} alkyl)C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a deuterated C_1-C_{10} heterocycloalkyl group, a (C_1-C_{20} alkyl)C_1-C_{10} heterocycloalkyl group, a phenyl group, a deuterated phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a deuterated biphenyl group, a (C_1-C_{20} alkyl)biphenyl group, or any combination thereof; or
a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a phenyl group, or a biphenyl group, each unsubstituted or substituted with deuterium, -F, a cyano group, a C_1-C_{20} alkyl group, a deuterated C_1-C_{20} alkyl group, a C_1-C_{20} alkoxy group, a deuterated C_1-C_{20} alkoxy group, a C_3-C_{10} cycloalkyl group, a deuterated C_3-C_{10} cycloalkyl group, a (C_1-C_{20} alkyl)C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a deuterated C_1-C_{10} heterocycloalkyl group, a (C_1-C_{20} alkyl)C_1-C_{10} heterocycloalkyl group, a phenyl group, a deuterated phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a deuterated biphenyl group, a (C_1-C_{20} alkyl)biphenyl group, or any combination thereof.

[0071] In one or more embodiments, Z_0 and Z_2 in Formula 2A and R_{14} in Formula 2B may each independently be:

hydrogen, deuterium, -F, or a cyano group;
a C_1-C_{20} alkyl group unsubstituted or substituted with deuterium, -F, a cyano group, a C_3-C_{10} cycloalkyl group, a deuterated C_3-C_{10} cycloalkyl group, a fluorinated C_3-C_{10} cycloalkyl group, a (C_1-C_{20} alkyl)C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a deuterated C_1-C_{10} heterocycloalkyl group, a fluorinated C_1-C_{10} heterocycloalkyl group, a (C_1-C_{20} alkyl)C_1-C_{10} heterocycloalkyl group, a phenyl group, a deuterated phenyl group, a fluorinated phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a deuterated biphenyl group, a fluorinated biphenyl group, a (C_1-C_{20} alkyl)biphenyl group, or any combination thereof;
a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a phenyl group, or a biphenyl group, each unsubstituted or substituted with deuterium, -F, a cyano group, a C_1-C_{20} alkyl group, a deuterated C_1-C_{20} alkyl group, a fluorinated C_1-C_{20} alkyl group, a C_1-C_{20} alkoxy group, a deuterated C_1-C_{20} alkoxy group, a fluorinated C_1-C_{20} alkoxy group, a C_3-C_{10} cycloalkyl group, a deuterated C_3-C_{10} cycloalkyl group, a fluorinated C_3-C_{10} cycloalkyl group, a (C_1-C_{20} alkyl)C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a deuterated C_1-C_{10} heterocycloalkyl group, a fluorinated C_1-C_{10} heterocycloalkyl group, a (C_1-C_{20} alkyl)C_1-C_{10} heterocycloalkyl group, a phenyl group, a deuterated phenyl group, a fluorinated phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a deuterated biphenyl group, a fluorinated biphenyl group, a (C_1-C_{20} alkyl)biphenyl group, or any combination thereof; or
$-Si(Q_3)(Q_4)(Q_5)$ or $-Ge(Q_3)(Q_4)(Q_5)$.

[0072] In one or more embodiments, R_{12} in Formula 2B may be hydrogen or a methyl group.

[0073] In one or more embodiments, R_{12} in Formula 2B may be a deuterated methyl group (for example, $-CD_3$, $-CD_2H$, or $-CDH_2$).

[0074] In one or more embodiments, the number of carbon atoms included in R_{12} in Formula 2B may be 2 or more.

[0075] In one or more embodiments, R_{12} in Formula 2B may be:

a C_2-C_{20} alkyl group or a C_2-C_{20} alkoxy group;
a methyl group or a methoxy group, each substituted with a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{14} aryl group, a C_1-C_{14} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, or any combination thereof;
a C_2-C_{20} alkyl group or a C_2-C_{20} alkoxy group, each substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{10} alkyl group, a C_1-C_{10} alkoxy group, a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{14} aryl group, a C_1-C_{14} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, or any combination thereof; or
a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{14} aryl group, a C_1-C_{14} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, or

a monovalent non-aromatic condensed heteropolycyclic group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{20} alkyl group, a C_1-C_{20} alkoxy group, a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{14} aryl group, a C_1-C_{14} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, or any combination thereof.

[0076] In one or more embodiments, R_{12} in Formula 2B may be:

a methyl group or a methoxy group, each substituted with a cyclopentyl group, a cyclohexyl group, a cycloheptyl group, a cyclooctyl group, an adamantanyl group, a norbornanyl group, a norbornenyl group, a cyclopentenyl group, a cyclohexenyl group, a cycloheptenyl group, a bicyclo[1.1.1]pentyl group, a bicyclo[2.1.1]hexyl group, a bicyclo[2.2.2]octyl group, a (C_1-C_{20} alkyl)cyclopentyl group, a (C_1-C_{20} alkyl)cyclohexyl group, a (C_1-C_{20} alkyl)cycloheptyl group, a (C_1-C_{20} alkyl)cyclooctyl group, a (C_1-C_{20} alkyl)adamantanyl group, a (C_1-C_{20} alkyl)norbornanyl group, a (C_1-C_{20} alkyl)norbornenyl group, a (C_1-C_{20} alkyl)cyclopentenyl group, a (C_1-C_{20} alkyl)cyclohexenyl group, a (C_1-C_{20} alkyl)cycloheptenyl group, a (C_1-C_{20} alkyl)bicyclo[1.1.1]pentyl group, a (C_1-C_{20} alkyl)bicyclo[2.1.1]hexyl group, a (C_1-C_{20} alkyl)bicyclo[2.2.2]octyl group, a phenyl group, a (C_1-C_{20} alkyl)phenyl group, a naphthyl group, a pyridinyl group, a pyrimidinyl group, or any combination thereof;

a methyl group or a methoxy group, each substituted with i) a cyclopentyl group, a cyclohexyl group, a cycloheptyl group, a cyclooctyl group, an adamantanyl group, a norbornanyl group, a norbornenyl group, a cyclopentenyl group, a cyclohexenyl group, a cycloheptenyl group, a bicyclo[1.1.1]pentyl group, a bicyclo[2.1.1]hexyl group, a bicyclo[2.2.2]octyl group, a (C_1-C_{20} alkyl)cyclopentyl group, a (C_1-C_{20} alkyl)cyclohexyl group, a (C_1-C_{20} alkyl)cycloheptyl group, a (C_1-C_{20} alkyl)cyclooctyl group, a (C_1-C_{20} alkyl)adamantanyl group, a (C_1-C_{20} alkyl)norbornanyl group, a (C_1-C_{20} alkyl)norbornenyl group, a (C_1-C_{20} alkyl)cyclopentenyl group, a (C_1-C_{20} alkyl)cyclohexenyl group, a (C_1-C_{20} alkyl)cycloheptenyl group, a (C_1-C_{20} alkyl)bicyclo[1.1.1]pentyl group, a (C_1-C_{20} alkyl)bicyclo[2.1.1]hexyl group, a (C_1-C_{20} alkyl)bicyclo[2.2.2]octyl group, a phenyl group, a (C_1-C_{20} alkyl)phenyl group, a naphthyl group, a pyridinyl group, a pyrimidinyl group, or any combination thereof, and ii) at least one deuterium atom;

a C_2-C_{20} alkyl group or a C_2-C_{20} alkoxy group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, - CFH_2, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{20} alkyl group, a cyclopentyl group, a cyclohexyl group, a cycloheptyl group, a cyclooctyl group, an adamantanyl group, a norbornanyl group, a norbornenyl group, a cyclopentenyl group, a cyclohexenyl group, a cycloheptenyl group, a bicyclo[1.1.1]pentyl group, a bicyclo[2.1.1]hexyl group, a bicyclo[2.2.2]octyl group, a (C_1-C_{20} alkyl)cyclopentyl group, a (C_1-C_{20} alkyl)cyclohexyl group, a (C_1-C_{20} alkyl)cycloheptyl group, a (C_1-C_{20} alkyl)cyclooctyl group, a (C_1-C_{20} alkyl)adamantanyl group, a (C_1-C_{20} alkyl)norbornanyl group, a (C_1-C_{20} alkyl)norbornenyl group, a (C_1-C_{20} alkyl)cyclopentenyl group, a (C_1-C_{20} alkyl)cyclohexenyl group, a (C_1-C_{20} alkyl)cycloheptenyl group, a (C_1-C_{20} alkyl)bicyclo[1.1.1]pentyl group, a (C_1-C_{20} alkyl)bicyclo[2.1.1]hexyl group, a (C_1-C_{20} alkyl)bicyclo[2.2.2]octyl group, a phenyl group, a (C_1-C_{20} alkyl)phenyl group, a naphthyl group, a pyridinyl group, a pyrimidinyl group, or any combination thereof; or

a cyclopentyl group, a cyclohexyl group, a cycloheptyl group, a cyclooctyl group, an adamantanyl group, a norbornanyl group, a norbornenyl group, a cyclopentenyl group, a cyclohexenyl group, a cycloheptenyl group, a bicyclo[1.1.1]pentyl group, a bicyclo[2.1.1]hexyl group, a bicyclo[2.2.2]octyl group, a phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a terphenyl group, a naphthyl group, a fluorenyl group, a phenanthrenyl group, an anthracenyl group, a fluoranthenyl group, a triphenylenyl group, a pyrenyl group, a chrysenyl group, a pyrrolyl group, a thiophenyl group, a furanyl group, an imidazolyl group, a pyrazolyl group, a thiazolyl group, an isothiazolyl group, an oxazolyl group, an isoxazolyl group, a pyridinyl group, a pyrazinyl group, a pyrimidinyl group, a pyridazinyl group, an isoindolyl group, an indolyl group, an indazolyl group, a purinyl group, a quinolinyl group, an isoquinolinyl group, a benzoquinolinyl group, a quinoxalinyl group, a quinazolinyl group, a cinnolinyl group, a carbazolyl group, a phenanthrolinyl group, a benzoimidazolyl group, a benzofuranyl group, a benzothiophenyl group, a benzoisothiazolyl group, a benzoxazolyl group, a benzoisoxazolyl group, a triazolyl group, a tetrazolyl group, an oxadiazolyl group, a triazinyl group, a dibenzofuranyl group, a dibenzothiophenyl group, a benzocarbazolyl group, a dibenzocarbazolyl group, an imidazopyridinyl group, an imidazopyrimidinyl group, an azacarbazolyl group, an azadibenzofuranyl group, or an azadibenzothiophenyl group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{20} alkyl group, a C_1-C_{20} alkoxy group, a cyclopentyl group, a cyclohexyl group, a cycloheptyl group, a cyclooctyl group, an adamantanyl group, a norbornanyl group, a norbornenyl group, a cy-

clopentenyl group, a cyclohexenyl group, a cycloheptenyl group, a bicyclo[1.1.1]pentyl group, a bicyclo[2.1.1]hexyl group, a bicyclo[2.2.2]octyl group, a (C_1-C_{20} alkyl)cyclopentyl group, a (C_1-C_{20} alkyl)cyclohexyl group, a (C_1-C_{20} alkyl)cycloheptyl group, a (C_1-C_{20} alkyl)cyclooctyl group, a (C_1-C_{20} alkyl)adamantanyl group, a (C_1-C_{20} alkyl)norbornanyl group, a (C_1-C_{20} alkyl)norbornenyl group, a (C_1-C_{20} alkyl)cyclopentenyl group, a (C_1-C_{20} alkyl)cyclohexenyl group, a (C_1-C_{20} alkyl)cycloheptenyl group, a (C_1-C_{20} alkyl)bicyclo[1.1.1]pentyl group, a (C_1-C_{20} alkyl)bicyclo[2.1.1]hexyl group, a (C_1-C_{20} alkyl)bicyclo[2.2.2]octyl group, a phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a terphenyl group, a naphthyl group, a fluorenyl group, a phenanthrenyl group, an anthracenyl group, a fluoranthenyl group, a triphenylenyl group, a pyrenyl group, a chrysenyl group, a pyrrolyl group, a thiophenyl group, a furanyl group, an imidazolyl group, a pyrazolyl group, a thiazolyl group, an isothiazolyl group, an oxazolyl group, an isoxazolyl group, a pyridinyl group, a pyrazinyl group, a pyrimidinyl group, a pyridazinyl group, an isoindolyl group, an indolyl group, an indazolyl group, a purinyl group, a quinolinyl group, an isoquinolinyl group, a benzoquinolinyl group, a quinoxalinyl group, a quinazolinyl group, a cinnolinyl group, a carbazolyl group, a phenanthrolinyl group, a benzoimidazolyl group, a benzofuranyl group, a benzothiophenyl group, a benzoisothiazolyl group, a benzoxazolyl group, a benzoisoxazolyl group, a triazolyl group, a tetrazolyl group, an oxadiazolyl group, a triazinyl group, a dibenzofuranyl group, a dibenzothiophenyl group, a benzocarbazolyl group, a dibenzocarbazolyl group, an imidazopyridinyl group, an imidazopyrimidinyl group, an azacarbazolyl group, an azadibenzofuranyl group, an azadibenzothiophenyl group, or any combination thereof.

[0077] In one or more embodiments, R_{51}, R_{61}, R_{71}, and R_{73} in Formula 5 may each independently be:

hydrogen, deuterium, -F, or a cyano group;
a C_1-C_{20} alkyl group unsubstituted or substituted with deuterium, -F, a cyano group, or any combination thereof; or a phenyl group, a biphenyl group, a dibenzofuranyl group, or a dibenzothiophenyl group, each unsubstituted or substituted with deuterium, - F, a cyano group, a C_1-C_{20} alkyl group, a deuterated C_1-C_{20} alkyl group, a fluorinated C_1-C_{20} alkyl group, a phenyl group, a deuterated phenyl group, a fluorinated phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a deuterated biphenyl group, a fluorinated biphenyl group, a (C_1-C_{20} alkyl)biphenyl group, or any combination thereof.

[0078] In one or more embodiments, R_{72} in Formula 5 may be a phenyl group, a biphenyl group, a carbazolyl group, a fluorenyl group, a dibenzofuranyl group, or a dibenzothiophenyl group, each unsubstituted or substituted with deuterium, -F, a cyano group, a C_1-C_{20} alkyl group, a deuterated C_1-C_{20} alkyl group, a fluorinated C_1-C_{20} alkyl group, a phenyl group, a deuterated phenyl group, a fluorinated phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a deuterated biphenyl group, a fluorinated biphenyl group, a (C_1-C_{20} alkyl)biphenyl group, or any combination thereof.

[0079] In one or more embodiments, Z_0, Z_1, Z_2, Z_{29}, Z_{30}, R_{11} to R_{14}, R_{51}, R_{61}, and R_{71} to R_{73} in Formulae 2A, 2B, and 5 may each independently be:

hydrogen, deuterium, -F, -Cl, -Br, -I, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, -SF_5, a C_1-C_{20} alkyl group, a C_1-C_{20} alkoxy group, or a C_1-C_{20} alkylthio group;
a C_1-C_{20} alkyl group, a C_1-C_{20} alkoxy group, or a C_1-C_{20} alkylthio group, each substituted with deuterium, -F, -Cl, -Br, -I, -CD_3, -CD_2H, -CDH_2, -CF_3, - CF_2H, -CFH_2, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{10} alkyl group, a cyclopentyl group, a cyclohexyl group, a cycloheptyl group, a cyclooctyl group, an adamantanyl group, a norbornanyl group, a norbornenyl group, a cyclopentenyl group, a cyclohexenyl group, a cycloheptenyl group, a bicyclo[1.1.1]pentyl group, a bicyclo[2.1.1]hexyl group, a bicyclo[2.2.2]octyl group, a (C_1-C_{20} alkyl)cyclopentyl group, a (C_1-C_{20} alkyl)cyclohexyl group, a (C_1-C_{20} alkyl)cycloheptyl group, a (C_1-C_{20} alkyl)cyclooctyl group, a (C_1-C_{20} alkyl)adamantanyl group, a (C_1-C_{20} alkyl)norbornanyl group, a (C_1-C_{20} alkyl)norbornenyl group, a (C_1-C_{20} alkyl)cyclopentenyl group, a (C_1-C_{20} alkyl)cyclohexenyl group, a (C_1-C_{20} alkyl)cycloheptenyl group, a (C_1-C_{20} alkyl)bicyclo[1.1.1]pentyl group, a (C_1-C_{20} alkyl)bicyclo[2.1.1]hexyl group, a (C_1-C_{20} alkyl)bicyclo[2.2.2]octyl group, a phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a terphenyl group, a naphthyl group, a pyridinyl group, a pyrimidinyl group, or any combination thereof;
a cyclopentyl group, a cyclohexyl group, a cycloheptyl group, a cyclooctyl group, an adamantanyl group, a norbornanyl group, a norbornenyl group, a cyclopentenyl group, a cyclohexenyl group, a cycloheptenyl group, a bicyclo[1.1.1]pentyl group, a bicyclo[2.1.1]hexyl group, a bicyclo[2.2.2]octyl group, a phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a terphenyl group, a naphthyl group, a fluorenyl group, a phenanthrenyl group, an anthracenyl group, a fluoranthenyl group, a triphenylenyl group, a pyrenyl group, a chrysenyl group, a pyrrolyl group, a thiophenyl group, a furanyl group, an imidazolyl group, a pyrazolyl group, a thiazolyl group, an isothiazolyl group, an oxazolyl

group, an isoxazolyl group, a pyridinyl group, a pyrazinyl group, a pyrimidinyl group, a pyridazinyl group, an isoindolyl group, an indolyl group, an indazolyl group, a purinyl group, a quinolinyl group, an isoquinolinyl group, a benzoquinolinyl group, a quinoxalinyl group, a quinazolinyl group, a cinnolinyl group, a carbazolyl group, a phenanthrolinyl group, a benzimidazolyl group, a benzofuranyl group, a benzothiophenyl group, a benzoisothiazolyl group, a benzoxazolyl group, a benzoisoxazolyl group, a triazolyl group, a tetrazolyl group, an oxadiazolyl group, a triazinyl group, a dibenzofuranyl group, a dibenzothiophenyl group, a benzocarbazolyl group, a dibenzocarbazolyl group, an imidazopyridinyl group, an imidazopyrimidinyl group, an azacarbazolyl group, an azadibenzofuranyl group or azadibenzothiophenyl group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{20} alkyl group, a (phenyl)C_1-C_{10} alkyl group, a C_1-C_{20} alkoxy group, a cyclopentyl group, a cyclohexyl group, a cycloheptyl group, a cyclooctyl group, an adamantanyl group, a norbornanyl group, a norbornenyl group, a cyclopentenyl group, a cyclohexenyl group, a cycloheptenyl group, a bicyclo[1.1.1]pentyl group, a bicyclo[2.1.1]hexyl group, a bicyclo[2.2.2]octyl group, a (C_1-C_{20} alkyl)cyclopentyl group, a (C_1-C_{20} alkyl)cyclohexyl group, a (C_1-C_{20} alkyl)cycloheptyl group, a (C_1-C_{20} alkyl)cyclooctyl group, a (C_1-C_{20} alkyl)adamantanyl group, a (C_1-C_{20} alkyl)norbornanyl group, a (C_1-C_{20} alkyl)norbornenyl group, a (C_1-C_{20} alkyl)cyclopentenyl group, a (C_1-C_{20} alkyl)cyclohexenyl group, a (C_1-C_{20} alkyl)cycloheptenyl group, a (C_1-C_{20} alkyl)bicyclo[1.1.1]pentyl group, a (C_1-C_{20} alkyl)bicyclo[2.1.1]hexyl group, a (C_1-C_{20} alkyl)bicyclo[2.2.2]octyl group, a phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a terphenyl group, a naphthyl group, a fluorenyl group, a phenanthrenyl group, an anthracenyl group, a fluoranthenyl group, a triphenylenyl group, a pyrenyl group, a chrysenyl group, a pyrrolyl group, a thiophenyl group, a furanyl group, an imidazolyl group, a pyrazolyl group, a thiazolyl group, an isothiazolyl group, an oxazolyl group, an isoxazolyl group, a pyridinyl group, a pyrazinyl group, a pyrimidinyl group, a pyridazinyl group, an isoindolyl group, an indolyl group, an indazolyl group, a purinyl group, a quinolinyl group, an isoquinolinyl group, a benzoquinolinyl group, a quinoxalinyl group, a quinazolinyl group, a cinnolinyl group, a carbazolyl group, a phenanthrolinyl group, a benzimidazolyl group, a benzofuranyl group, a benzothiophenyl group, a benzoisothiazolyl group, a benzoxazolyl group, a benzoisoxazolyl group, a triazolyl group, a tetrazolyl group, an oxadiazolyl group, a triazinyl group, a dibenzofuranyl group, a dibenzothiophenyl group, a benzocarbazolyl group, a dibenzocarbazolyl group, an imidazopyridinyl group, an imidazopyrimidinyl group, an azacarbazolyl group, an azadibenzofuranyl group, an azadibenzothiophenyl group, or any combination thereof; or

$-N(Q_1)(Q_2)$, $-Si(Q_3)(Q_4)(Q_5)$, $-Ge(Q_3)(Q_4)(Q_5)$, $-B(Q_6)(Q_7)$, $-P(=O)(Q_8)(Q_9)$, or $-P(Q_8)(Q_9)$, and

Q_1 to Q_9 may each independently be:

$-CH_3$, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CH_2CH_3$, $-CH_2CD_3$, $-CH_2CD_2H$, $-CH_2CDH_2$, $-CHDCH_3$, $-CHDCD_2H$, $-CHDCDH_2$, $-CHDCD_3$, $-CD_2CD_3$, $-CD_2CD_2H$, or $-CD_2CDH_2$; or

an n-propyl group, an isopropyl group, an n-butyl group, a sec-butyl group, an isobutyl group, a tert-butyl group, an n-pentyl group, a tert-pentyl group, a neopentyl group, an isopentyl group, a sec-pentyl group, a 3-pentyl group, a sec-isopentyl group, a phenyl group, a biphenyl group, or a naphthyl group, each unsubstituted or substituted with deuterium, a C_1-C_{10} alkyl group, a phenyl group, or any combination thereof.

[0080] In one or more embodiments, Z_1 in Formula 2A may not include Si.

[0081] In one or more embodiments, Z_1 in Formula 2A may not be a group represented by $-Si(Q_3)(Q_4)(Q_5)$.

[0082] In one or more embodiments, R_{21} to R_{23}, Z_1, Z_2, and R_{11} to R_{14} in Formulae 2A and 2B may each not include silicon (Si). As a result, an electronic device, such as an organic light-emitting device, including the first compound represented by Formula 1 may have improved out-coupling characteristics.

[0083] In one or more embodiments, the first compound represented by Formula 1 may satisfy at least one of Conditions A to C.

[0084] Condition A: in Formula 2A, Z_1 is not hydrogen, and a1 is not 0.

[0085] Condition B: in Formula 2A, Z_2 is not hydrogen, and a2 is not 0.

[0086] Condition C: in Formula 2B, R_{14} is not hydrogen, and b1 is not 0.

[0087] In one or more embodiments, the first compound represented by Formula 1 may include at least one deuterium atom, at least one fluoro group (-F), at least one cyano group (-CN), or any combination thereof.

[0088] In one or more embodiments, the first compound represented by Formula 1 may include at least one deuterium atom.

[0089] In one or more embodiments, the first compound represented by Formula 1 may satisfy at least one of Conditions (1) to (6), or Condition (7).

[0090] Condition (1): in Formula 2A, a1 is not 0, and at least one of Z_1(s) in the number of a1 includes deuterium.

[0091] Condition (2): in Formula 2A, a2 is not 0, and at least one of Z_2(s) in the number of a2 includes deuterium, a fluoro group (-F), a cyano group, or any combination thereof.

[0092] Condition (3): at least one of Ar_2(s) in the number of d2 in Formula 2A includes deuterium, a fluoro group (-F), a cyano group, or any combination thereof.

[0093] Condition (4): at least one of R_{21} to R_{23} in Formula 2B includes deuterium.

[0094] Condition (5): R_{12} in Formula 2B includes at least one deuterium atom.

[0095] Condition (6): in Formula 2B, b1 is not 0, and at least one of R_{14}(s) in the number of b1 includes deuterium, a fluoro group (-F), a cyano group, or any combination thereof.

[0096] Condition (7): Z_1, Z_2, and Ar_2 in Formula 2A and R_{11} to R_{14} and R_{21} to R_{23} in Formula 2B each consist of only carbon and hydrogen.

[0097] In one or more embodiments, Z_0, Z_1, Z_2, Z_{29}, Z_{30}, R_{11} to R_{14}, R_{51}, R_{61}, and R_{71} to R_{73} in Formulae 2A, 2B, and 5 may each independently be hydrogen, deuterium, - F, a cyano group, a nitro group, $-SF_5$, $-CH_3$, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, $-OCH_3$, $-OCDH_2$, $-OCD_2H$, $-OCD_3$, $-SCH_3$, $-SCDH_2$, $-SCD_2H$, $-SCD_3$, a group represented by one of Formulae 9-1 to 9-39, a group represented by one of Formulae 9-1 to 9-39 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 9-1 to 9-39 in which at least one hydrogen is substituted with -F, a group represented by one of Formulae 9-201 to 9-230, a group represented by one of Formulae 9-201 to 9-230 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 9-201 to 9-230 in which at least one hydrogen is substituted with -F, a group represented by one of Formulae 10-1 to 10-145, a group represented by one of Formulae 10-1 to 10-145 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 10-1 to 10-145 in which at least one hydrogen is substituted with -F, a group represented by one of Formulae 10-201 to 10-354, a group represented by one of Formulae 10-201 to 10-354 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 10-201 to 10-354 in which at least one hydrogen is substituted with -F, $-Si(Q_3)(Q_4)(Q_5)$, or $-Ge(Q_3)(Q_4)(Q_5)$ (wherein Q_3 to Q_5 are respectively the same as those described herein).

[0098] In one or more embodiments, Z_1 in Formula 2A and R_{11} to R_{13} in Formula 2B may each independently be hydrogen, deuterium, $-CH_3$, $-CD_3$, $-CD_2H$, $-CDH_2$, $-OCH_3$, $-OCDH_2$, $-OCD_2H$, $-OCD_3$, $-SCH_3$, $-SCDH_2$, $-SCD_2H$, $-SCD_3$, a group represented by one of Formulae 9-1 to 9-39, a group represented by one of Formulae 9-1 to 9-39 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 9-201 to 9-230, a group represented by one of Formulae 9-201 to 9-230 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 10-1 to 10-138 and 10-145, or a group represented by one of Formulae 10-1 to 10-138 and 10-145 in which at least one hydrogen is substituted with deuterium.

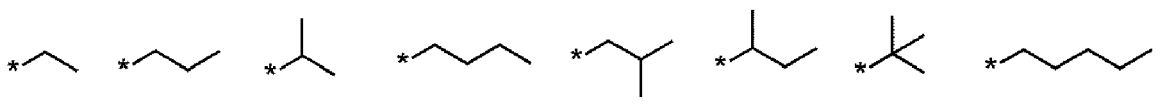
[0099] In one or more embodiments, Ar_2 in Formula 2A may be a group represented by one of Formulae 10-12 to 10-145, a group represented by one of Formulae 10-12 to 10-145 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 10-12 to 10-145 in which at least one hydrogen is substituted with -F, a group represented by one of Formulae 10-201 to 10-354, a group represented by one of Formulae 10-201 to 10-354 in which at least one hydrogen is substituted with deuterium, or a group represented by one of Formulae 10-201 to 10-354 in which at least one hydrogen is substituted with -F.

[0100] In one or more embodiments, R_{12} in Formula 2B may be hydrogen, $-CH_3$, $-CH_2D$, $-CHD_2$, or $-CD_3$.

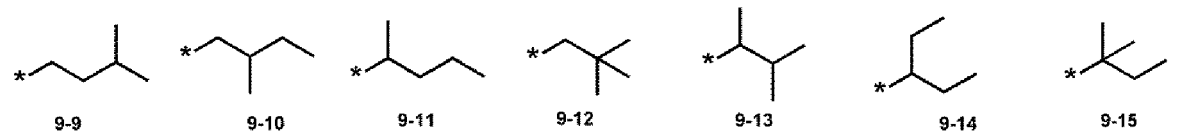
[0101] In one or more embodiments, R_{12} in Formula 2B may be hydrogen or a methyl group ($-CH_3$).

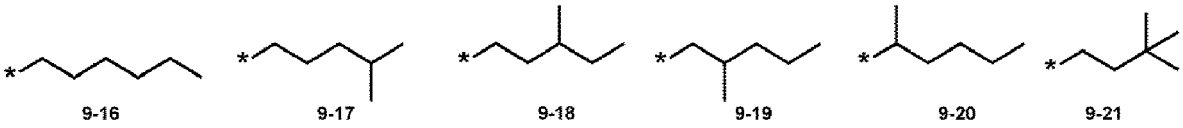
[0102] In one or more embodiments, R_{12} in Formula 2B may be $-CH_2D$, $-CHD_2$, or $-CD_3$.

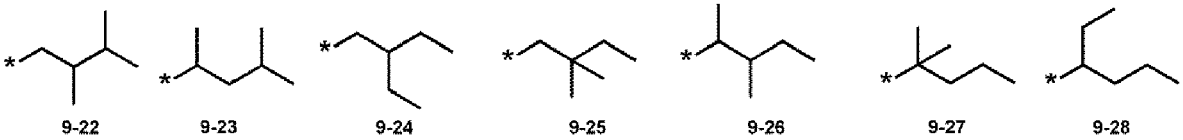
[0103] In one or more embodiments, R_{12} in Formula 2B may be a group represented by one of Formulae 9-1 to 9-39, a group represented by one of Formulae 9-1 to 9-39 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 9-1 to 9-39 in which at least one hydrogen is substituted with -F, a group represented by one of Formulae 9-201 to 9-230, a group represented by one of Formulae 9-201 to 9-230 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 9-201 to 9-230 in which at least one hydrogen is substituted with -F, a group represented by one of Formulae 10-1 to 10-145, a group represented by one of Formulae 10-1 to 10-145 in which at least one hydrogen is substituted with deuterium, a group represented by one of Formulae 10-1 to 10-145 in which at least one hydrogen is substituted with -F, a group represented by one of Formulae 10-201 to 10-354, a group represented by one of Formulae 10-201 to 10-354 in which at least one hydrogen is substituted with deuterium, or a group represented by one of Formulae 10-201 to 10-354 in which at least one hydrogen is substituted with -F.

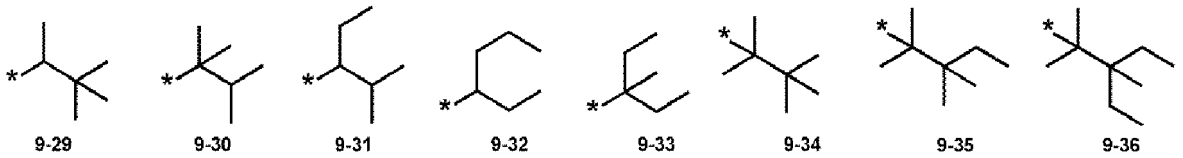


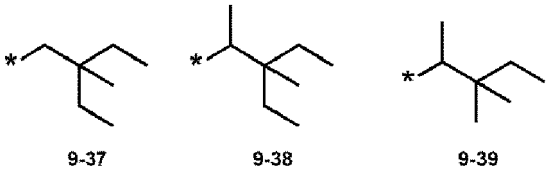
9-1 9-2 9-3 9-4 9-5 9-6 9-7 9-8


9-9
9-10
9-11
9-12
9-13
9-14
9-15

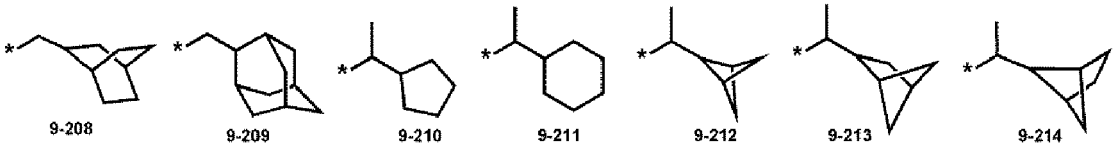

9-16
9-17
9-18
9-19
9-20
9-21

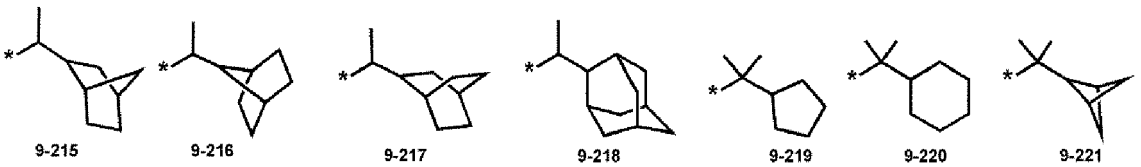

9-22
9-23
9-24
9-25
9-26
9-27
9-28

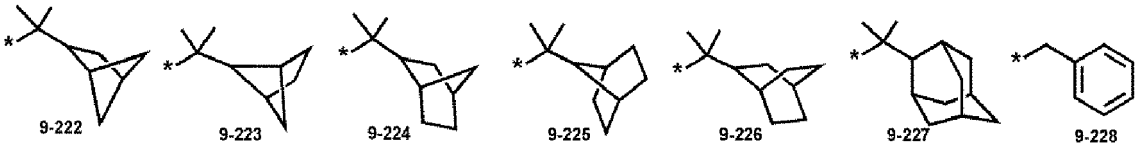

9-29
9-30
9-31
9-32
9-33
9-34
9-35
9-36

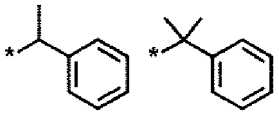

9-37
9-38
9-39


9-201
9-202
9-203
9-204
9-205
9-206
9-207

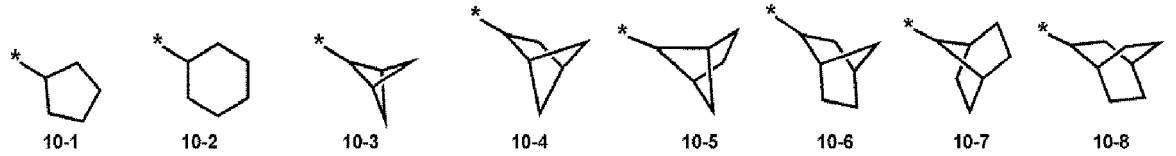

9-208
9-209
9-210
9-211
9-212
9-213
9-214


9-215
9-216
9-217
9-218
9-219
9-220
9-221

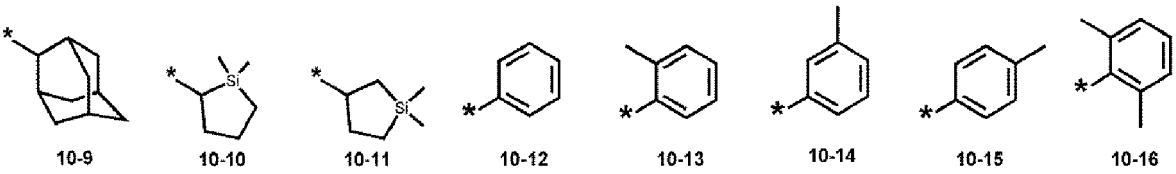

9-222
9-223
9-224
9-225
9-226
9-227
9-228



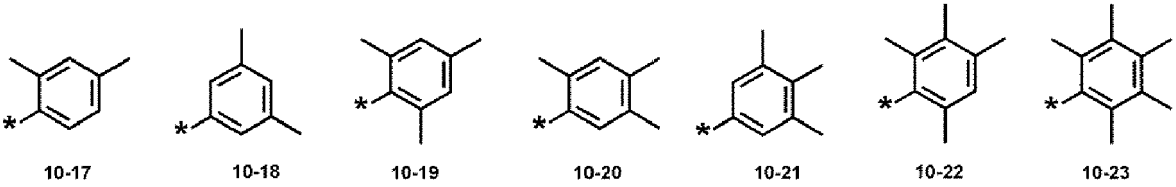
9-229 9-230



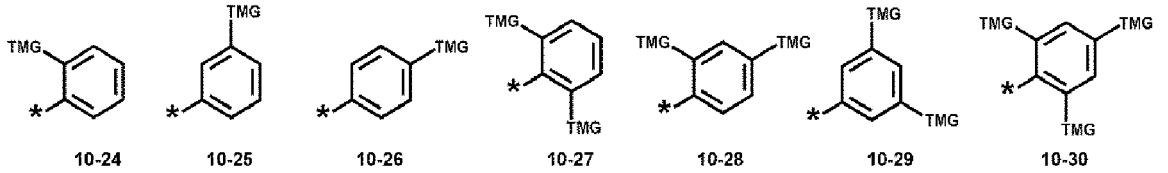
10-1 10-2 10-3 10-4 10-5 10-6 10-7 10-8



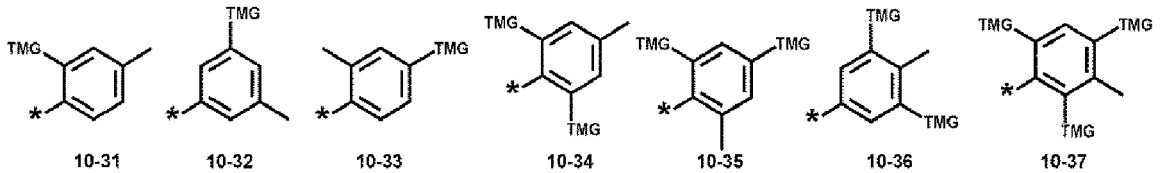
10-9 10-10 10-11 10-12 10-13 10-14 10-15 10-16



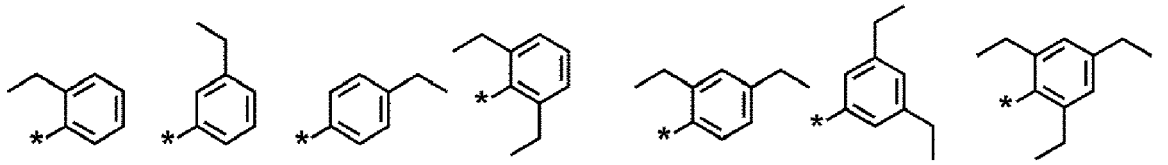
10-17 10-18 10-19 10-20 10-21 10-22 10-23



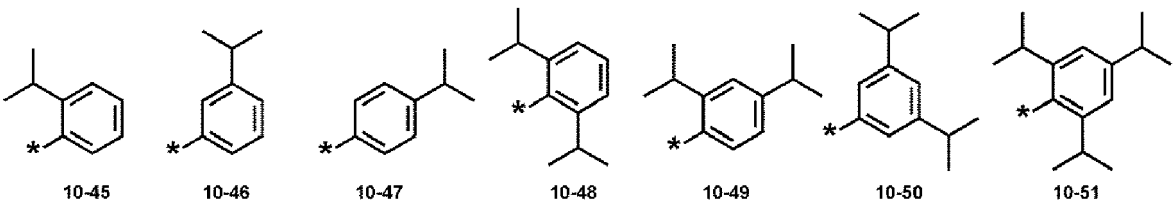
10-24 10-25 10-26 10-27 10-28 10-29 10-30



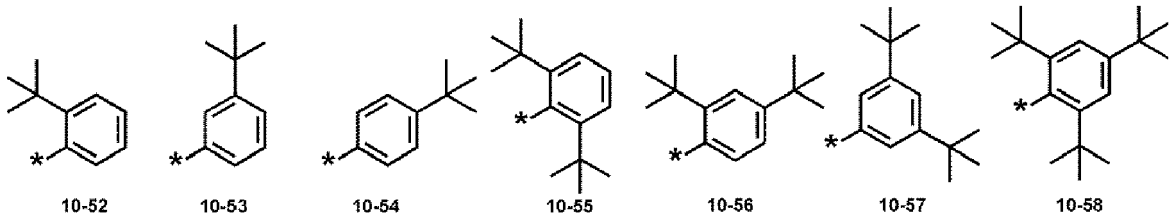
10-31 10-32 10-33 10-34 10-35 10-36 10-37

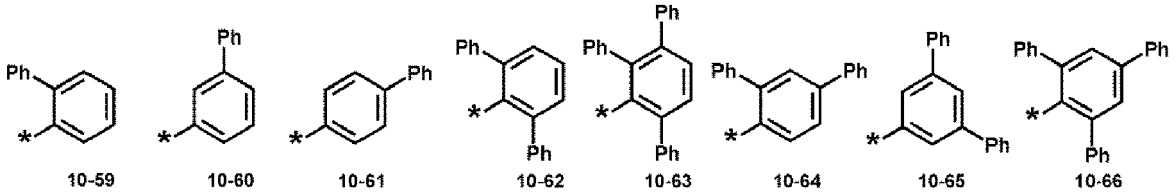


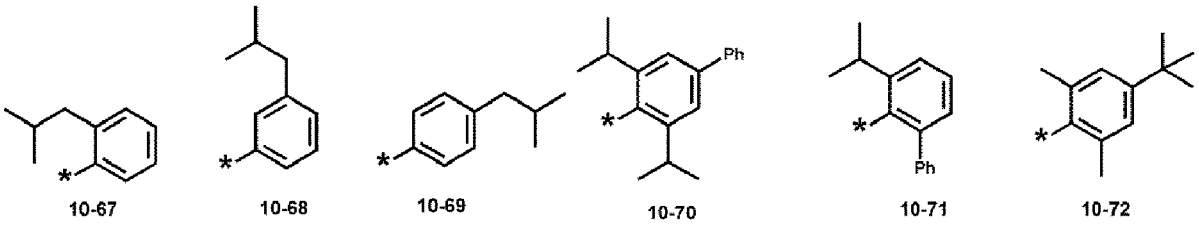
10-38 10-39 10-40 10-41 10-42 10-43 10-44

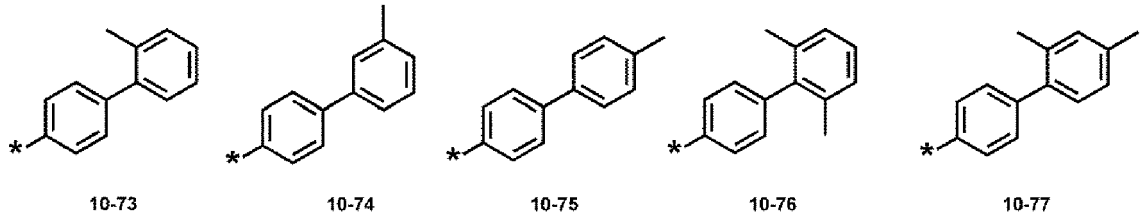


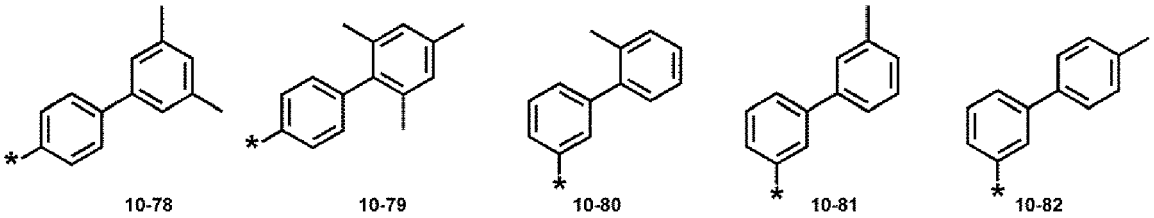
10-45 10-46 10-47 10-48 10-49 10-50 10-51

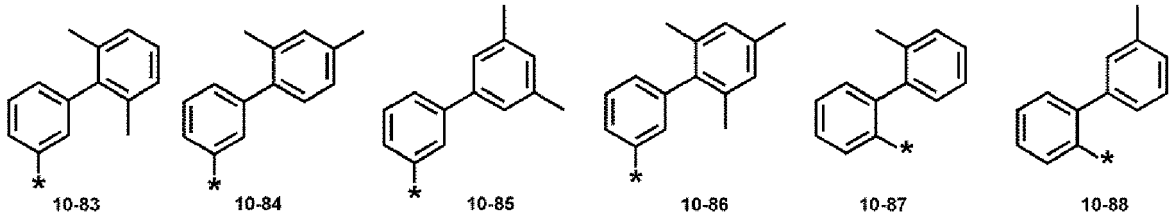

10-52
10-53
10-54
10-55
10-56
10-57
10-58

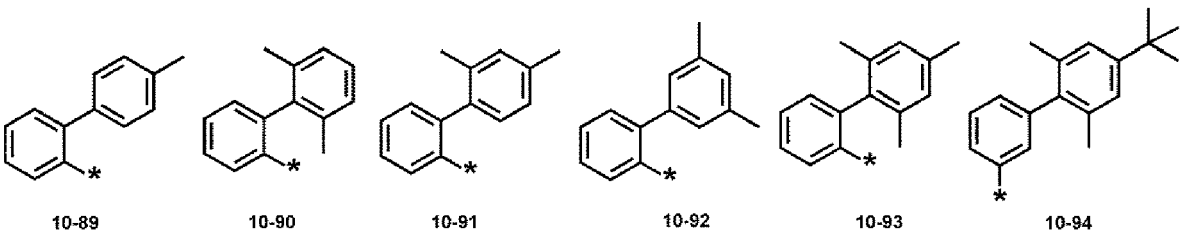

Ph
10-59
10-60
10-61
10-62
10-63
10-64
10-65
10-66

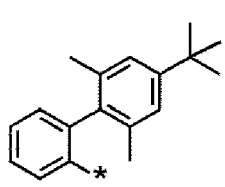

Ph
10-67
10-68
10-69
10-70
10-71
10-72

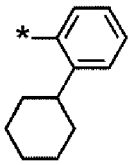

10-73
10-74
10-75
10-76
10-77

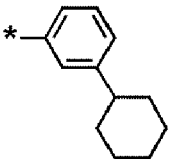

10-78
10-79
10-80
10-81
10-82

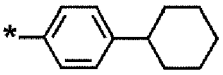

10-83
10-84
10-85
10-86
10-87
10-88

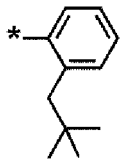

10-89
10-90
10-91
10-92
10-93
10-94

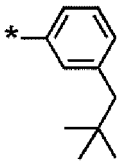

10-95

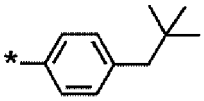

10-96

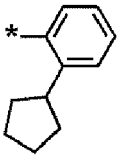

10-97

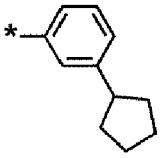

10-98

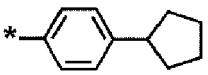

10-99

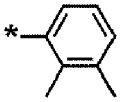

10-100

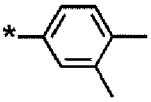

10-101

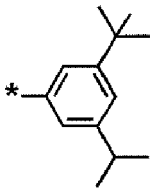

10-102

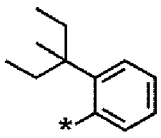

10-103

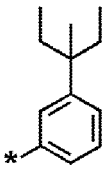

10-104

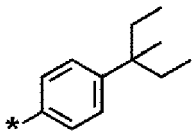

10-105

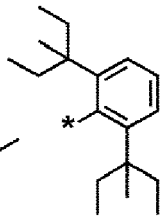

10-106

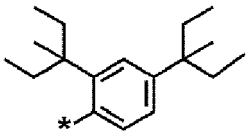

10-107

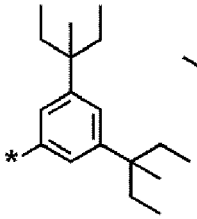

10-108

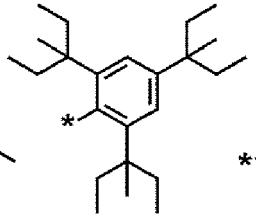

10-109

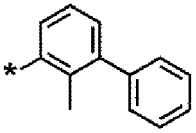

10-110

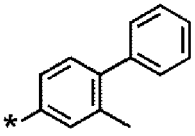

10-111

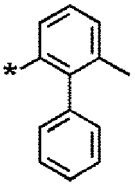

10-112

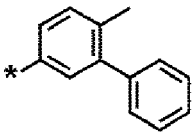

10-113

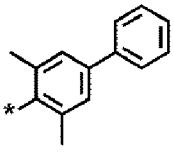

10-114

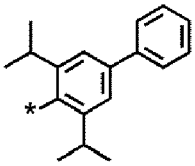

10-115

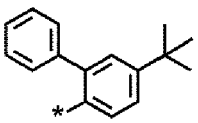

10-116

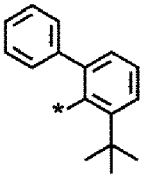

10-117

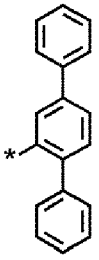

10-118

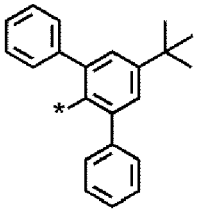

10-119

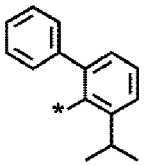

10-120

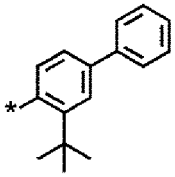

10-121

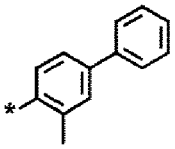

10-122

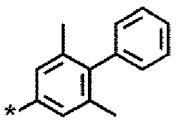

10-123

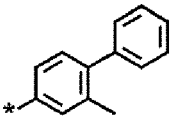

10-124

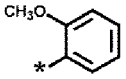

10-125


10-126

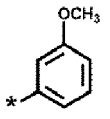

10-127

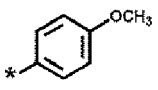

10-128

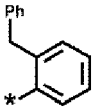

10-129

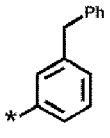


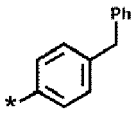
10-130

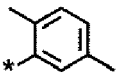

10-131

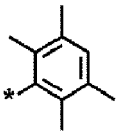

10-132

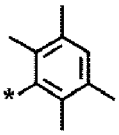

10-133

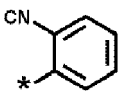

10-134

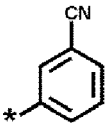

10-135

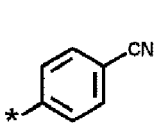

10-136

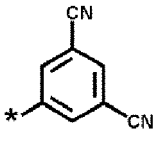

10-137

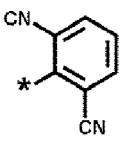

10-138

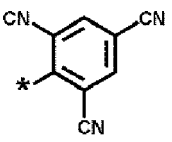

10-139

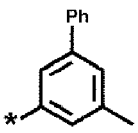

10-140

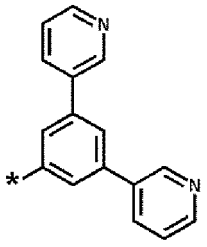

10-141

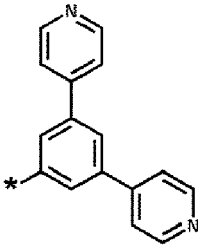

10-142

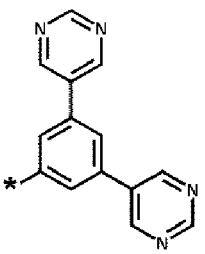

10-143

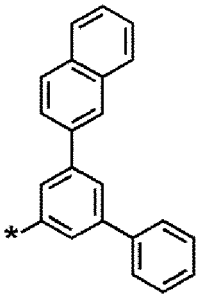

10-144

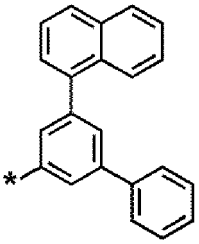

10-145

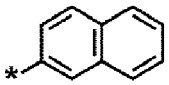

10-201

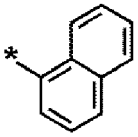

10-202

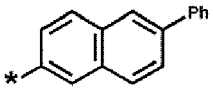

10-203

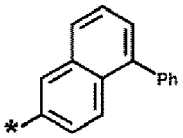

10-204

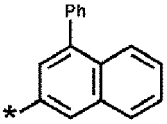

10-205

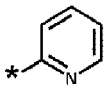

10-206

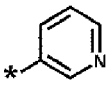

10-207

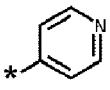

10-208

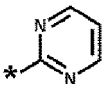

10-209

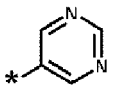

10-210

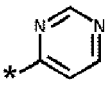

10-211

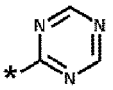

10-212

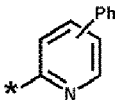

10-213

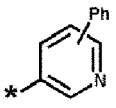

10-214

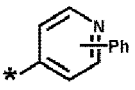

10-215

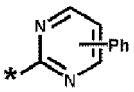

10-216

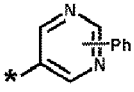

10-217

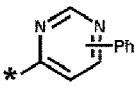

10-218

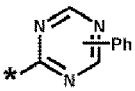

10-219

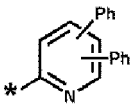

10-220


10-221


10-222


10-223


10-224


10-225

10-226

10-227

10-228

10-229

10-230

10-231

10-232

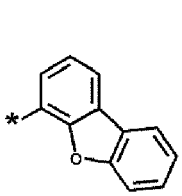
10-233

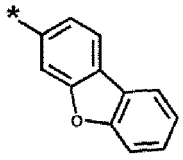
10-234

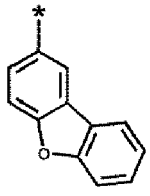
10-235

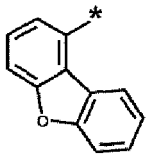
10-236

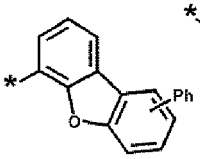
10-237

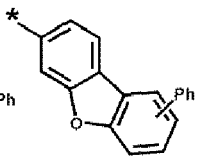

10-238

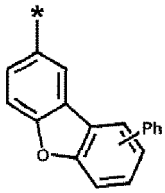

10-239

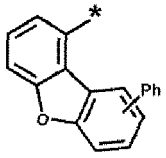

10-240

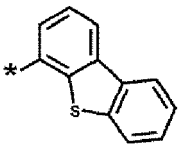

10-241

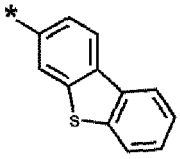

10-242

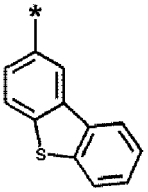

10-243

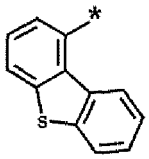

10-244

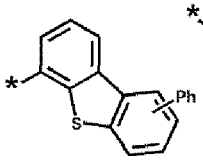

10-245

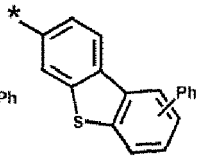

10-246

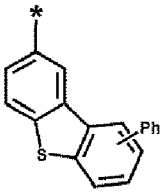

10-247

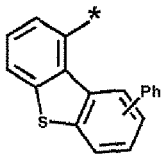

10-248

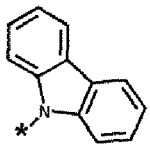

10-249

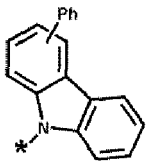

10-250

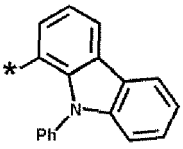

10-251

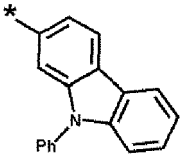

10-252

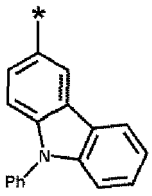

10-253

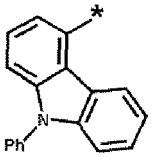

10-254

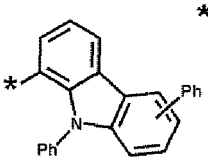

10-255

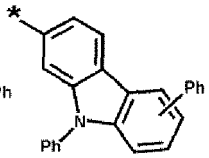

10-256

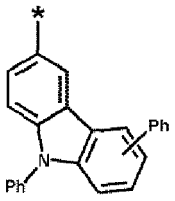

10-257

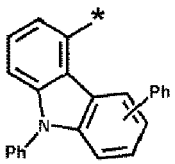

10-258

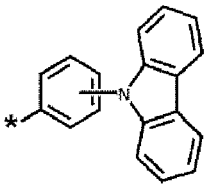

10-259

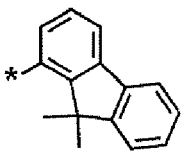

10-260

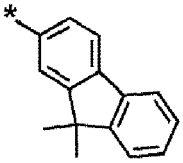

10-261

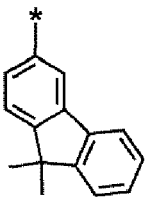

10-262

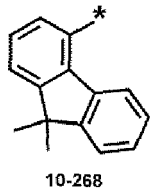

10-263

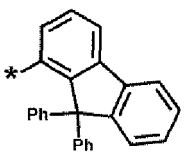

10-264

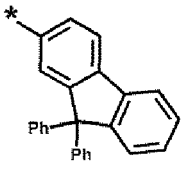

10-265

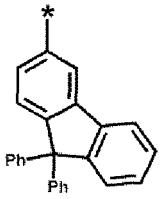

10-266

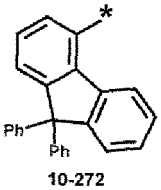

10-267

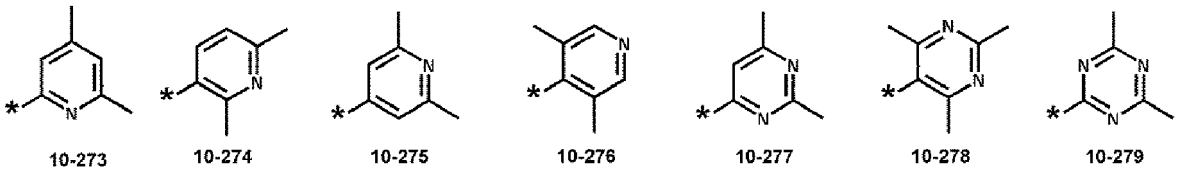

10-268

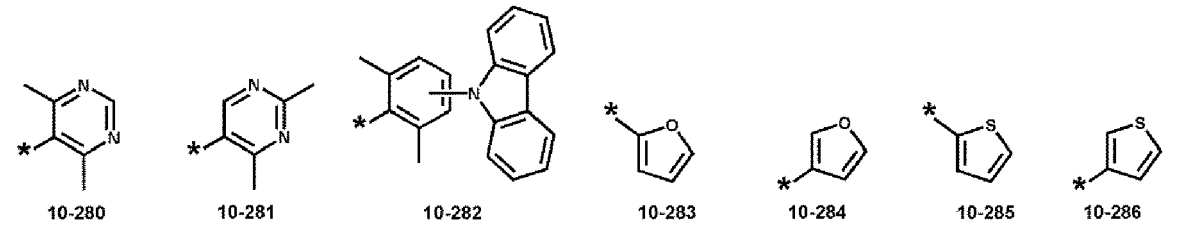

10-269

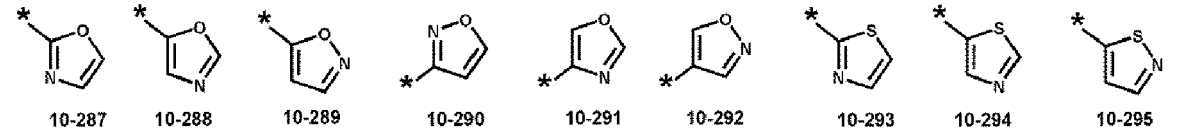

10-270

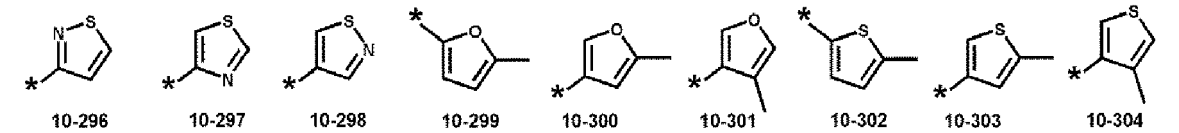

10-271

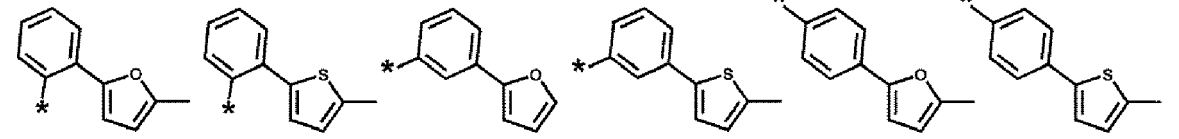

10-272

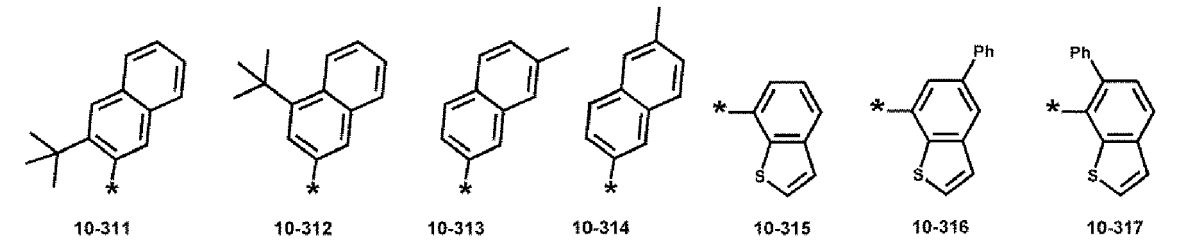

10-273 10-274 10-275 10-276 10-277 10-278 10-279

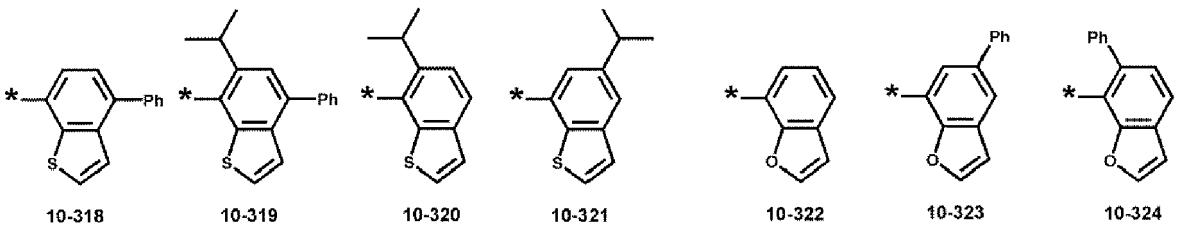

10-280 10-281 10-282 10-283 10-284 10-285 10-286

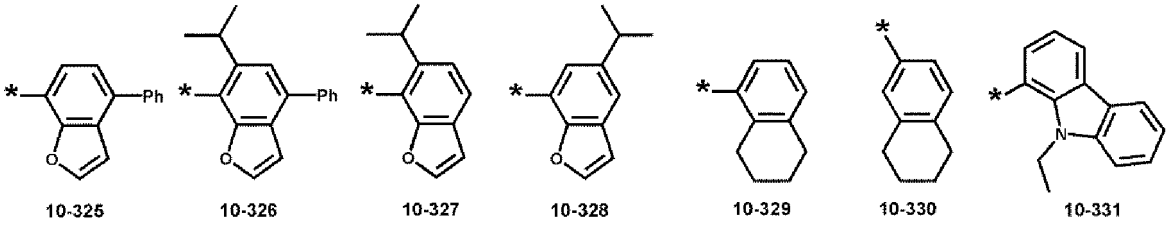

10-287 10-288 10-289 10-290 10-291 10-292 10-293 10-294 10-295

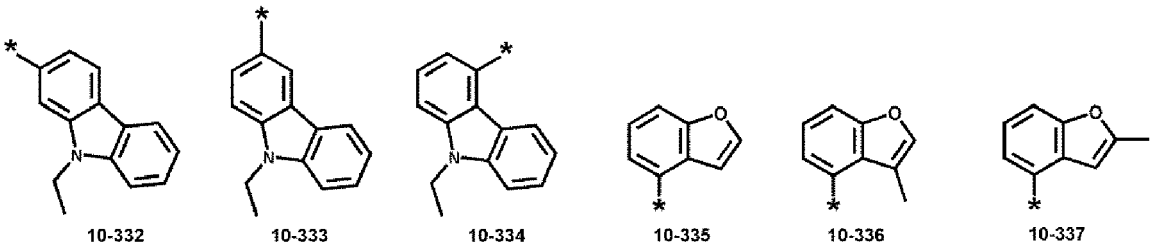

10-296 10-297 10-298 10-299 10-300 10-301 10-302 10-303 10-304

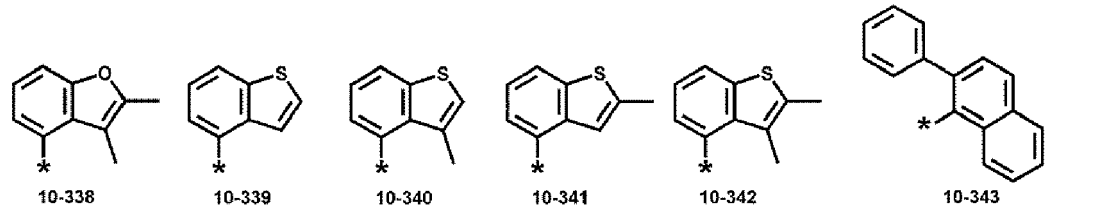

10-305 10-306 10-307 10-308 10-309 10-310

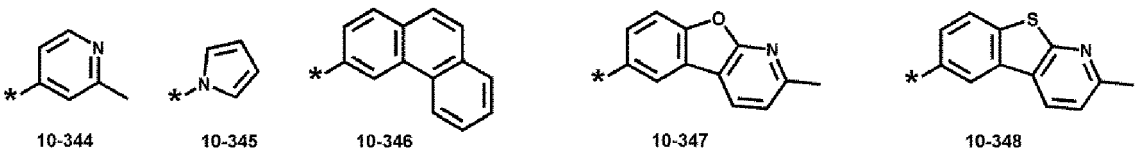

10-311 10-312 10-313 10-314 10-315 10-316 10-317

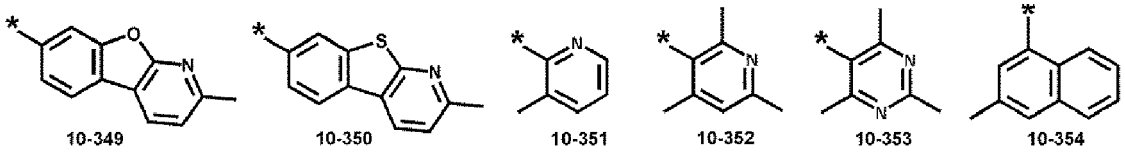

10-318 10-319 10-320 10-321 10-322 10-323 10-324





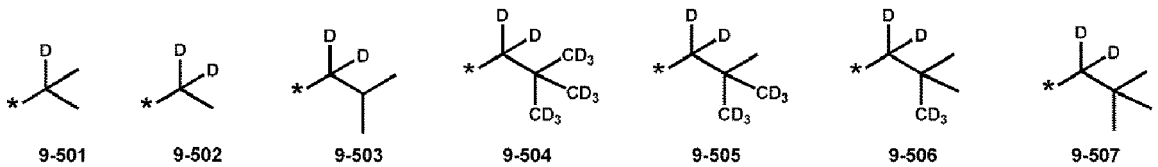


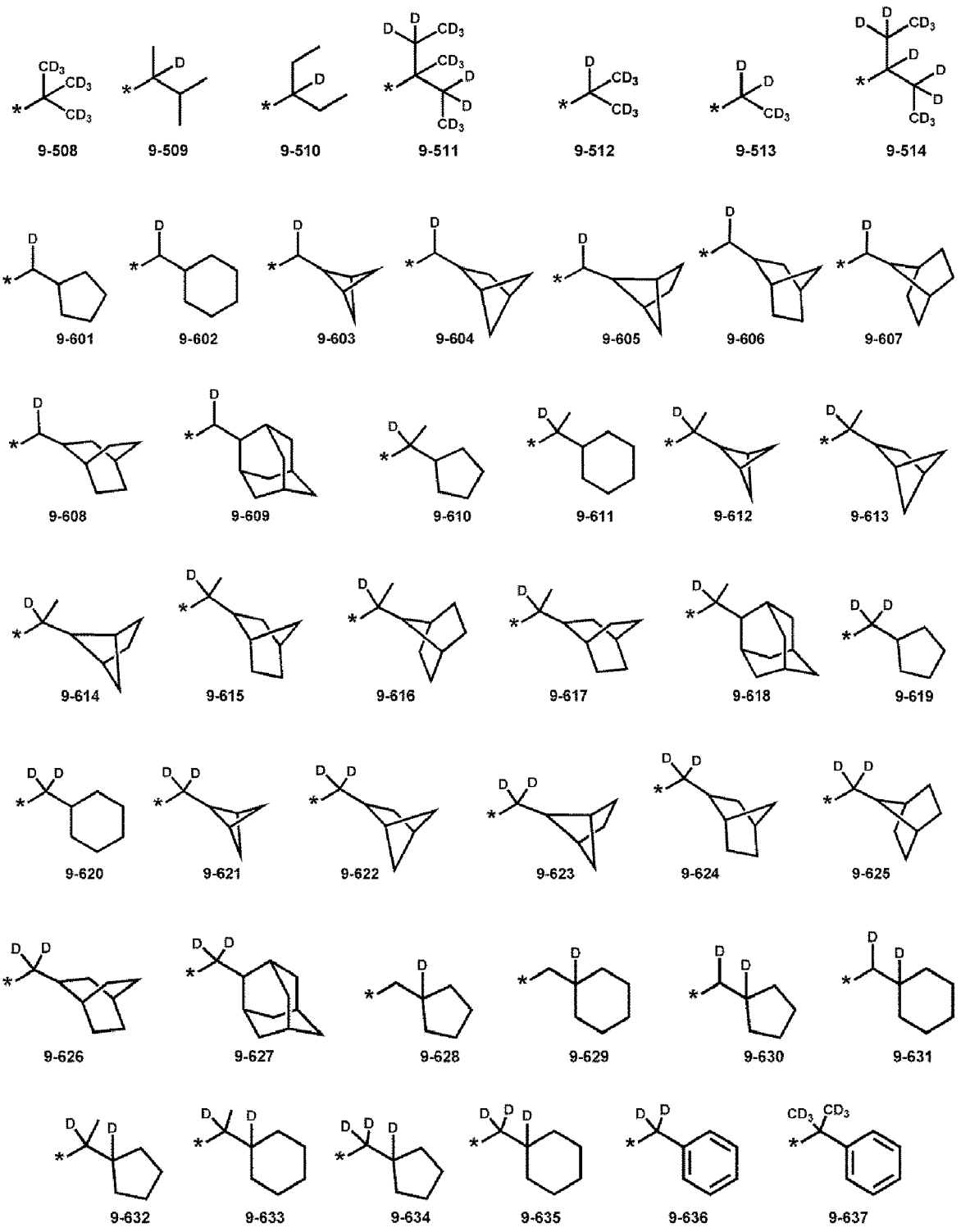




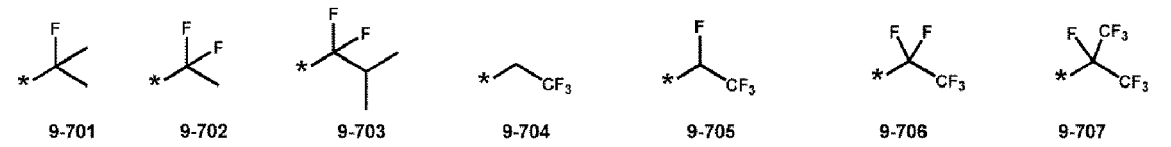
[0104] In Formulae 9-1 to 9-39, 9-201 to 9-230, 10-1 to 10-145, and 10-201 to 10-354, * indicates a binding site to a neighboring atom, Ph is a phenyl group, TMS is a trimethylsilyl group, TMG is a trimethylgermyl group, and OMe is a methoxy group.

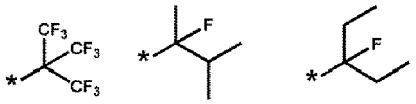
[0105] The "group represented by one of Formulae 9-1 to 9-39 in which at least one hydrogen is substituted with deuterium" and the "group represented by one of Formulae 9-201 to 9-230 in which at least one hydrogen is substituted with deuterium" may be, for example, a group represented by one of Formulae 9-501 to 9-514 and 9-601 to 9-637:





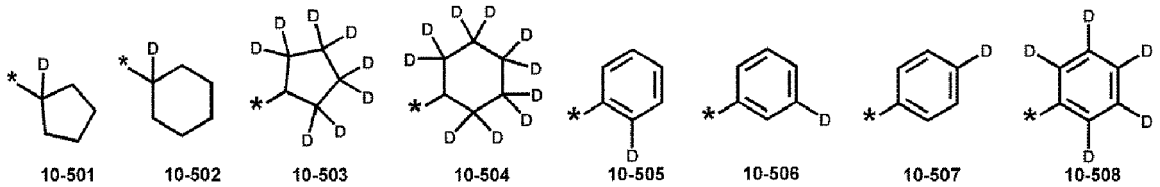
[0106] The "group represented by one of Formulae 9-1 to 9-39 in which at least one hydrogen is substituted with -F" and the "group represented by one of Formulae 9-201 to 9-230 in which at least one hydrogen is substituted with -F" may be, for example, a group represented by one of Formulae 9-701 to 9-710:



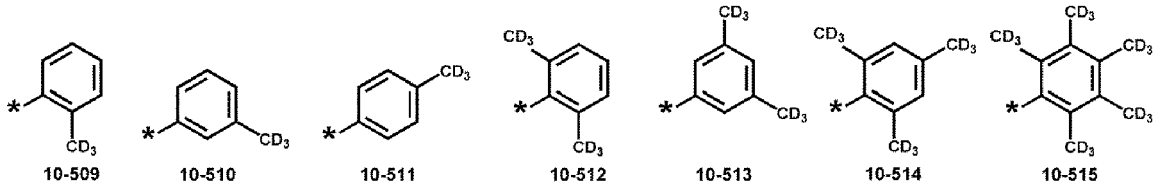


9-708 9-709 9-710

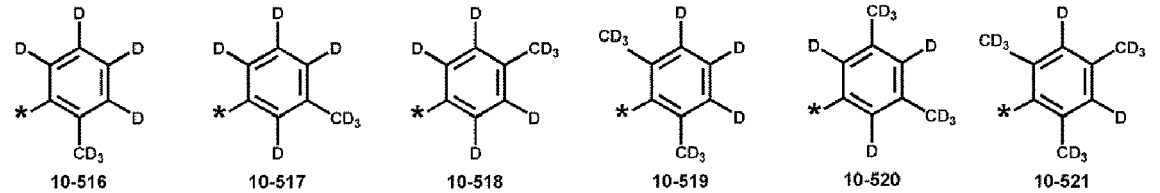
[0107] The "group represented by one of Formulae 10-1 to 10-145 in which at least one hydrogen is substituted with deuterium" and the "group represented by one of Formulae 10-201 to 10-354 in which at least one hydrogen is substituted with deuterium" may be, for example, a group represented by one of Formulae 10-501 to 10-553:



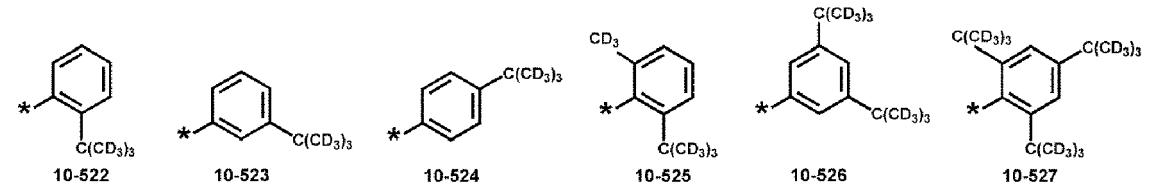
10-501 10-502 10-503 10-504 10-505 10-506 10-507 10-508



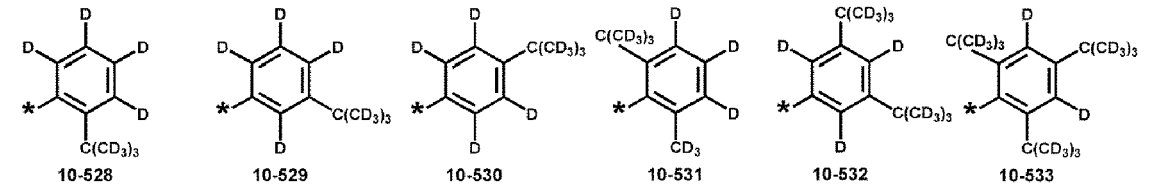
10-509 10-510 10-511 10-512 10-513 10-514 10-515



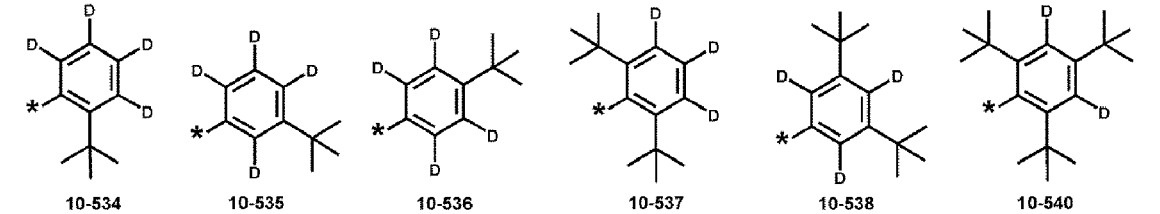
10-516 10-517 10-518 10-519 10-520 10-521



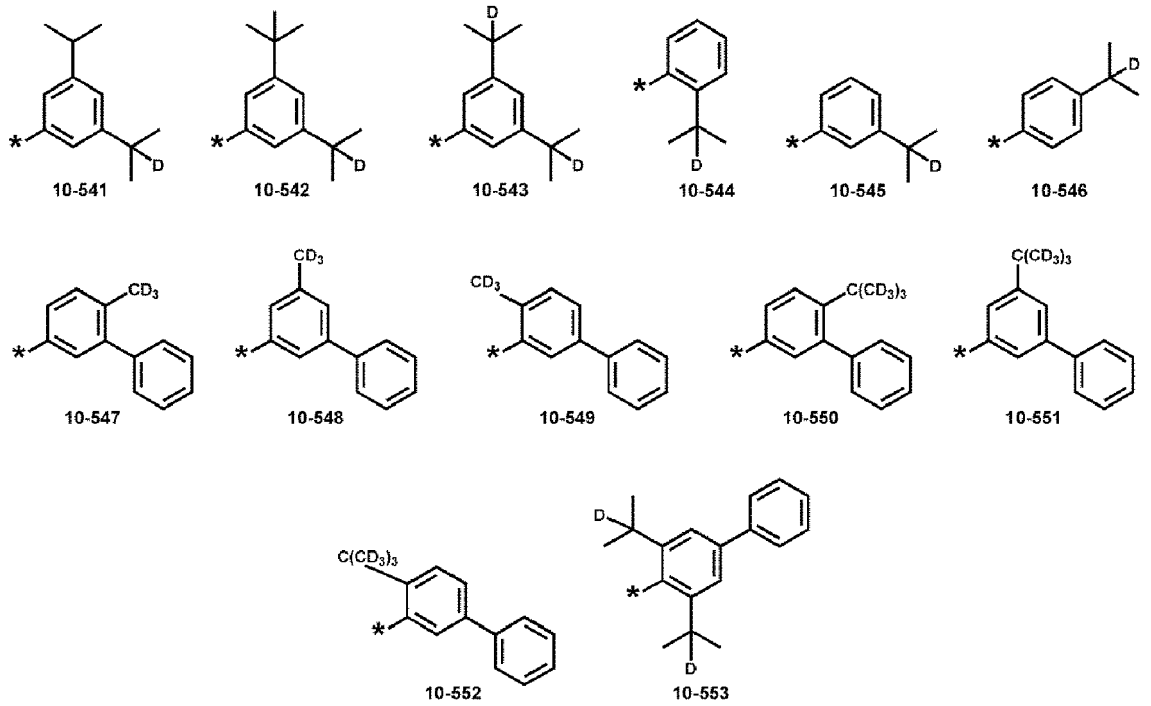
10-522 10-523 10-524 10-525 10-526 10-527



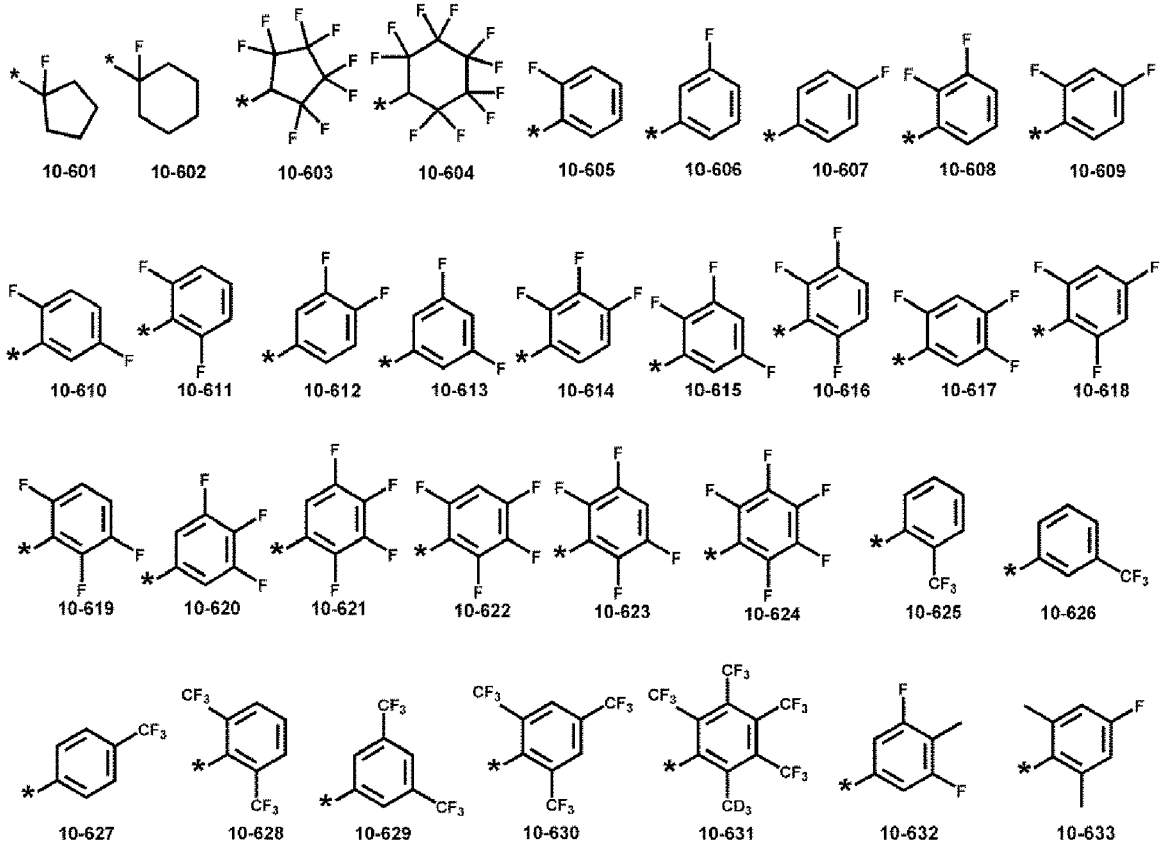
10-528 10-529 10-530 10-531 10-532 10-533

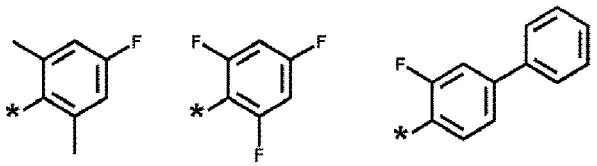


10-534 10-535 10-536 10-537 10-538 10-540



[0108] The "group represented by one of Formulae 10-1 to 10-145 in which at least one hydrogen is substituted with -F" and the "group represented by one of Formulae 10-201 to 10-354 in which at least one hydrogen is substituted with -F" may be, for example, a group represented by one of Formulae 10-601 to 10-636:



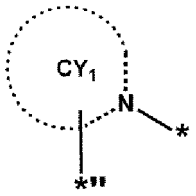


[0109] In Formulae 2A and 2B, each of: i) two or more of R_{21} to R_{23}; ii) two or more of a plurality of Z_1(s); iii) two or more of a plurality of Z_2(s); iv) R_{12} and R_{13}; v) two or more of a plurality of R_{14}(s); and vi) two or more of Z_0, Z_1, Z_2, Z_{29}, Z_{30}, and R_{11} to R_{14} may optionally be linked together to form a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a}. That is, i) two or more of R_{21} to R_{23} may optionally be linked together to form a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a}, ii) two or more of a plurality of Z_1(s) may optionally be linked together to form a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a}, iii) two or more of a plurality of Z_2(s) may optionally be linked together to form a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a}, iv) R_{12} and R_{13} may optionally be linked together to form a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a}, v) two or more of a plurality of R_{14}(s) may optionally be linked together to form a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a}, and vi) two or more of Z_0, Z_1, Z_2, Z_{29}, Z_{30}, and R_{11} to R_{14} may optionally be linked together to form a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a}.

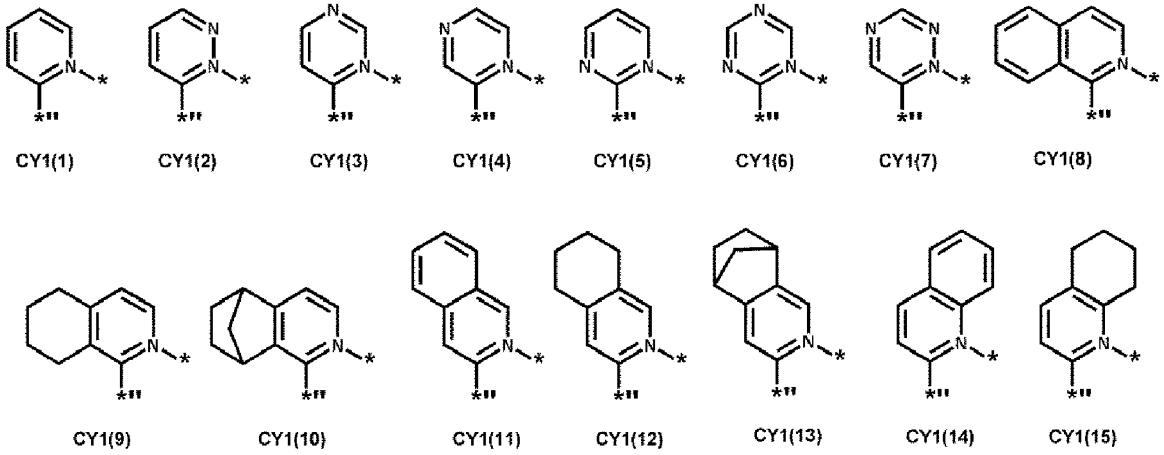
[0110] R_{10a} is the same as described in connection with R_{14}.

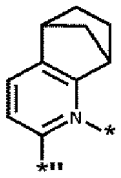
[0111] * and *' in Formulae 2A and 2B each indicate a binding site to M in Formula 1.

[0112] In an embodiment, a group represented by



in Formula 2A may be a group represented by one of Formulae CY1(1) to CY1(16):

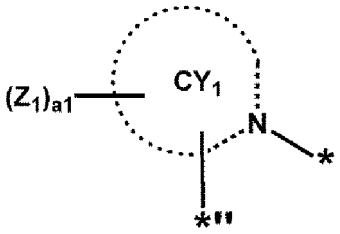




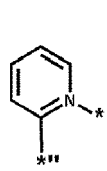
CY1(16)

wherein, in Formulae CY_1 (1) to CY_1 (16),
* indicates a binding site to M in Formula 1, and
*" indicates a binding site to one of T_1 to T_4 in Formula 2A.

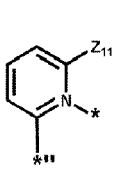
[0113] In one or more embodiments, a group represented by



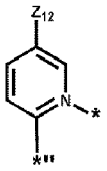
in Formula 2A may be a group represented by one of Formulae CY1-1 to CY_1 -28:



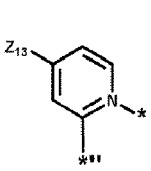
CY1-1



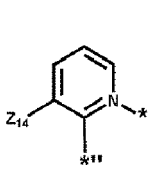
CY1-2



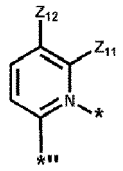
CY1-3



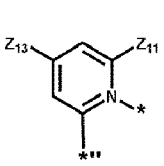
CY1-4



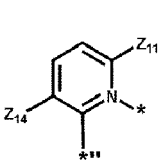
CY1-5



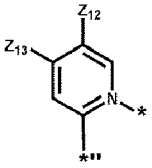
CY1-6



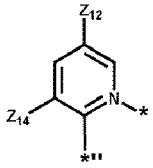
CY1-7



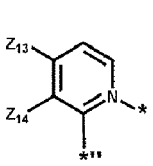
CY1-8



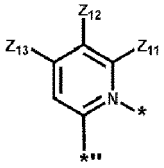
CY1-9



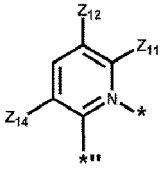
CY1-10



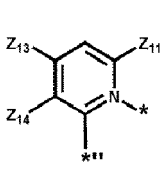
CY1-11



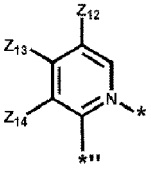
CY1-12



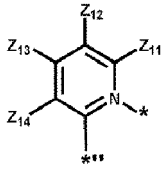
CY1-13



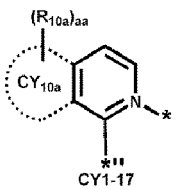
CY1-14



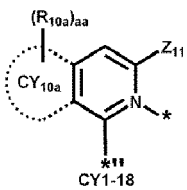
CY1-15



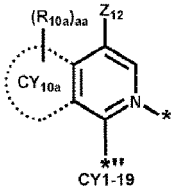
CY1-16



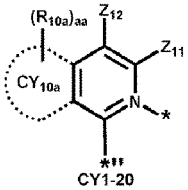
CY1-17



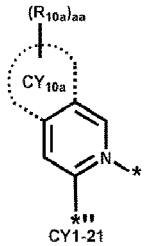
CY1-18



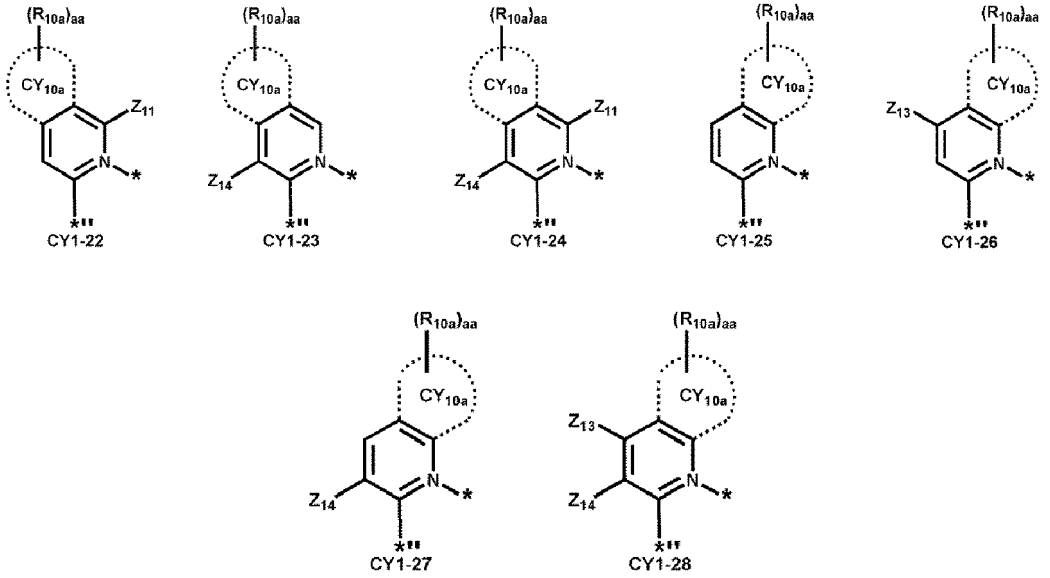
CY1-19



CY1-20



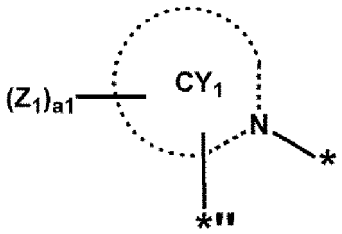
CY1-21



wherein, in Formulae CY1-1 to CY1-28,
Z_{11} to Z_{14} are each the same as described in connection with Z_1, wherein Z_{11} to Z_{14} may each not be hydrogen,
ring CY_{10a} may be a C_5-C_{30} carbocyclic group or a C_1-C_{30} heterocyclic group,
R_{10a} is the same as R_{10a} described herein,
aa may be an integer from 0 to 10,
* indicates a binding site to M in Formula 1, and
*" indicates a binding site to one of T_1 to T_4 in Formula 2A.

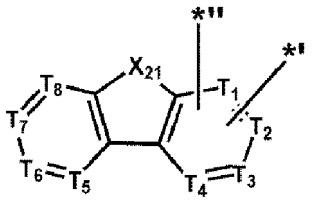
[0114] For example, ring CY_{10a} may be a cyclohexane group, a norbornane group, a benzene group, or a naphthalene group.

[0115] In one or more embodiments, a group represented by

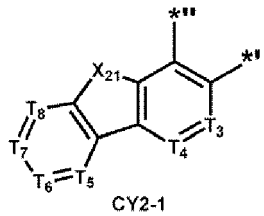


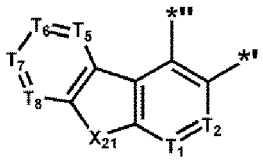
in Formula 2A may be a group represented by one of Formulae CY1-1, CY1-4, CY1-7, CY1-9, CY1-11, CY1-12, and CY1-14 to CY1-24.

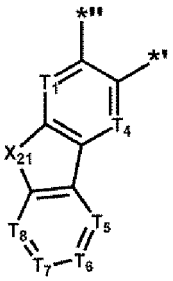
[0116] In one or more embodiments, a group represented by

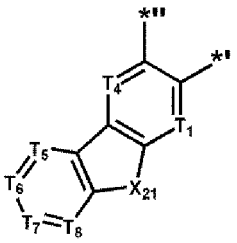


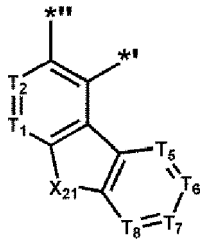
in Formula 2A may be a group represented by one of Formulae CY2-1 to CY2-6:

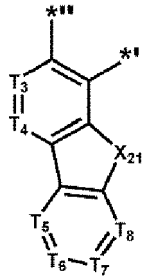

CY2-1


CY2-2


CY2-3

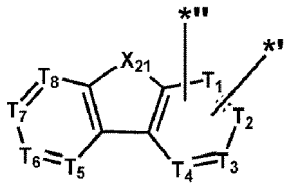

CY2-4


CY2-5


CY2-6

wherein, in Formulae CY2-1 to CY2-6,
T_1 to T_8 may each independently be C or N,
X_{21} is the same as X_{21} described herein,
*'' indicates a binding site to ring CY_1 in Formula 2A, and
*' indicates a binding site to M in Formula 1.

[0117] For example, a group represented by



in Formula 2A may be a group represented by one of Formulae CY2-1 to CY2-6, and

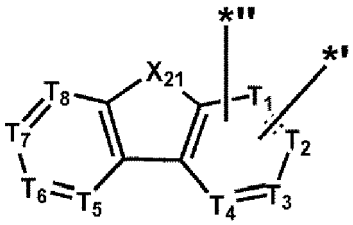
a) R_{12} in Formula 2B may not be hydrogen or a methyl group (for example, the number of carbon atoms included in R_{12} may be 2 or more), and the number of N(s) among T_1 to T_8 in Formulae CY2-1 to CY2-6 may be 0 or 1 (for example, the number of N(s) among T_1 to T_8 may be 0; or T_1 to T_7 may each not be N, and T_8 may be N), or
b) R_{12} in Formula 2B may be hydrogen, a methyl group, or a deuterated methyl group, and the number of N(s) among T_1 to T_8 in Formulae CY2-1 to CY2-6 may be 0 or 1 (for example, the number of N(s) among T_1 to T_8 may be 0; or T_1 to T_7 may each not be N, and T_8 may be N).

[0118] In one or more embodiments,

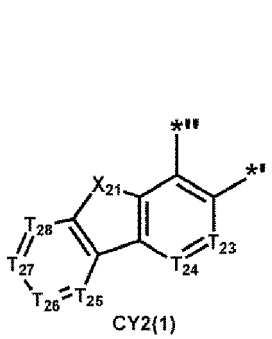
1) T_1 to T_8 in Formulae CY2-1 to CY2-6 may each be C;
2) in Formula CY2-1, one of T_3 to T_8 may be N, and the remaining T_3 to T_8 that are not N may each be C;
3) in Formula CY2-1, T_3 and T_8 may each be N, and T_4 to T_7 may each be C;
4) in Formula CY2-1, T_6 and T_8 may each be N, and T_3 to T_5 and T_7 may each be C;
5) in Formula CY2-2, one of T_1, T_2, and T_8 may be N, and the remaining T_1, T_2, and T_5 to T_8 that are not N may each be C;
6) in Formula CY2-2, T_1 and T_8 may each be N, and T_2 and T_5 to T_7 may each be C;
7) in Formula CY2-2, T_2 and T_8 may each be N, and T_1 and T_5 to T_7 may each be C;
8) in Formulae CY2-3 and CY2-4, one of T_1, T_4, and T_8 may be N, and the remaining T_1, T_4, and T_5 to T_8 that are

not N may each be C;
9) in Formulae CY2-3 and CY2-4, T_1 and T_8 may each be N, and T_4 and T_5 to T_7 may each be C;
10) in Formulae CY2-3 and CY2-4, T_4 and T_8 may each be N, and T_1 and T_5 to T_7 may each be C;
11) in Formula CY2-5, one of T_1 and T_8 may be N, and the remaining T_1, T_2, and T_5 to T_8 that are not N may each be C;
12) in Formula CY2-5, T_1 and T_8 may each be N, and T_2 and T_5 to T_7 may each be C;
13) in Formula CY2-6, one of T_4 and T_8 may be N, and the remaining T_3 to T_8 that are not N may each be C; or
14) in Formula CY2-6, T_4 and T_8 may each be N, and T_3 and T_5 to T_7 may each be C.

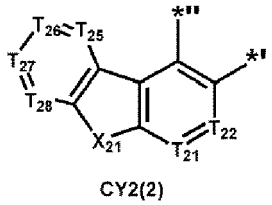
[0119] In one or more embodiments, a group represented by



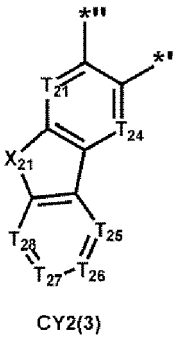
in Formula 2A may be a group represented by one of Formulae CY2(1) to CY2(6):



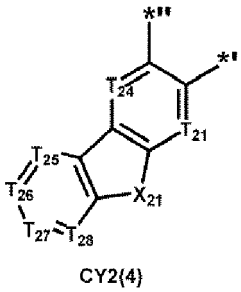
CY2(1)



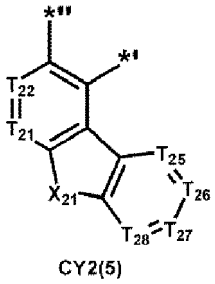
CY2(2)



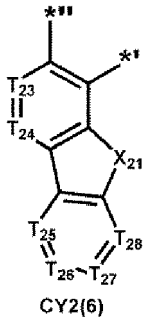
CY2(3)



CY2(4)



CY2(5)

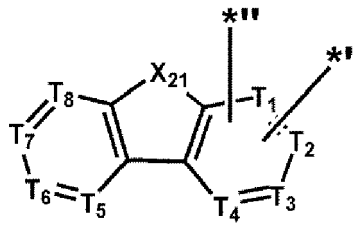


CY2(6)

wherein, in Formulae CY2(1) to CY2(6),
T_{21} may be N, $C(Z_{21})$, or $C(Ar_{21})$, T_{22} may be N, $C(Z_{22})$, or $C(Ar_{22})$, T_{23} may be N, $C(Z_{23})$, or $C(Ar_{23})$, T_{24} may be N, $C(Z_{24})$, or $C(Ar_{24})$, T_{25} may be N, $C(Z_{25})$, or $C(Ar_{25})$, T_{26} may be N, $C(Z_{26})$, or $C(Ar_{26})$, T_{27} may be N, $C(Z_{27})$, or $C(Ar_{27})$, and T_{28} may be N, $C(Z_{28})$, or $C(Ar_{28})$,
the number of N(s) among T_{23} to T_{28} in Formulae CY2(1) and CY2(6) may be 0 or 1, the number of N(s) among T_{21}, T_{22}, T_{25}, T_{26}, T_{27}, and T_{28} in Formulae CY2(2) and CY2(5) may be 0 or 1, and the number of N(s) among T_{21}, T_{24}, T_{25}, T_{26}, T_{27}, and T_{28} in Formulae CY2(3) and CY2(4) may be 0 or 1,
X_{21} is the same as X_{21} described herein,
Z_{21} to Z_{28} are each the same as described in connection with Z_2,
Ar_{21} to Ar_{28} are each the same as described in connection with Ar_2,
Formulae CY2(1) and CY2(6) may each include at least one of Ar_{23} to Ar_{28}, Formulae CY2(2) and CY2(5) may each include at least one of Ar_{21}, Ar_{22}, Ar_{25}, Ar_{26}, Ar_{27}, and Ar_{28}, Formulae CY2(3) and CY2(4) may each include at least one of Ar_{21}, Ar_{24}, Ar_{25}, Ar_{26}, Ar_{27}, and Ar_{28},

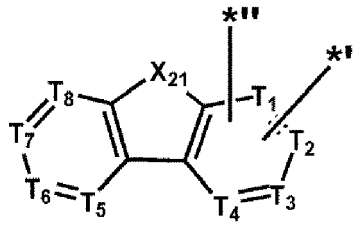
*" indicates a binding site to ring CY_1 in Formula 2A, and
*' indicates a binding site to M in Formula 1.

[0120] In one or more embodiments, a group represented by



in Formula 2A may be a group represented by one of Formulae CY2(1) to CY2(6), and may satisfy at least one of Conditions 1-1 to 1-8.

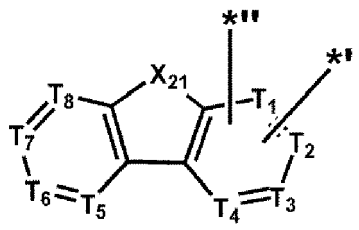
[0121] Condition 1-1: T_{28} in Formulae CY2(1) to CY2(6) is $C(Ar_{28})$.
[0122] Condition 1-2: T_{27} in Formulae CY2(1) to CY2(6) is $C(Ar_{27})$.
[0123] Condition 1-3: T_{26} in Formulae CY2(1) to CY2(6) is $C(Ar_{26})$.
[0124] Condition 1-4: T_{25} in Formulae CY2(1) to CY2(6) is $C(Ar_{25})$
[0125] Condition 1-5: T_{24} in Formulae CY2(1), CY2(3), CY2(4), and CY2(6) is $C(Ar_{24})$.
[0126] Condition 1-6: T_{23} in Formulae CY2(1) and CY2(6) is $C(Ar_{23})$.
[0127] Condition 1-7: T_{22} in Formulae CY2(2) and CY2(5) is $C(Ar_{22})$.
[0128] Condition 1-8: T_{21} in Formulae CY2(2) to CY2(5) is $C(Ar_{21})$.
[0129] In one or more embodiments, a group represented by



in Formula 2A may be a group represented by one of Formulae CY2(1) to CY2(6), and may satisfy at least one of Conditions 2-1 to 2-8:

Condition 2-1: in Formulae CY2(1) to CY2(6), T_{28} is $C(Z_{28})$, and Z_{28} is not hydrogen.
Condition 2-2: in Formulae CY2(1) to CY2(6), T_{27} is $C(Z_{27})$, and Z_{27} is not hydrogen.
Condition 2-3: in Formulae CY2(1) to CY2(6), T_{26} is $C(Z_{26})$, and Z_{26} is not hydrogen.
Condition 2-4: in Formulae CY2(1) to CY2(6), T_{25} is $C(Z_{25})$, and Z_{25} is not hydrogen.
Condition 2-5: in Formulae CY2(1), CY2(3), CY2(4), and CY2(6), T_{24} is $C(Z_{24})$, and Z_{24} is not hydrogen.
Condition 2-6: in Formulae CY2(1) and CY2(6), T_{23} is $C(Z_{23})$, and Z_{23} is not hydrogen.
Condition 2-7: in Formulae CY2(2) and CY2(5), T_{22} is $C(Z_{22})$, and Z_{22} is not hydrogen.
Condition 2-8: in Formulae CY2(2) to CY2(5), T_{21} is $C(Z_{21})$, and Z_{21} is not hydrogen.

[0130] In one or more embodiments, a group represented by



in Formula 2A may be a group represented by one of Formulae CY2(1) to CY2(6), and may satisfy one of Conditions 3-1 to 3-9.

[0131] Condition 3-1: each of T_{21} to T_{28} in Formulae CY2(1) to CY2(6) is not N.

[0132] Condition 3-2: T_{28} in Formulae CY2(1) to CY2(6) is N.

[0133] Condition 3-3: T_{27} in Formulae CY2(1) to CY2(6) is N.

[0134] Condition 3-4: T_{26} in Formulae CY2(1) to CY2(6) is N.

[0135] Condition 3-5: T_{25} in Formulae CY2(1) to CY2(6) is N.

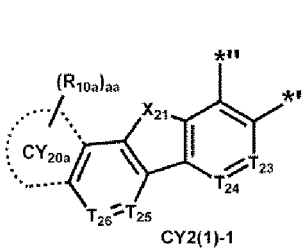
[0136] Condition 3-6: T_{24} in Formulae CY2(1), CY2(3), CY2(4), and CY2(6) is N.

[0137] Condition 3-7: T_{23} in Formulae CY2(1) and CY2(6) is N.

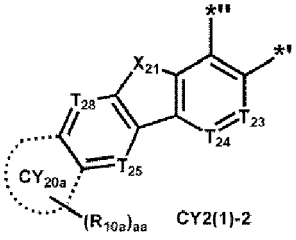
[0138] Condition 3-8: T_{22} in Formulae CY2(2) and CY2(5) is N.

[0139] Condition 3-9: T_{21} in Formulae CY2(2) to CY2(5) is N.

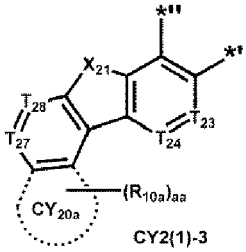
[0140] In one or more embodiments, a group represented by Formula CY2(1) may be a group represented by one of Formulae CY2(1)-1 to CY2(1)-4, a group represented by Formula CY2(2) may be a group represented by one of Formulae CY2(2)-1 to CY2(2)-4, a group represented by Formula CY2(3) may be a group represented by one of Formulae CY2(3)-1 to CY2(3)-3, a group represented by Formula CY2(4) may be a group represented by one of Formulae CY2(4)-1 to CY2(4)-3, a group represented by Formula CY2(5) may be a group represented by one of Formulae CY2(5)-1 to CY2(5)-4, and a group represented by Formula CY2(6) may be a group represented by one of Formulae CY2(6)-1 to CY2(6)-4:



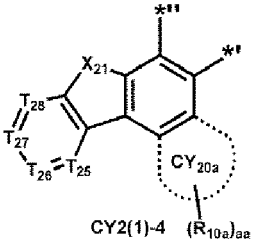
CY2(1)-1



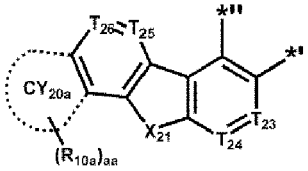
CY2(1)-2



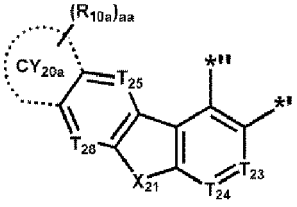
CY2(1)-3



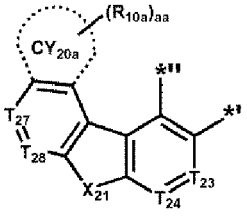
CY2(1)-4



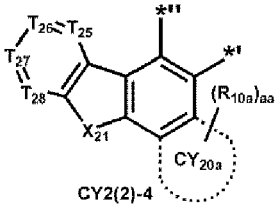
CY2(2)-1



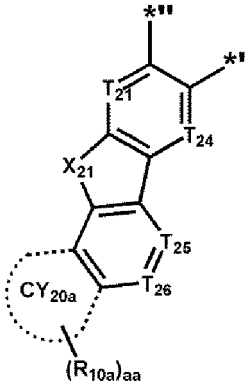
CY2(2)-2



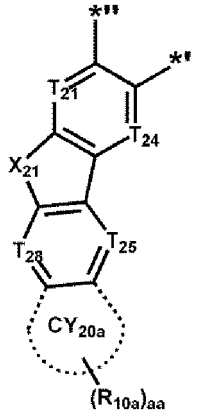
CY2(2)-3



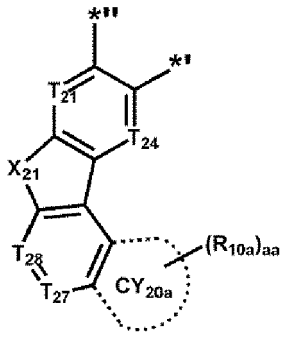
CY2(2)-4



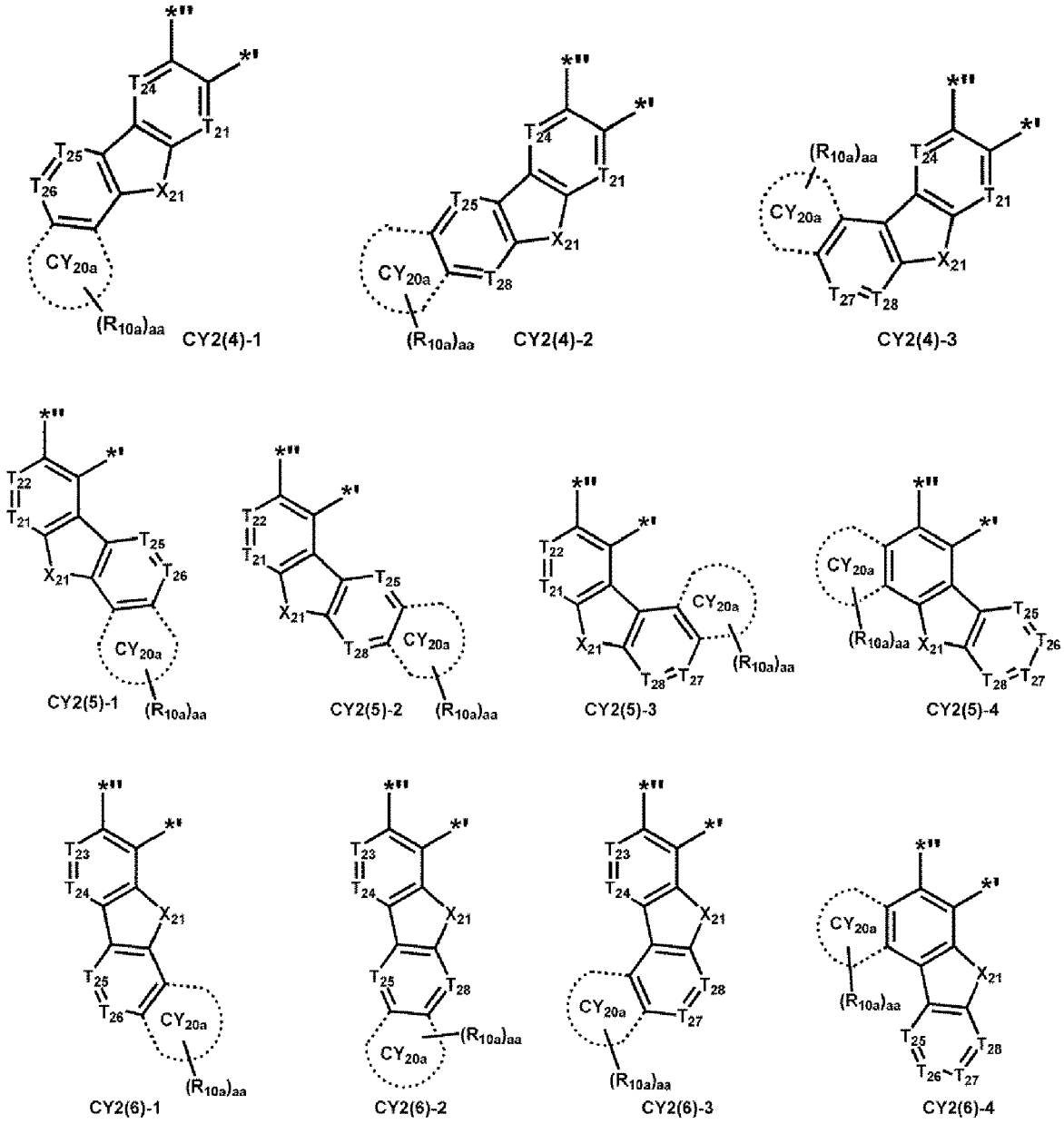
CY2(3)-1



CY2(3)-2



CY2(3)-3



wherein, in Formulae CY2(1)-1 to CY2(1)-4, CY2(2)-1 to CY2(2)-4, CY2(3)-1 to CY2(3)-3, CY2(4)-1 to CY2(4)-3, CY2(5)-1 to CY2(5)-4, and CY2(6)-1 to CY2(6)-4,

T_{21} to T_{28}, X_{21}, *", and *' are respectively the same as those described in connection with Formulae CY2(1) to CY2(6),

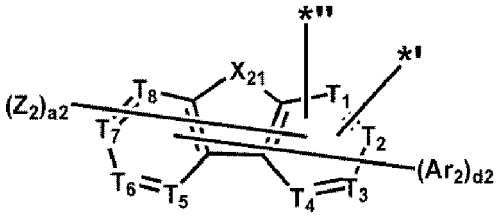
ring CY_{20a} may be a C_5-C_{30} carbocyclic group or a C_1-C_{30} heterocyclic group,

R_{10a} is the same as R_{10a} described herein, and

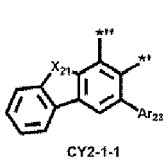
aa may be an integer from 0 to 10.

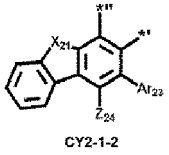
[0141] For example, ring CY_{20a} may be a cyclohexane group, a norbornane group, a benzene group, or a naphthalene group.

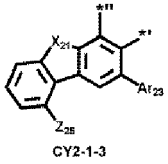
[0142] In one or more embodiments, a group represented by

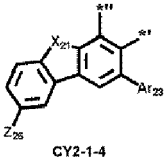


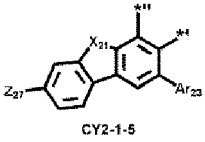
in Formula 2A may be a group represented by one of CY2-1-1 to CY2-1-65, CY2-2-1 to CY2-2-65, CY2-3-1 to CY2-3-65, CY2-4-1 to CY2-4-65, CY2-5-1 to CY2-5-65, CY2-6-1 to CY2-6-65, and CY2-1-1N to CY2-1-25N:

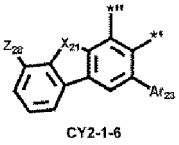

CY2-1-1

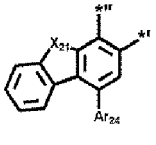

CY2-1-2

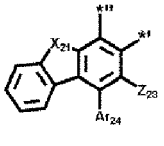

CY2-1-3

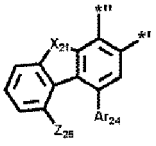

CY2-1-4

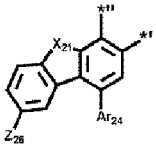

CY2-1-5

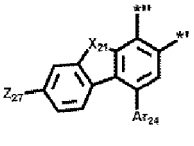

CY2-1-6

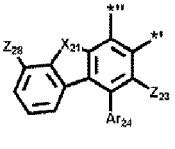

CY2-1-7

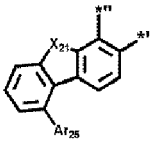

CY2-1-8

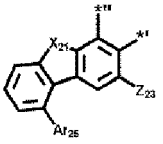

CY2-1-9

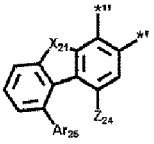

CY2-1-10

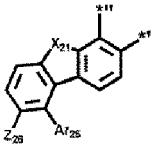

CY2-1-11

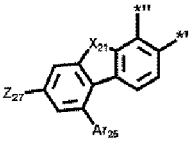

CY2-1-12

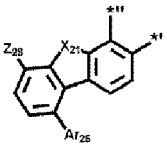

CY2-1-13

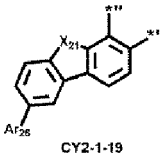

CY2-1-14

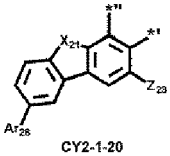

CY2-1-15

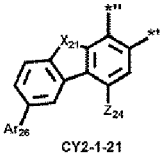

CY2-1-16

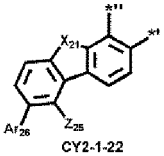

CY2-1-17

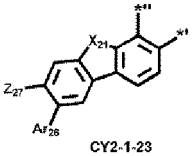

CY2-1-18

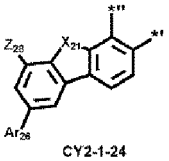

CY2-1-19

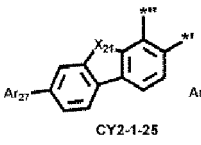

CY2-1-20

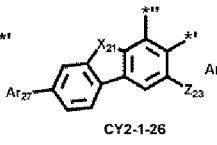

CY2-1-21

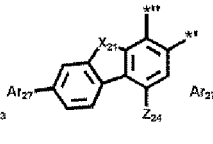

CY2-1-22

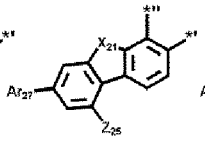

CY2-1-23

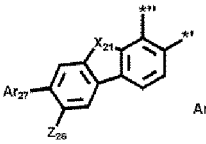

CY2-1-24

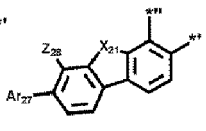

CY2-1-25

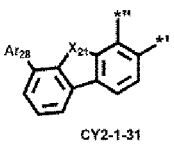

CY2-1-26

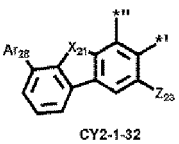

CY2-1-27

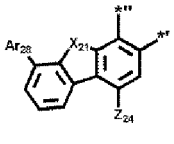

CY2-1-28

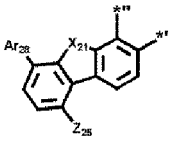

CY2-1-29

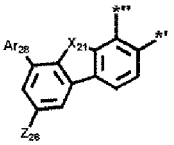

CY2-1-30

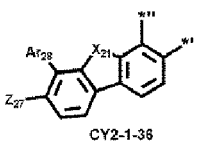

CY2-1-31

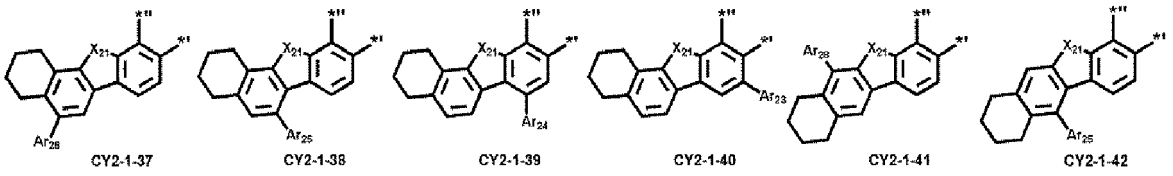

CY2-1-32

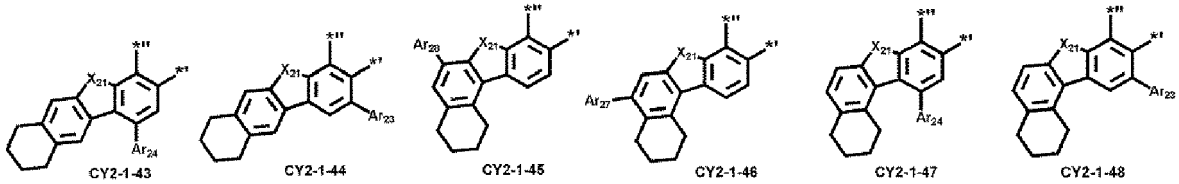

CY2-1-33

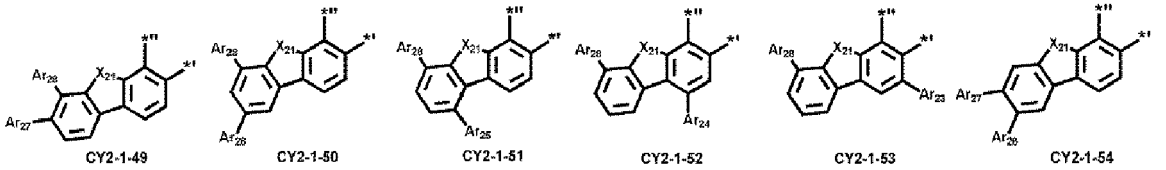

CY2-1-34

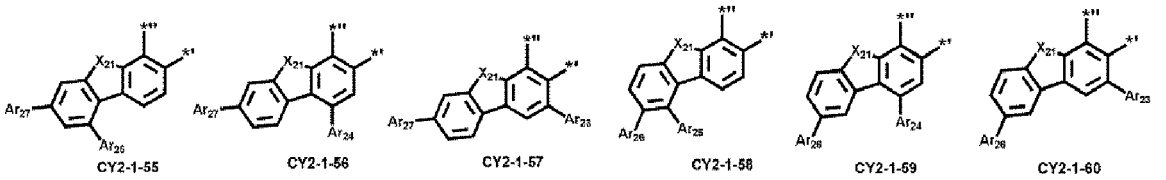

CY2-1-35

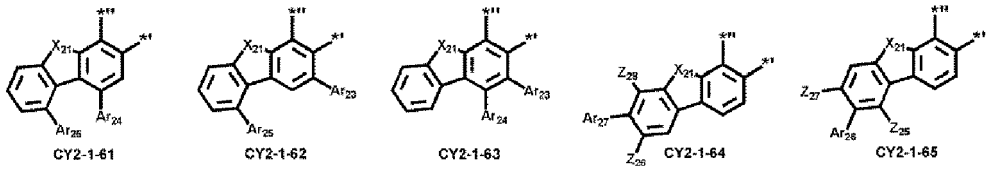

CY2-1-36

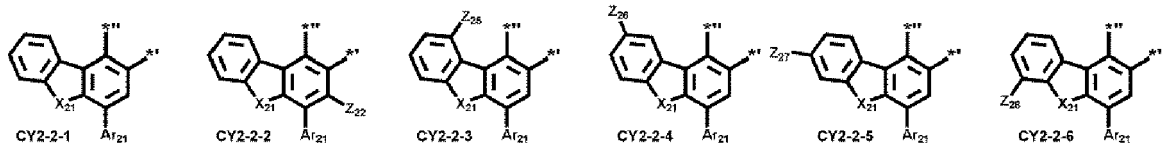

CY2-1-37 CY2-1-38 CY2-1-39 CY2-1-40 CY2-1-41 CY2-1-42

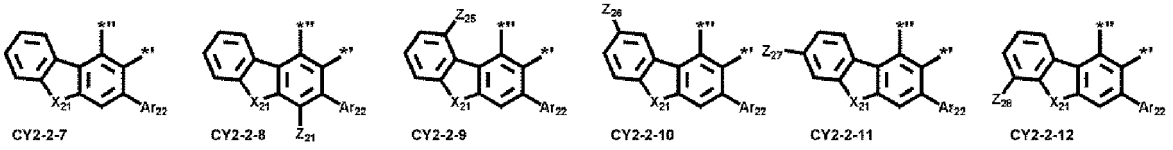

CY2-1-43 CY2-1-44 CY2-1-45 CY2-1-46 CY2-1-47 CY2-1-48

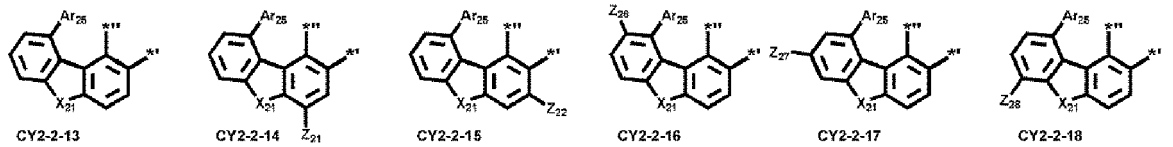

CY2-1-49 CY2-1-50 CY2-1-51 CY2-1-52 CY2-1-53 CY2-1-54

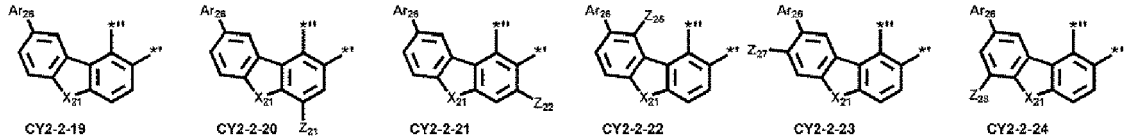

CY2-1-55 CY2-1-56 CY2-1-57 CY2-1-58 CY2-1-59 CY2-1-60

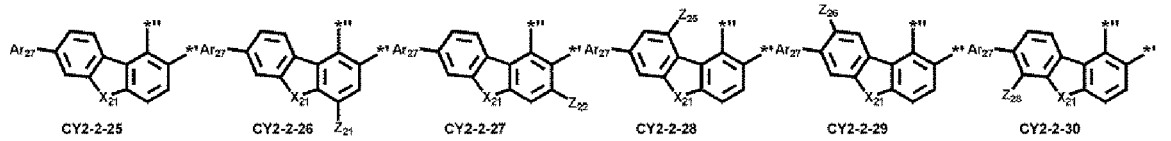

CY2-1-61 CY2-1-62 CY2-1-63 CY2-1-64 CY2-1-65

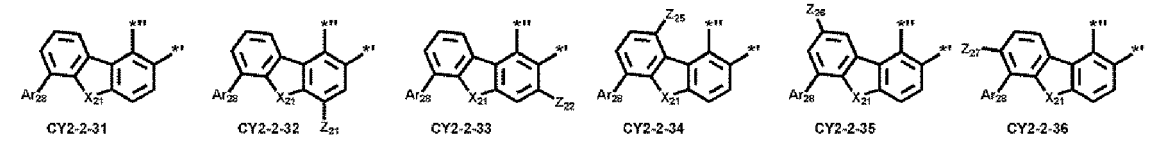

CY2-2-1 CY2-2-2 CY2-2-3 CY2-2-4 CY2-2-5 CY2-2-6

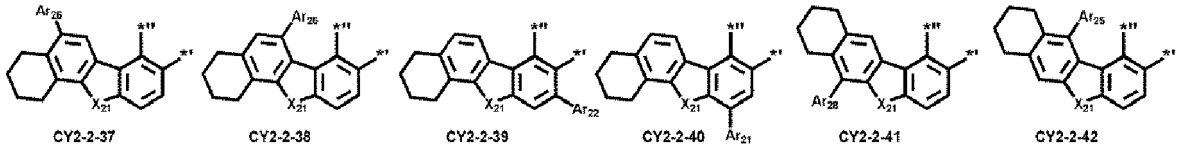

CY2-2-7 CY2-2-8 CY2-2-9 CY2-2-10 CY2-2-11 CY2-2-12

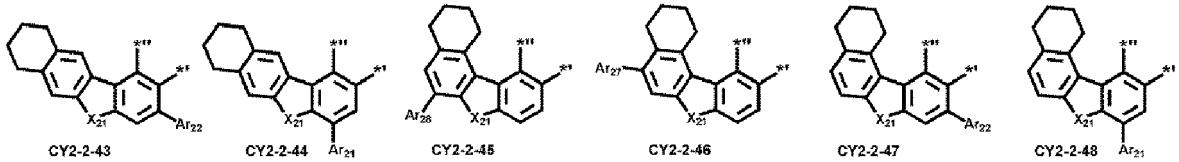

CY2-2-13 CY2-2-14 CY2-2-15 CY2-2-16 CY2-2-17 CY2-2-18

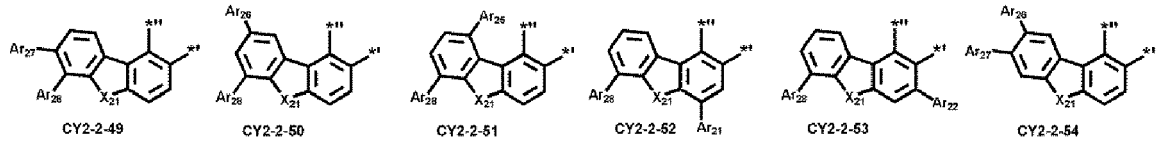

CY2-2-19 CY2-2-20 CY2-2-21 CY2-2-22 CY2-2-23 CY2-2-24

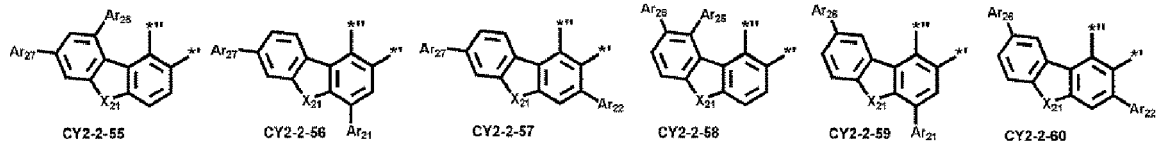

CY2-2-25
CY2-2-26
CY2-2-27
CY2-2-28
CY2-2-29
CY2-2-30

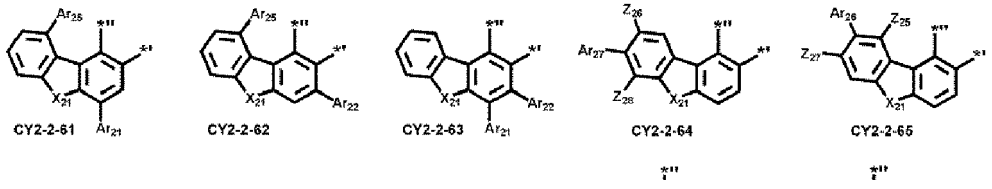

CY2-2-31
CY2-2-32
CY2-2-33
CY2-2-34
CY2-2-35
CY2-2-36

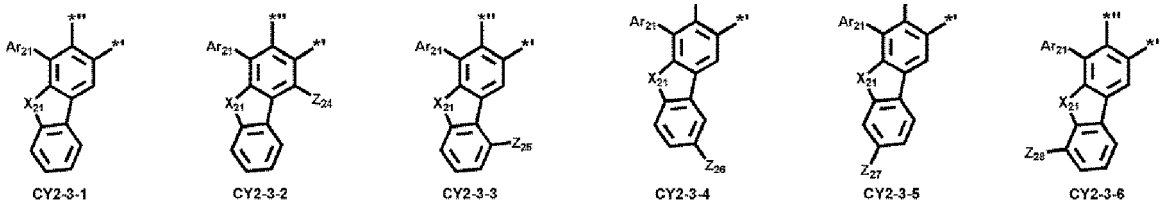

CY2-2-37
CY2-2-38
CY2-2-39
CY2-2-40
CY2-2-41
CY2-2-42

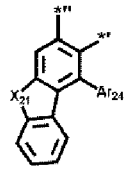

CY2-2-43
CY2-2-44
CY2-2-45
CY2-2-46
CY2-2-47
CY2-2-48

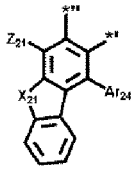

CY2-2-49
CY2-2-50
CY2-2-51
CY2-2-52
CY2-2-53
CY2-2-54

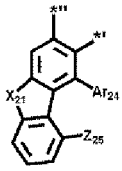

CY2-2-55
CY2-2-56
CY2-2-57
CY2-2-58
CY2-2-59
CY2-2-60

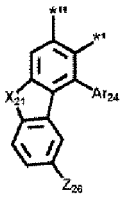

CY2-2-61
CY2-2-62
CY2-2-63
CY2-2-64
CY2-2-65

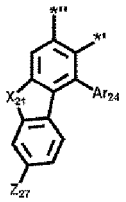

CY2-3-1
CY2-3-2
CY2-3-3
CY2-3-4
CY2-3-5
CY2-3-6

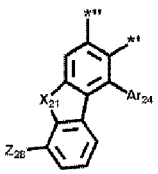

CY2-3-7

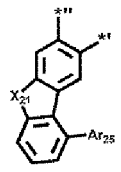

CY2-3-8

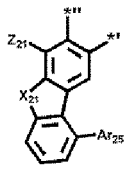

CY2-3-9

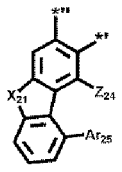

CY2-3-10

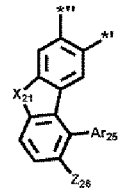

CY2-3-11

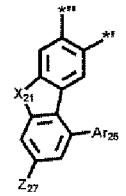

CY2-3-12

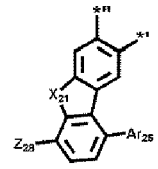

CY2-3-13

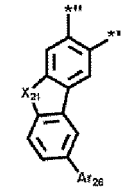

CY2-3-14

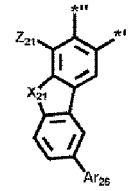

CY2-3-15

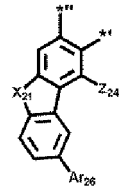

CY2-3-16

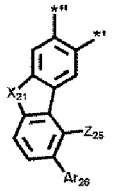

CY2-3-17

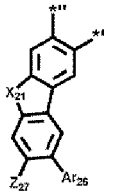

CY2-3-18

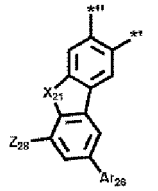

CY2-3-19

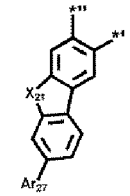

CY2-3-20

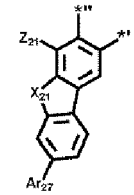

CY2-3-21

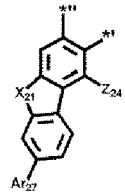

CY2-3-22

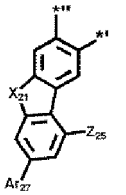

CY2-3-23

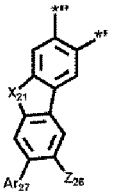

CY2-3-24

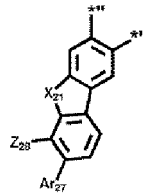

CY2-3-25

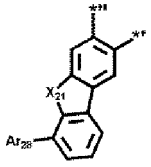

CY2-3-26

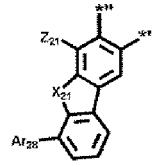

CY2-3-27

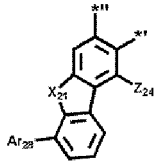

CY2-3-28

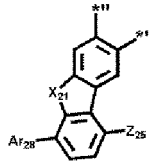

CY2-3-29

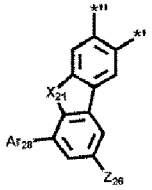

CY2-3-30

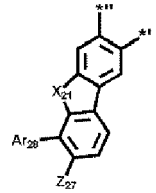

CY2-3-31

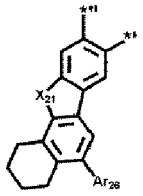

CY2-3-32

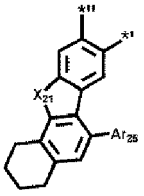

CY2-3-33

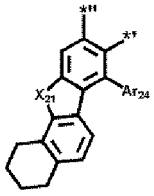

CY2-3-34

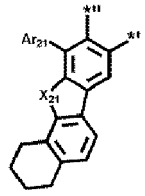

CY2-3-35

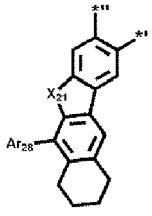

CY2-3-36

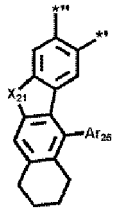

CY2-3-37

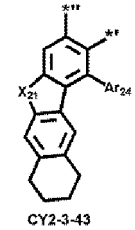

CY2-3-38

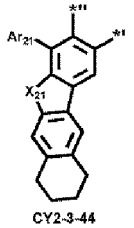

CY2-3-39

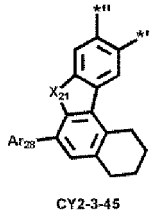

CY2-3-40

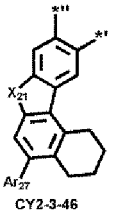

CY2-3-41


CY2-3-42


CY2-3-43

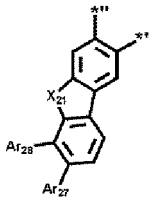

CY2-3-44

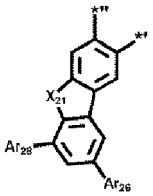

CY2-3-45

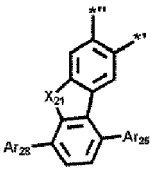

CY2-3-46

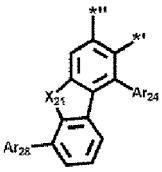
CY2-3-47

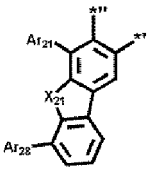
CY2-3-48

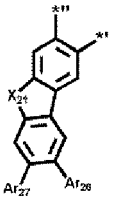

CY2-3-49

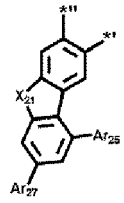

CY2-3-50

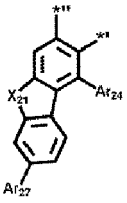

CY2-3-51

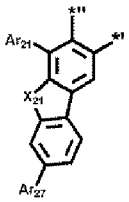

CY2-3-52

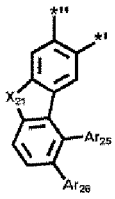

CY2-3-53

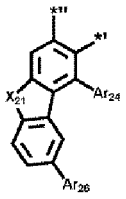

CY2-3-54

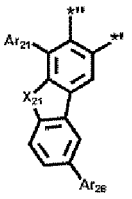

CY2-3-55

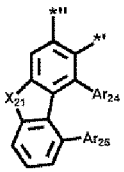

CY2-3-56

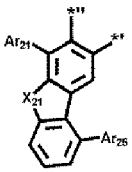

CY2-3-57

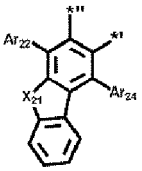

CY2-3-58

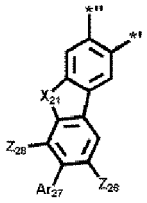

CY2-3-59

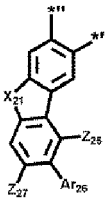

CY2-3-60

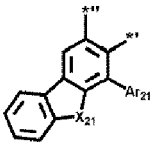

CY2-3-61

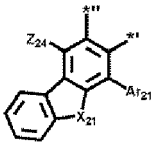

CY2-3-62

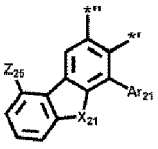

CY2-3-63

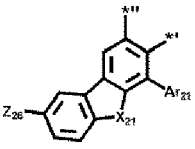

CY2-3-64

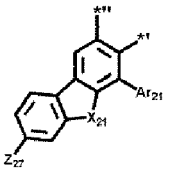

CY2-3-65

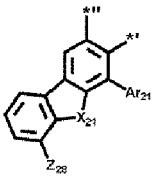

CY2-4-1

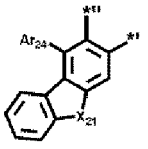

CY2-4-2

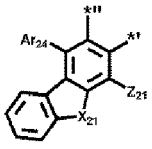

CY2-4-3

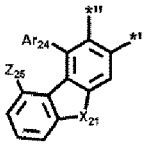

CY2-4-4

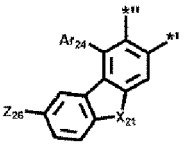

CY2-4-5

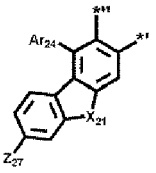

CY2-4-6

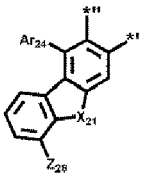

CY2-4-7

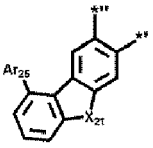

CY2-4-8

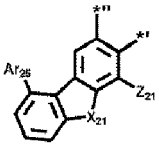

CY2-4-9

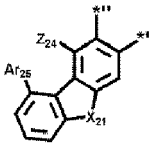

CY2-4-10

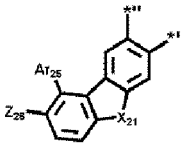

CY2-4-11

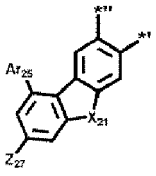

CY2-4-12

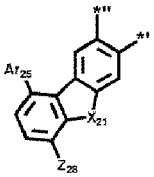

CY2-4-13

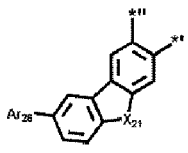

CY2-4-14

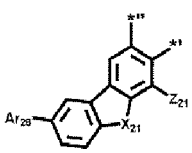

CY2-4-15

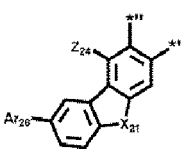

CY2-4-16

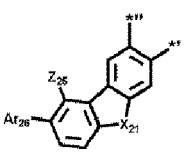

CY2-4-17

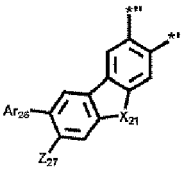

CY2-4-18


CY2-4-19

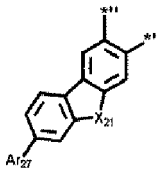

CY2-4-20

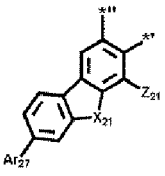

CY2-4-21

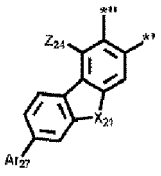

CY2-4-22

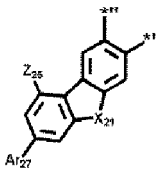

CY2-4-23

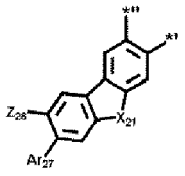
CY2-4-24

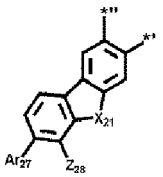

CY2-4-25

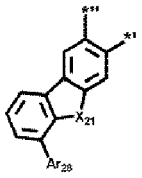

CY2-4-26

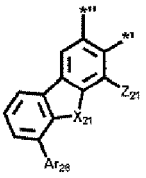

CY2-4-27

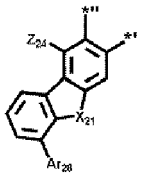

CY2-4-28

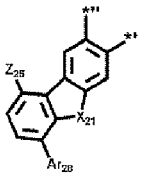

CY2-4-29

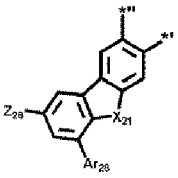

CY2-4-30

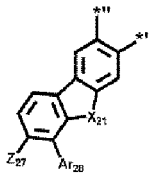

CY2-4-31

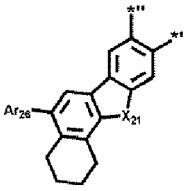

CY2-4-32

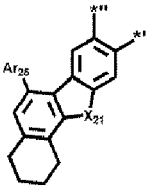

CY2-4-33

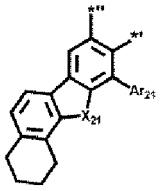

CY2-4-34

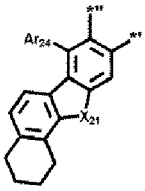

CY2-4-35

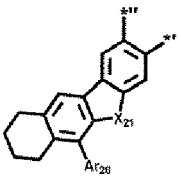

CY2-4-36

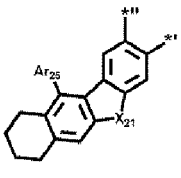

CY2-4-37

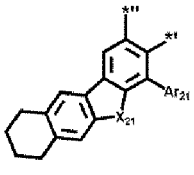

CY2-4-38

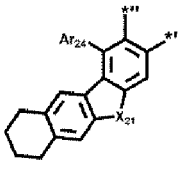

CY2-4-39

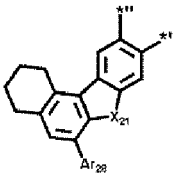

CY2-4-40

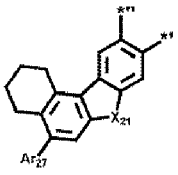

CY2-4-41

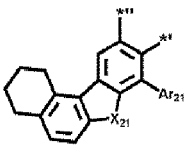

CY2-4-42

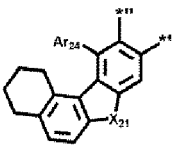

CY2-4-43

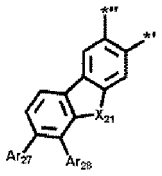

CY2-4-44

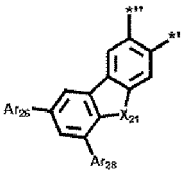

CY2-4-45

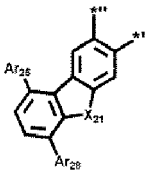

CY2-4-46

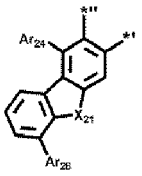

CY2-4-47

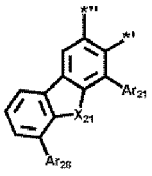

CY2-4-48

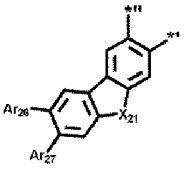

CY2-4-49

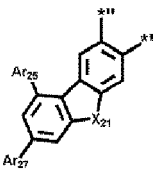

CY2-4-50

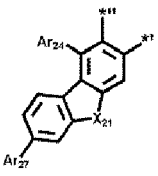

CY2-51

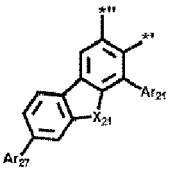

CY2-4-52

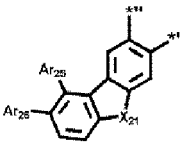

CY2-4-53

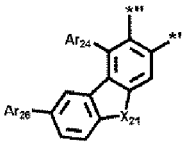

CY2-4-54

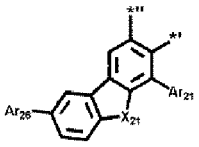

CY2-4-55

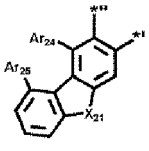

CY2-4-56

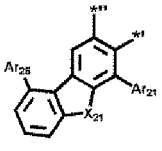

CY2-4-57

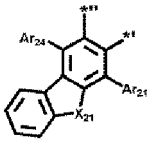

CY2-4-58

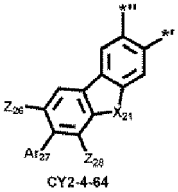

CY2-4-59


CY2-4-60

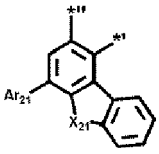

CY2-4-61

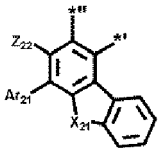

CY2-4-62

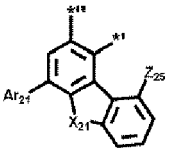

CY2-4-63

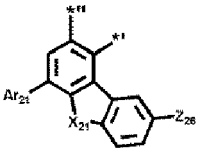

CY2-4-64

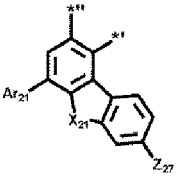
CY2-4-65

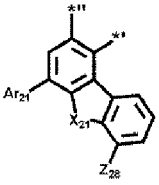

CY2-5-1

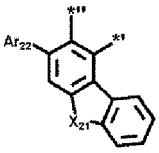

CY2-5-2

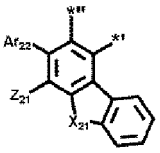

CY2-5-3

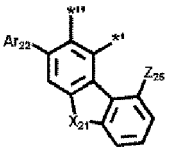

CY2-5-4

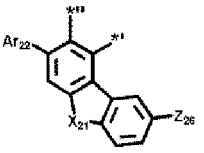

CY2-5-5

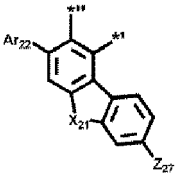

CY2-5-6

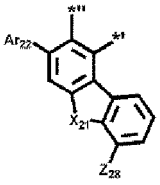

CY2-5-7

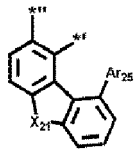

CY2-5-8

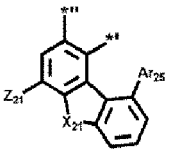

CY2-5-9

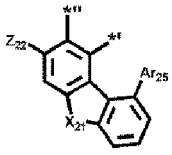

CY2-5-10

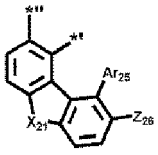

CY2-5-11

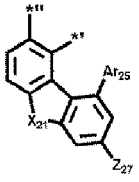

CY2-5-12

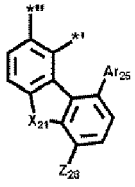

CY2-5-13

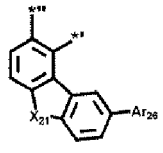

CY2-5-14

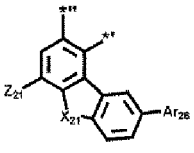

CY2-5-15

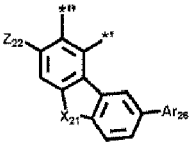

CY2-5-16

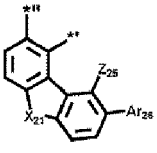

CY2-5-17

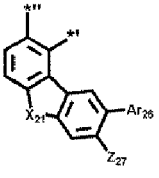

CY2-5-18

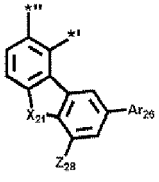

CY2-5-19

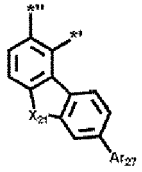

CY2-5-20

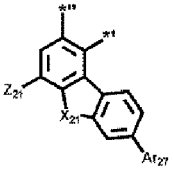

CY2-5-21

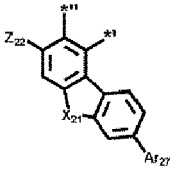

CY2-5-22

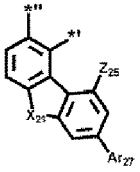

CY2-5-23

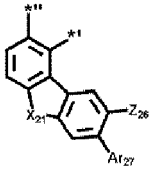

CY2-5-24

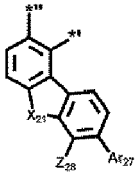

CY2-5-25

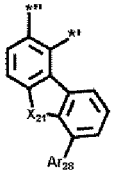

CY2-5-26

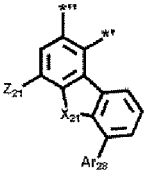

CY2-5-27

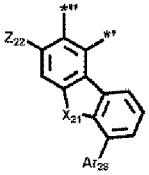

CY2-5-28

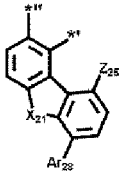

CY2-5-29

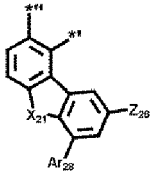

CY2-5-30

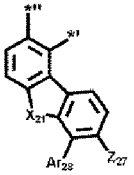

CY2-5-31

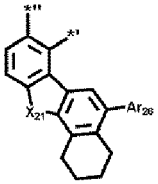

CY2-5-32

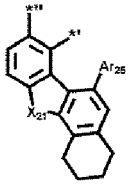

CY2-5-33

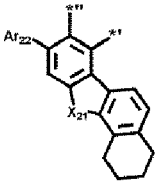

CY2-5-34

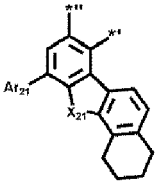

CY2-5-35


CY2-5-36


CY2-5-37

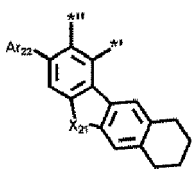

CY2-5-38

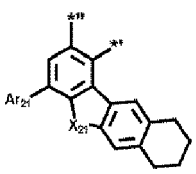

CY2-5-39

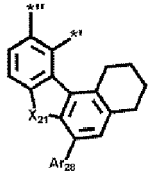

CY2-5-40

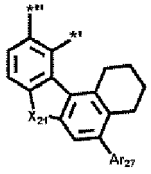
CY2-5-41

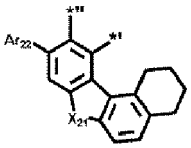
CY2-5-42

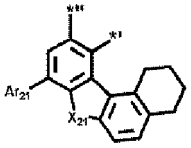

CY2-5-43

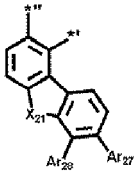

CY2-5-44

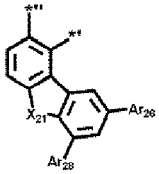

CY2-5-45

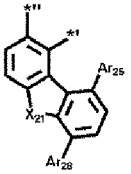

CY2-5-46

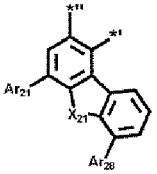

CY2-5-47

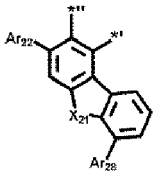

CY2-5-48

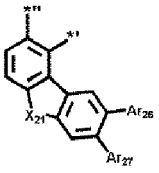

CY2-5-49

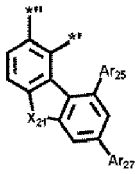

CY2-5-50

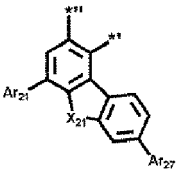

CY2-5-51

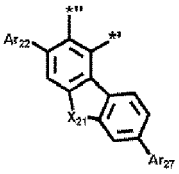

CY2-5-52

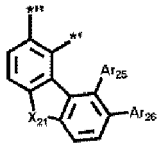

CY2-5-53

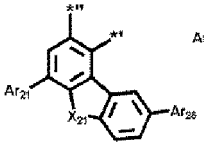

CY2-5-54

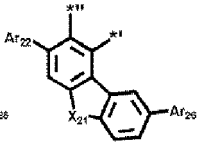

CY2-5-55

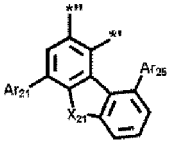

CY2-5-56

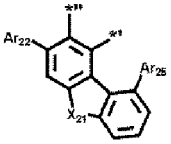

CY2-5-57

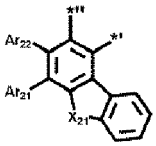

CY2-5-58

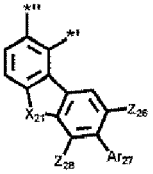

CY2-5-59

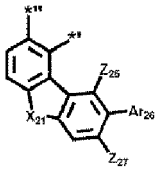

CY2-5-60

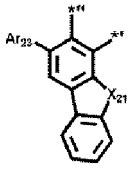

CY2-5-61

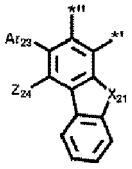

CY2-5-62

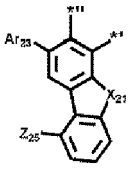

CY2-5-63

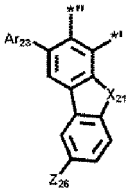

CY2-5-64

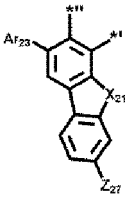

CY2-5-65

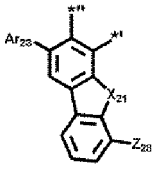

CY2-6-1

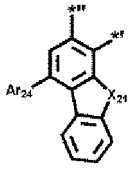

CY2-6-2

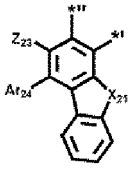

CY2-6-3

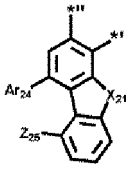

CY2-6-4

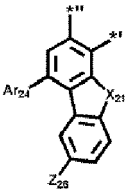

CY2-6-5

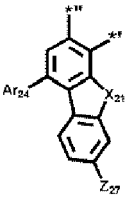

CY2-6-6

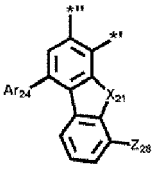

CY2-6-7

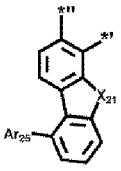

CY2-6-8

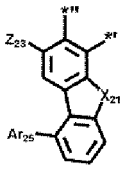

CY2-6-9

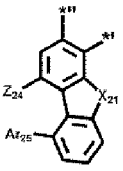

CY2-6-10

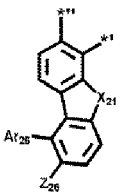

CY2-6-11

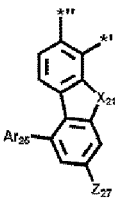

CY2-6-12


CY2-6-13

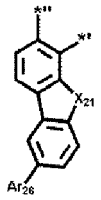

CY2-6-14

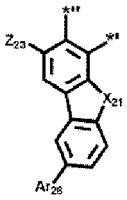

CY2-6-15

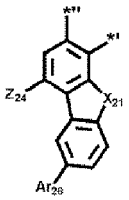

CY2-6-16

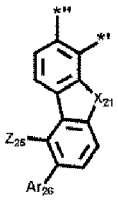

CY2-6-17

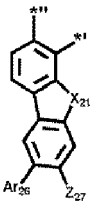
CY2-6-18

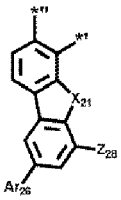

CY2-6-19

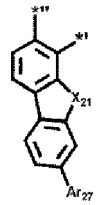

CY2-6-20

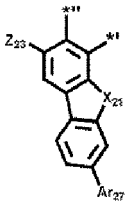

CY2-6-21

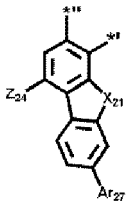

CY2-6-22

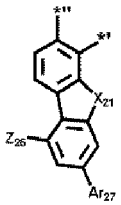

CY2-6-23

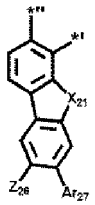

CY2-6-24

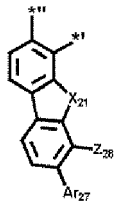

CY2-6-25

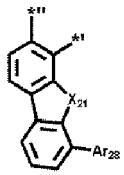

CY2-6-26

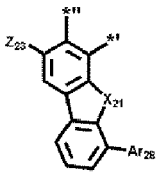

CY2-6-27

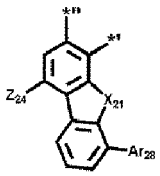

CY2-6-28

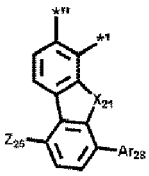

CY2-6-29

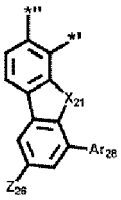

CY2-6-30

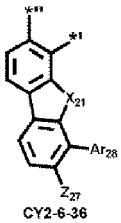

CY2-6-31

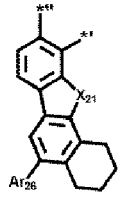

CY2-6-32

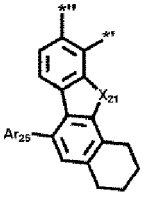

CY2-6-33

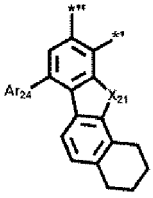

CY2-6-34

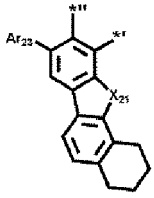

CY2-6-35

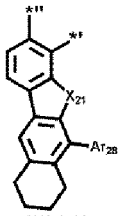

CY2-6-36

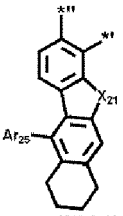

CY2-6-37

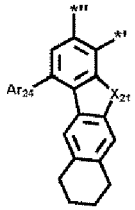

CY2-6-38

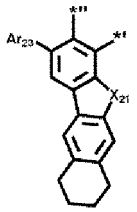

CY2-6-39

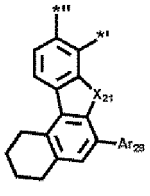

CY2-6-40

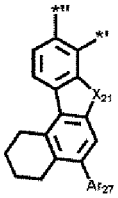

CY2-6-41

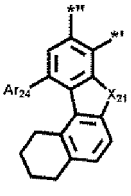

CY2-6-42

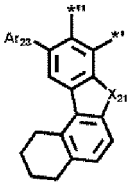

CY2-6-43

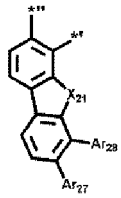

CY2-6-44

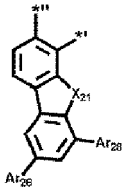

CY2-6-45

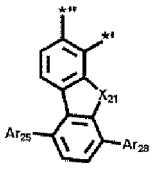

CY2-6-46

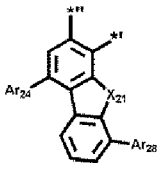

CY2-6-47

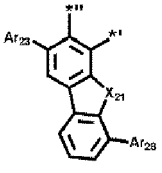

CY2-6-48

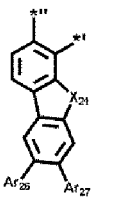

CY2-6-49

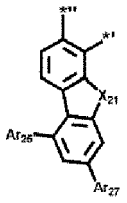

CY2-6-50

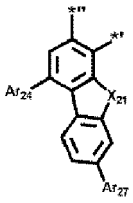

CY2-6-51

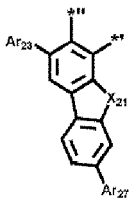

CY2-6-52

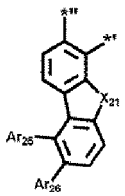

CY2-6-53

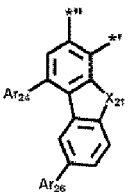

CY2-6-54

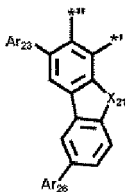

CY2-6-55

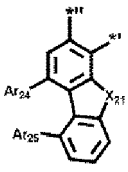

CY2-6-56

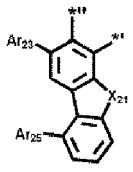

CY2-6-57

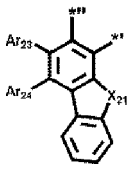

CY2-6-58

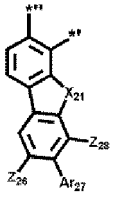

CY2-6-59

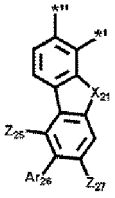

CY2-6-60

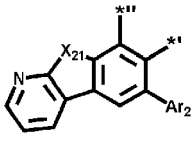

CY2-6-61

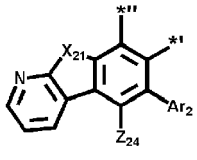

CY2-6-62

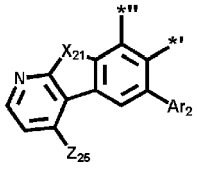

CY2-6-63

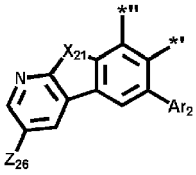

CY2-6-64

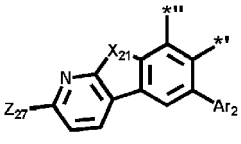

CY2-6-65

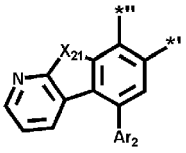

CY2-1-1N

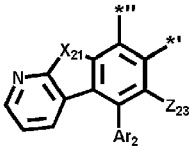

CY2-1-2N

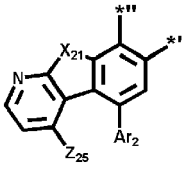

CY2-1-3N

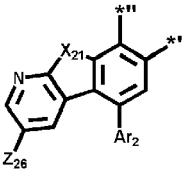

CY2-1-4N

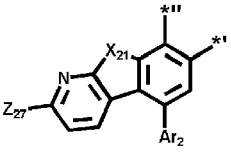

CY2-1-5N

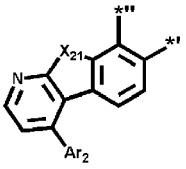

CY2-1-6N

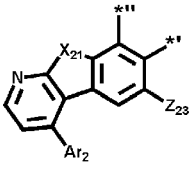

CY2-1-7N

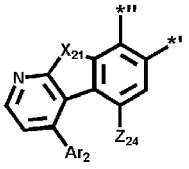

CY2-1-8N

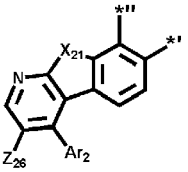

CY2-1-9N

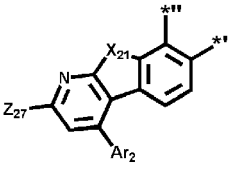

CY2-1-10N

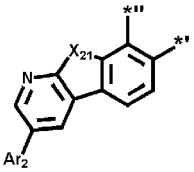

CY2-1-11N

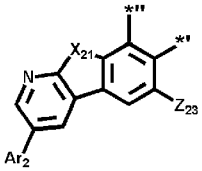

CY2-1-12N

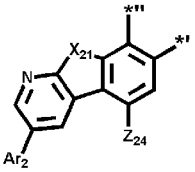

CY2-1-13N

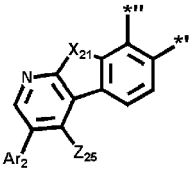

CY2-1-14N

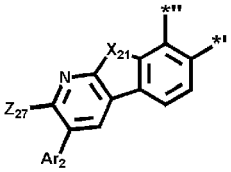

CY2-1-15N

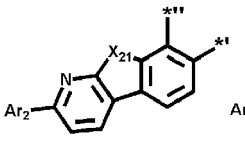

CY2-1-16N

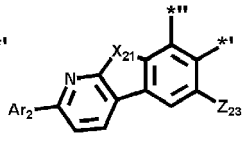

CY2-1-17N

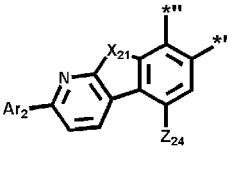

CY2-1-18N

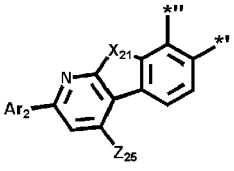

CY2-1-19N

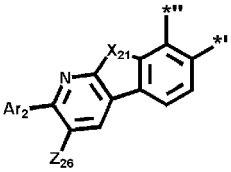

CY2-1-20N


CY2-1-21N


CY2-1-22N

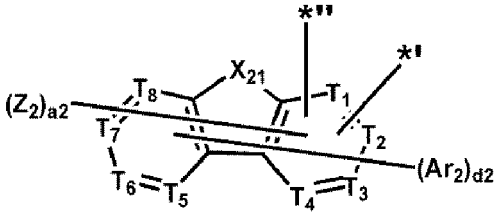

CY2-1-23N


CY2-1-24N


CY2-1-25N

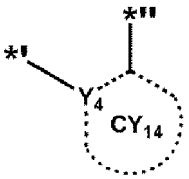
wherein, in Formulae CY2-1-1 to CY2-1-65, CY2-2-1 to CY2-2-65, CY2-3-1 to CY2-3-65, CY2-4-1 to CY2-4-65, CY2-5-1 to CY2-5-65, CY2-6-1 to CY2-6-65, and CY2-1-1N to CY2-1-25N,
X_{21} is the same as X_{21} described herein,
Z_{21} to Z_{28} are each the same as described in connection with Z_2, wherein Z_{21} to Z_{28} may each not be hydrogen,
Ar_{21} to Ar_{28} are each the same as described in connection with Ar_2,
*'' indicates a binding site to ring CY_1 in Formula 2A, and
*' indicates a binding site to M in Formula 1.

[0143] In one or more embodiments, a group represented by

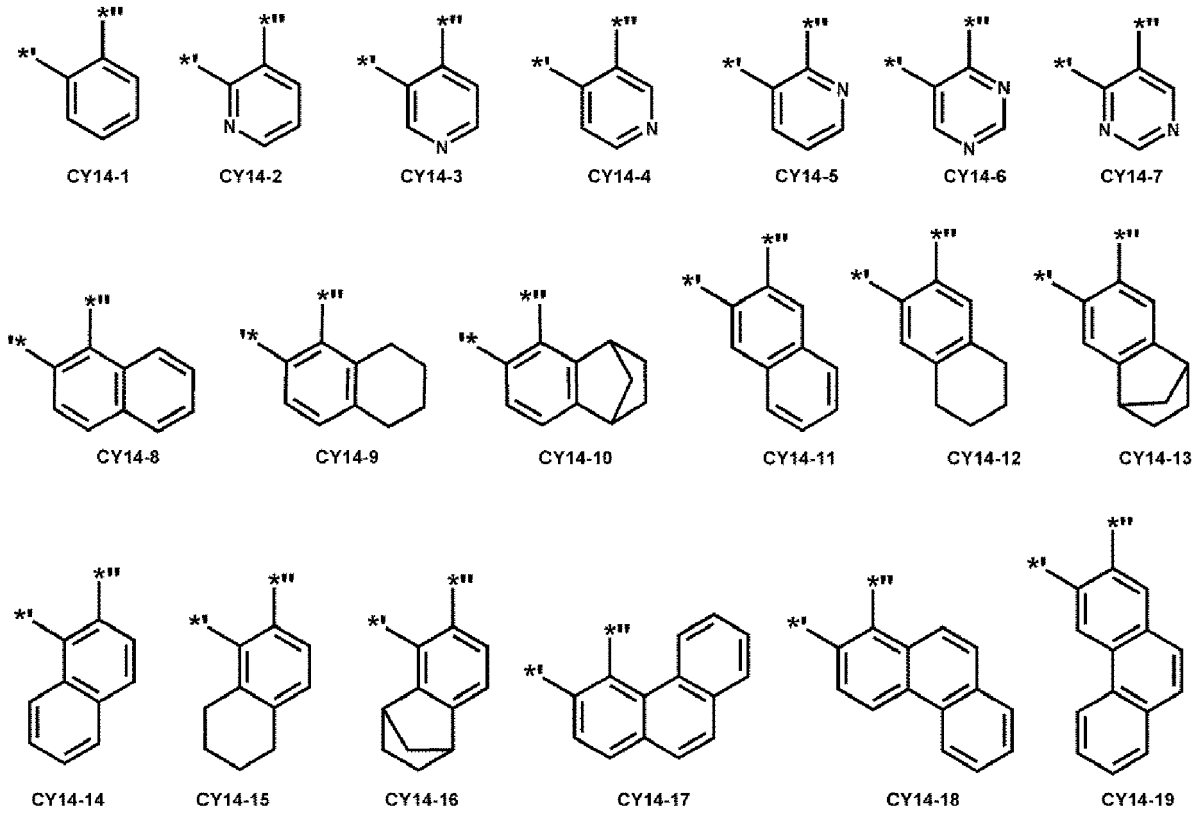


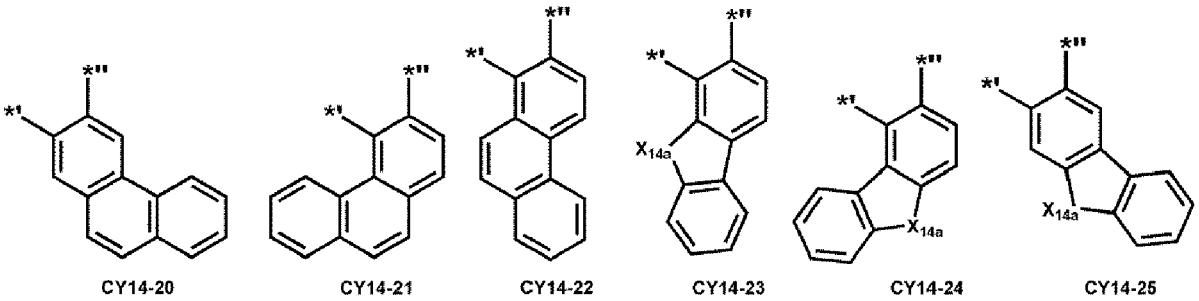
in Formula 2A may be a group represented by Formula CY2-1-25 or CY2-1-21N.

[0144] In one or more embodiments, a group represented by

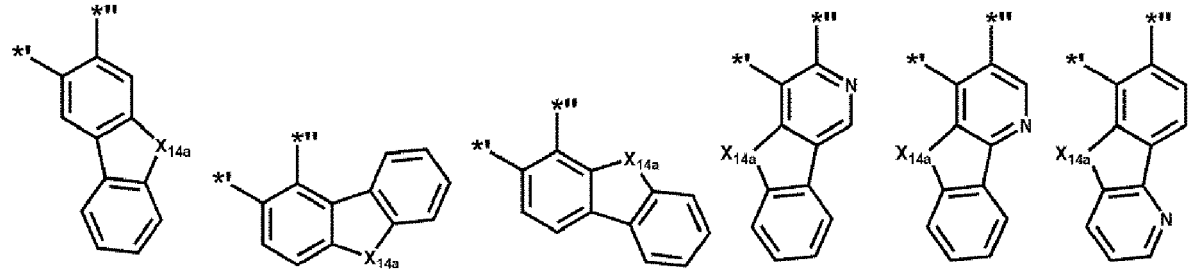


in Formula 2B may be a group represented by one of Formulae CY14-1 to CY14-64:

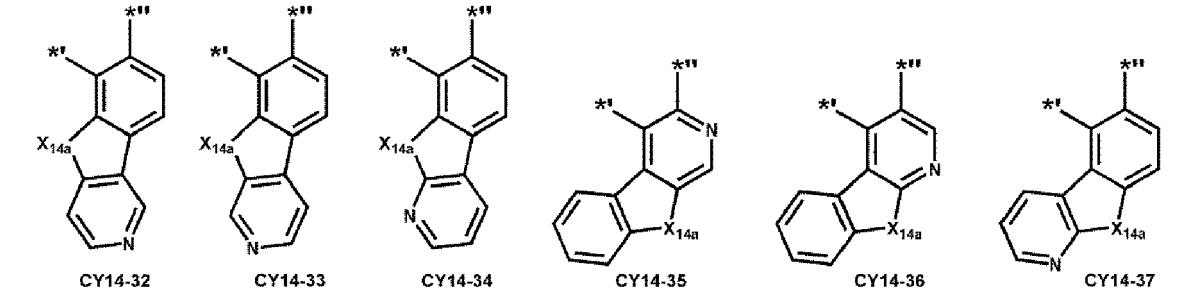




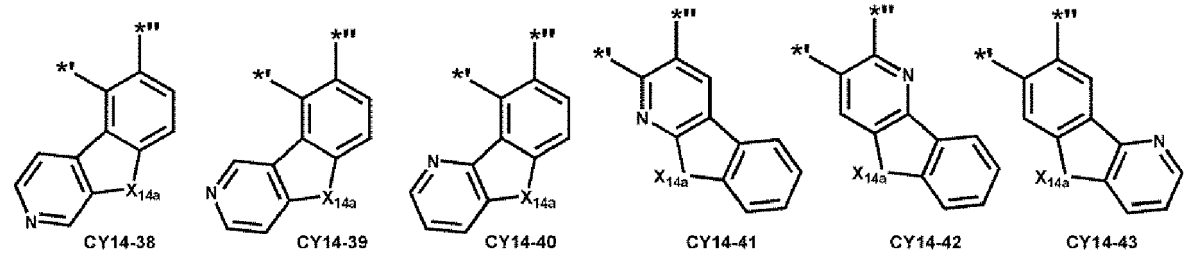
CY14-20 CY14-21 CY14-22 CY14-23 CY14-24 CY14-25



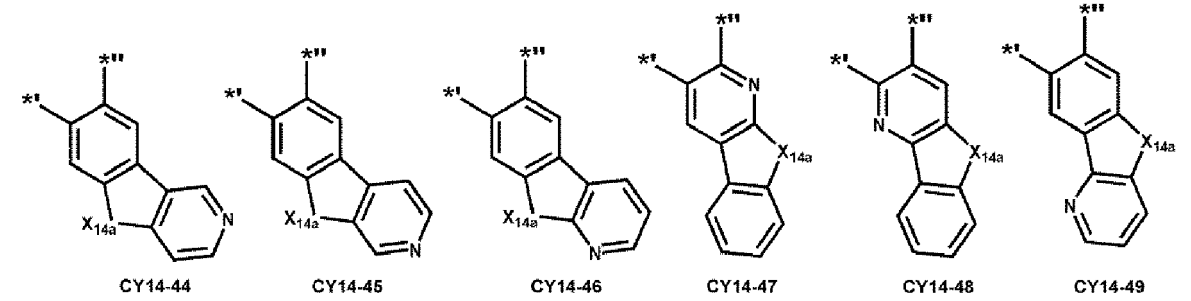
CY14-26 CY14-27 CY14-28 CY14-29 CY14-30 CY14-31



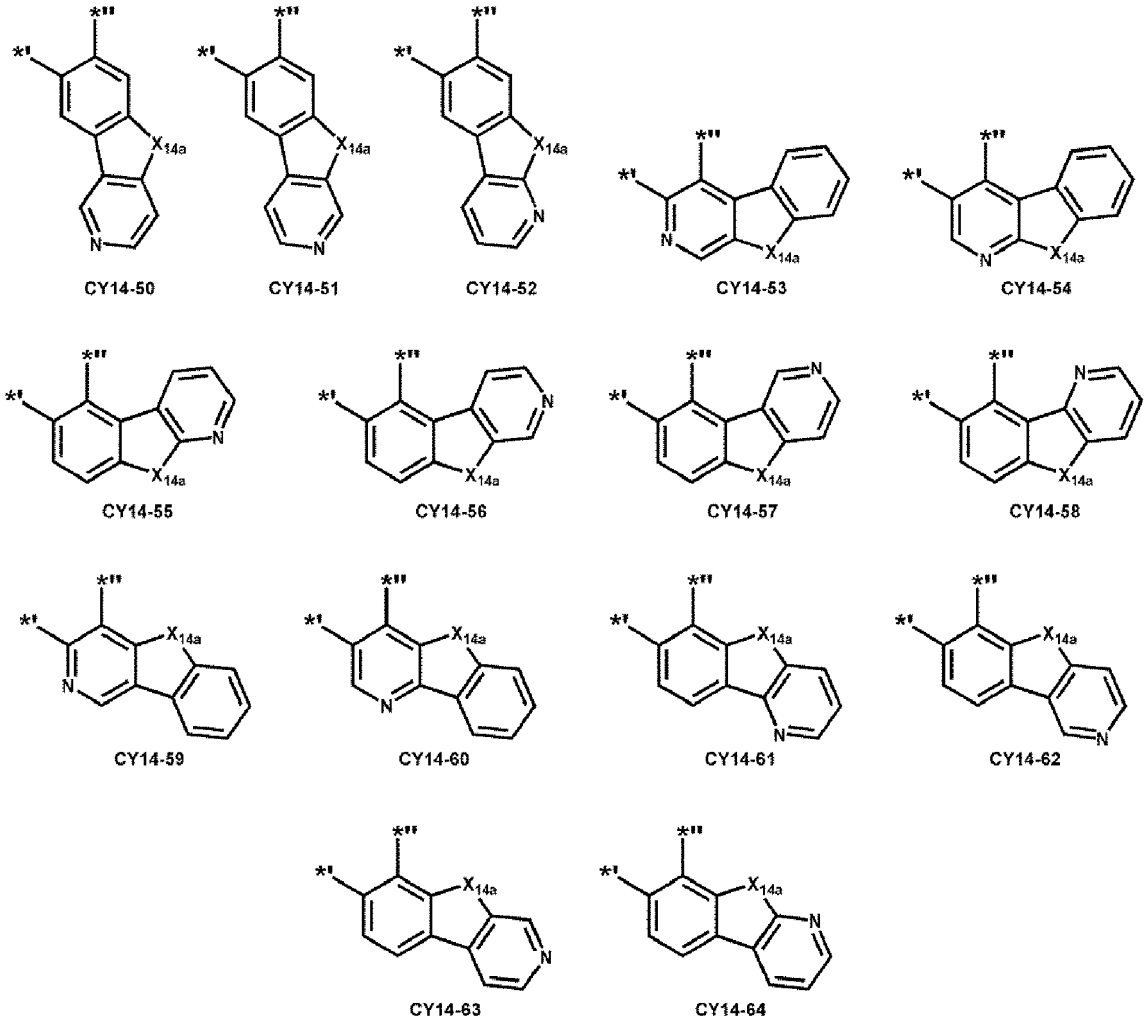
CY14-32 CY14-33 CY14-34 CY14-35 CY14-36 CY14-37



CY14-38 CY14-39 CY14-40 CY14-41 CY14-42 CY14-43



CY14-44 CY14-45 CY14-46 CY14-47 CY14-48 CY14-49

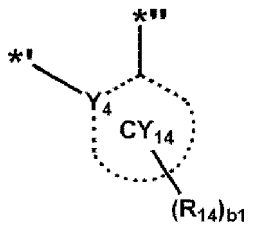


wherein, in Formulae CY14-1 to CY14-64,
X_{14a} may be O, S, N, C, or Si,
*" indicates a binding site to a carbon atom of a neighboring pyridine ring in Formula 2B,
*' indicates a binding site to M in Formula 1, and
each of carbon and X_{14a} in Formulae CY14-1 to CY14-64 may be unsubstituted or substituted with R_{14} as described herein.

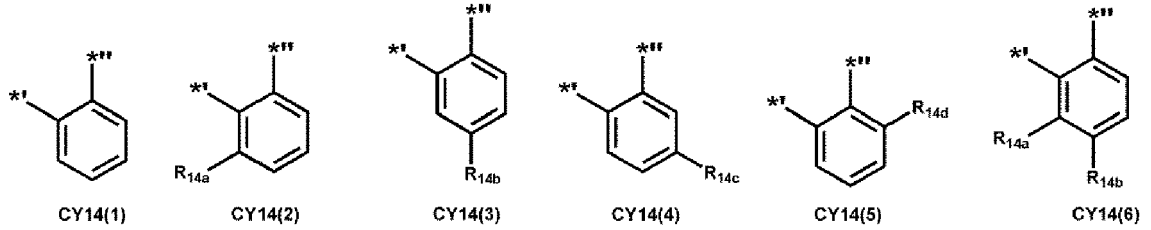
[0145] Alternatively, in Formulae CY14-1 to CY14-64,

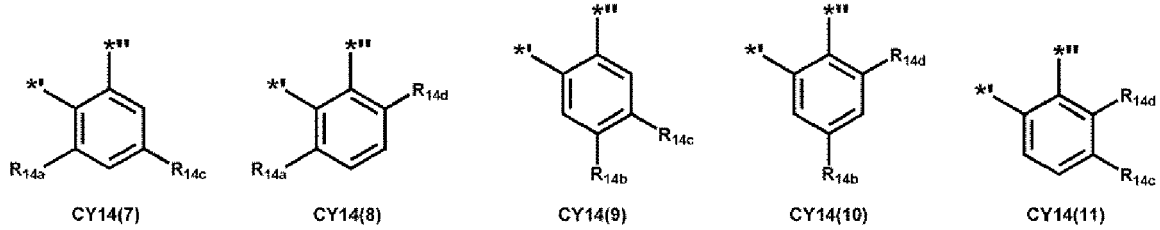
X_{14a} may be O, S, $N(R_{14a})$, $C(R_{14a})(R_{14b})$, or $Si(R_{14a})(R_{14b})$,
R_{14a} and R_{14b} may each independently be the same as described for R_{14} herein,
*" indicates a binding site to a carbon atom of a neighboring pyridine ring in Formula 2B,
*' indicates a binding site to M in Formula 1, and
carbon(s) in Formulae CY14-1 to CY14-64 may be unsubstituted or substituted with R_{14} as described herein.

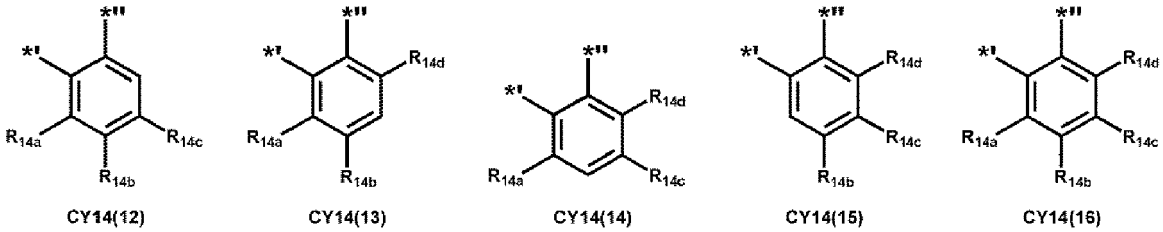
[0146] In one or more embodiments, a group represented by

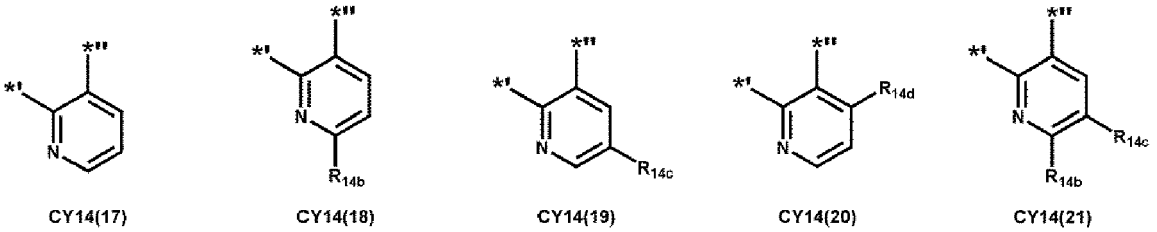


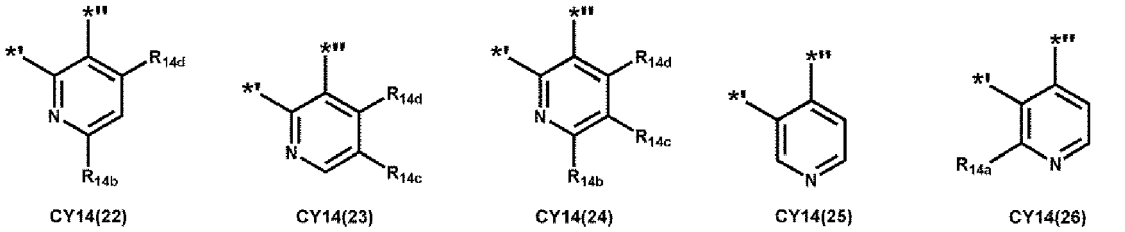
in Formula 2B may be a group represented by one of Formulae CY14(1) to CY14(63):

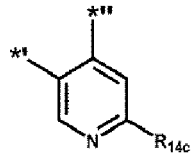




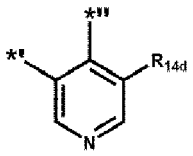




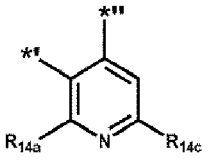




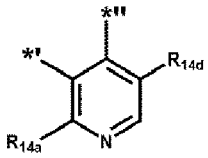
CY14(27)



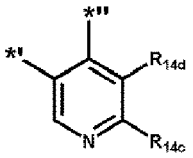
CY14(28)



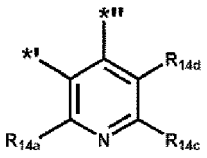
CY14(29)



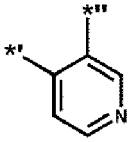
CY14(30)



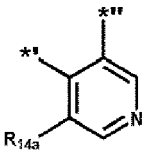
CY14(31)



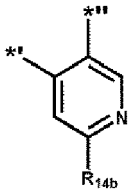
CY14(32)



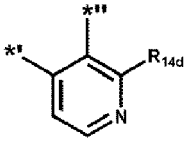
CY14(33)



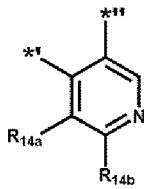
CY14(34)



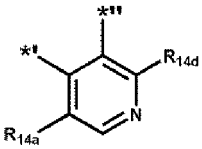
CY14(35)



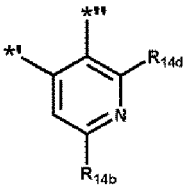
CY14(36)



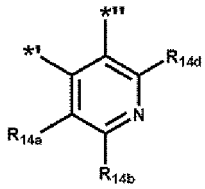
CY14(37)



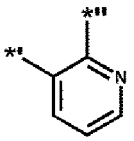
CY14(38)



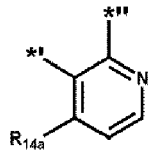
CY14(39)



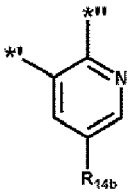
CY14(40)



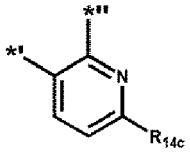
CY14(41)



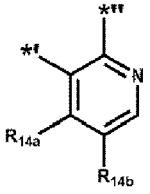
CY14(42)



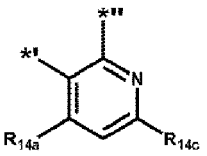
CY14(43)



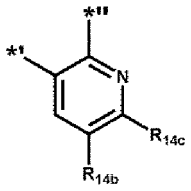
CY14(44)



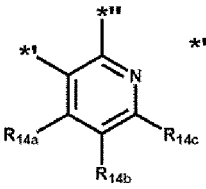
CY14(45)



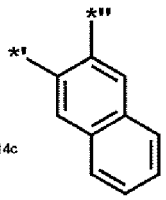
CY14(46)



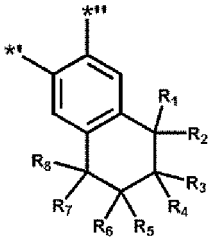
CY14(47)



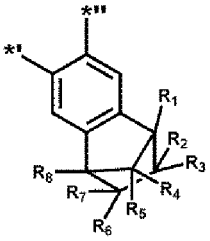
CY14(48)



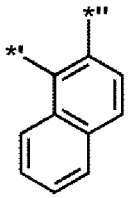
CY14(49)



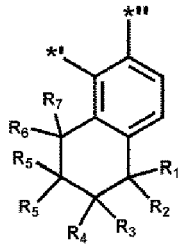
CY14(50)



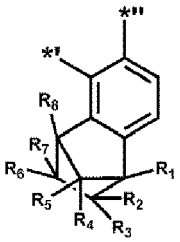
CY14(51)



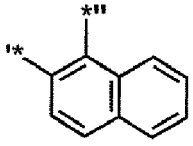
CY14(52)



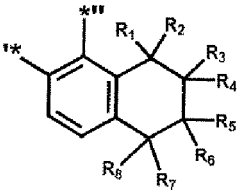
CY14(53)



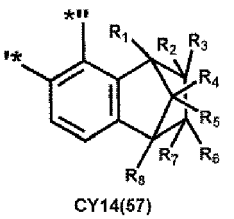
CY14(54)



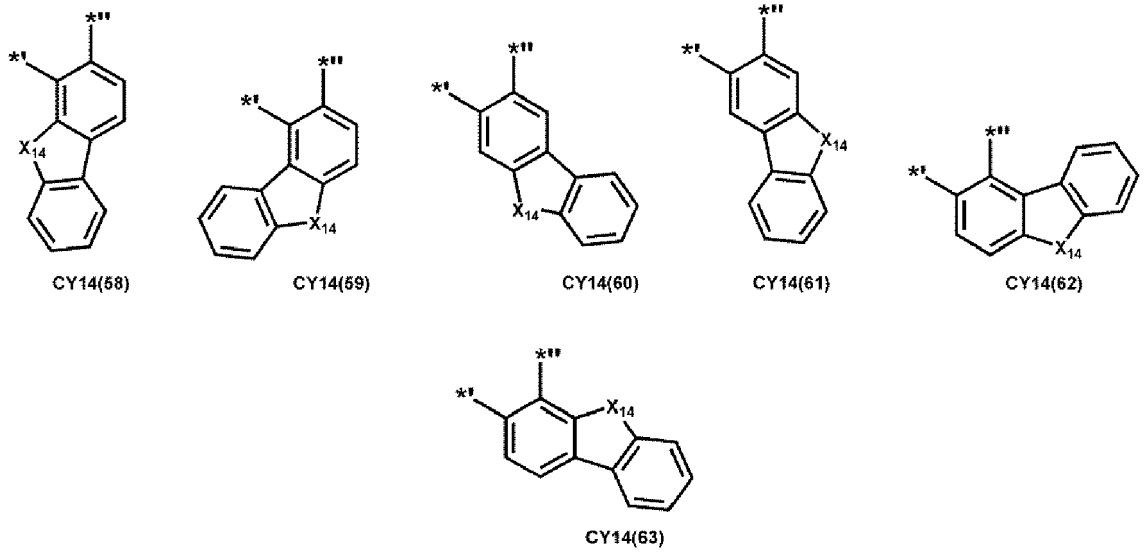
CY14(55)



CY14(56)



CY14(57)



CY14(58) CY14(59) CY14(60) CY14(61) CY14(62)

CY14(63)

wherein, in Formulae CY14(1) to CY14(63),

R_{14a} to R_{14d} are each the same as described in connection with of R_{14}, wherein R_{14a} to R_{14d} may each not be hydrogen,

X_{14} may be $C(R_1)(R_2)$, $N(R_1)$, O, S, or $Si(R_1)(R_2)$,

R_1 to R_8 are each the same as described in connection with R_{14},

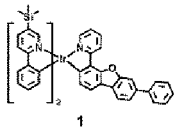
*'' indicates a binding site to a carbon atom of a neighboring pyridine ring in Formula 2B, and

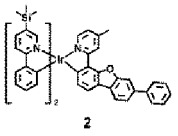
*' indicates a binding site to M in Formula 1.

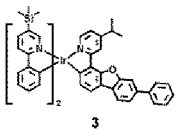
[0147] In one or more embodiments, the number of silicon (Si) atoms in the first compound represented by Formula 1 may be 1 or 2.

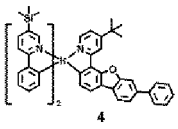
[0148] In one or more embodiments, the first compound represented by Formula 1 may be one of Compounds 1 to 5140 of Group A, one of Compounds 661 to 800, 1001 to 1280, and 1381 to 1620 of Group B, or one of Compounds 1-1 to 1-5 of Group C:

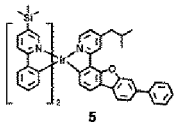
Group A

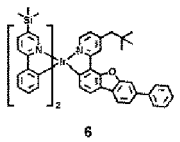

1

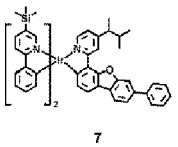

2

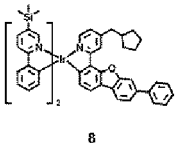

3

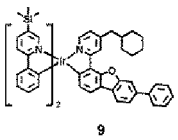

4

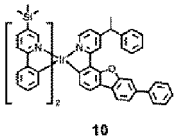

5

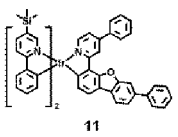

6

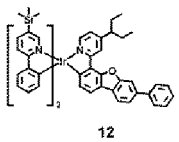

7

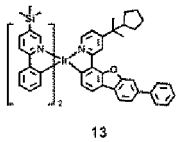

8

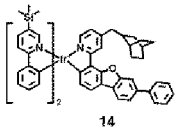

9

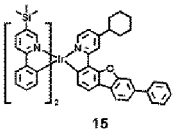

10

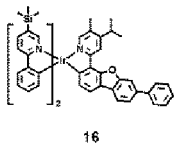

11

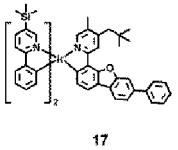

12

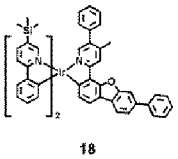

13

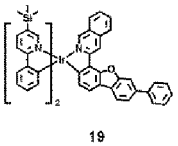

14

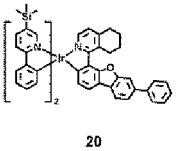

15

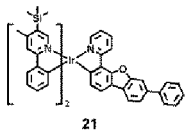

16

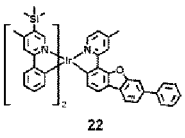

17

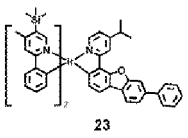

18

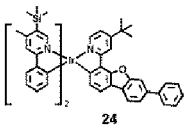

19

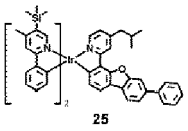

20

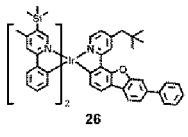

21

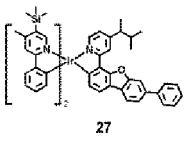

22

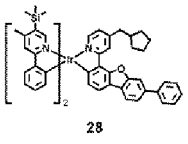

23

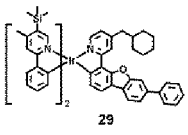

24

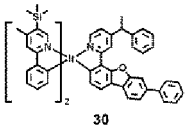

25

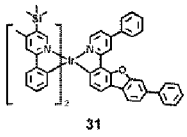

26

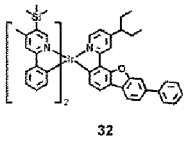

27

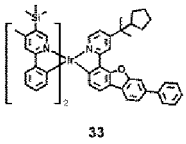

28

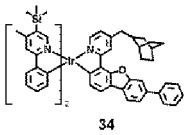

29

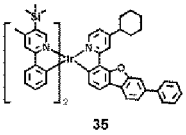

30

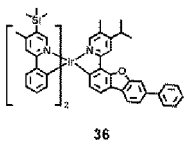

31

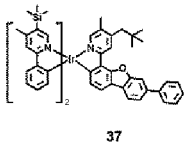

32

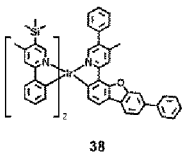

33

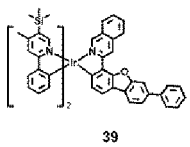

34

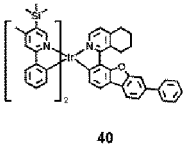

35

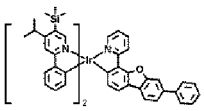

36

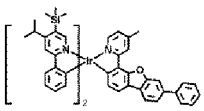

37

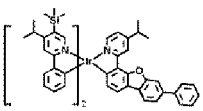

38

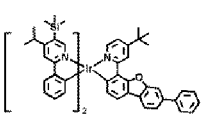

39

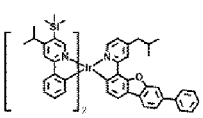

40

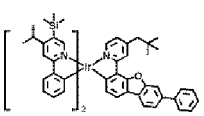

41

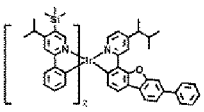

42

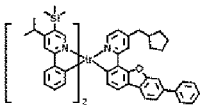

43

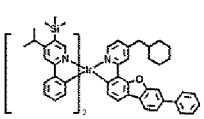

44

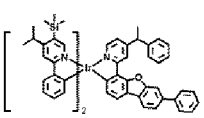

45

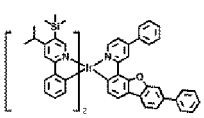

46

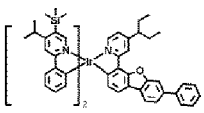

47

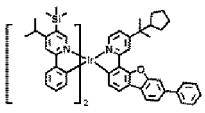

48

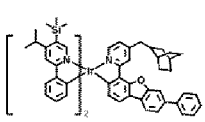

49

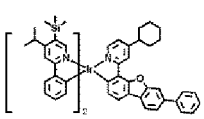

50

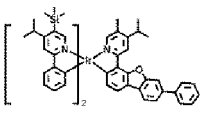

51

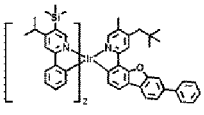

52

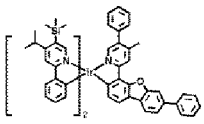

53

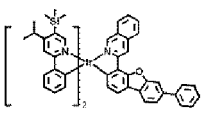

54

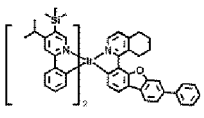

55

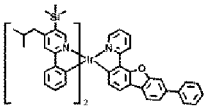

56

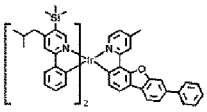

57

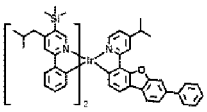

58

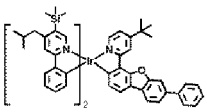

59

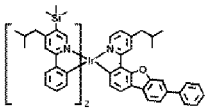

60

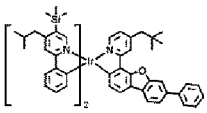

61

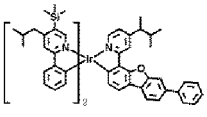

62

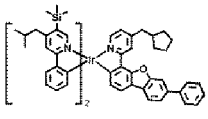

63

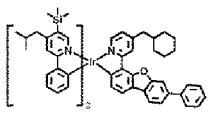

64

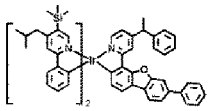

65

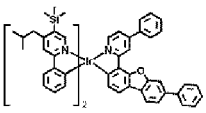

66

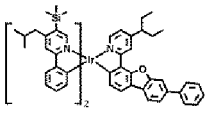

67

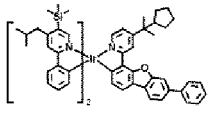

68

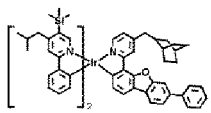

69

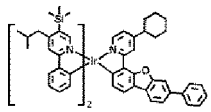

70

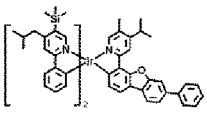

71

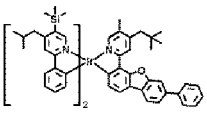

72

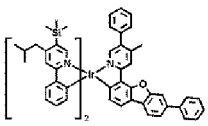

73

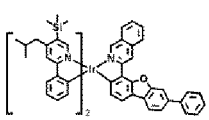

74

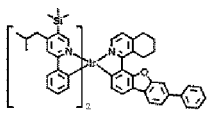

75

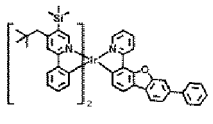

76

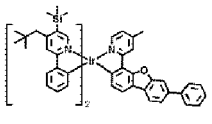

77

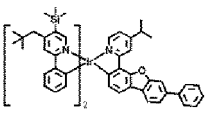

78

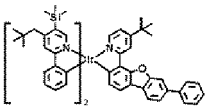

79

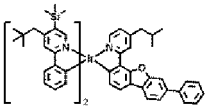

80

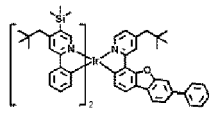

81

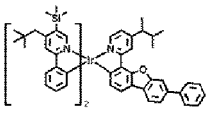

82

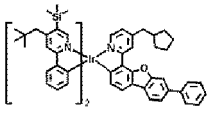

83

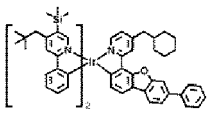

84

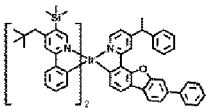

85

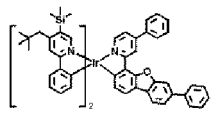

86

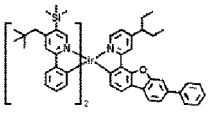

87

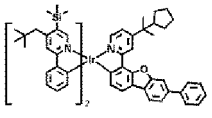

88

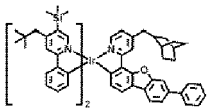

89

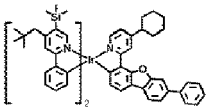

90

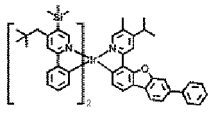

91

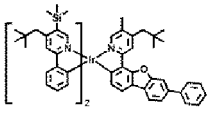

92

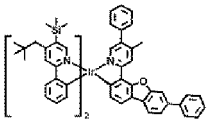

93

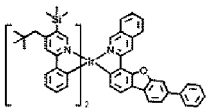

94

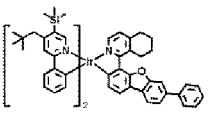

95

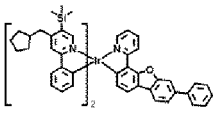

96

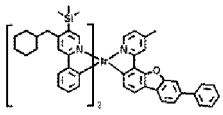

97

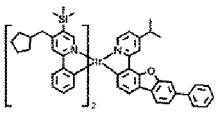

98

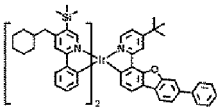

99

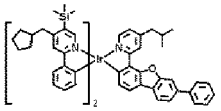

100

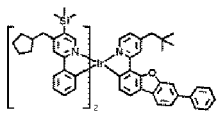

101

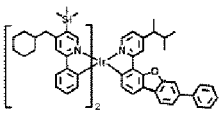

102

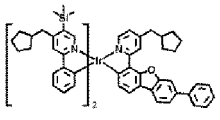

103

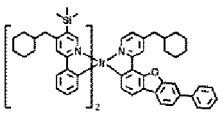

104

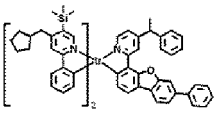

105

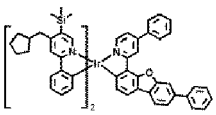

106

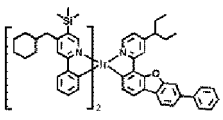

107

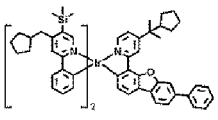

108

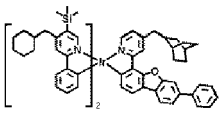

109

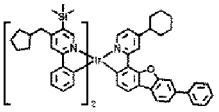

110

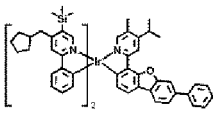

111

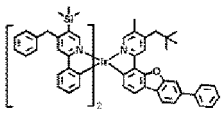

112

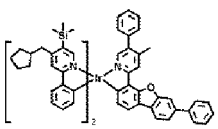

113

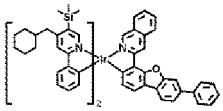

114

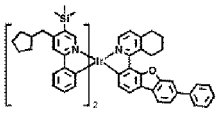

115

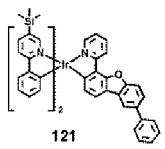

116

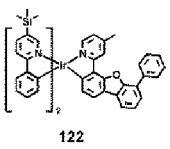

117

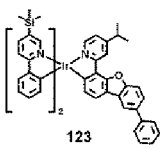

118

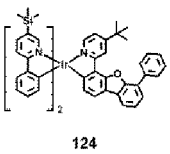

119

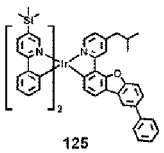

120

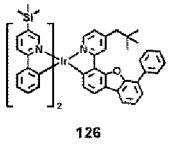

121

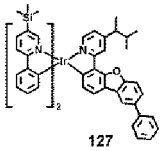

122

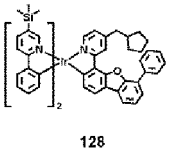

123

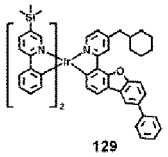

124

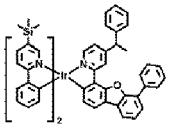

125

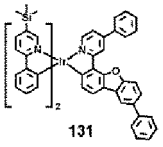

126

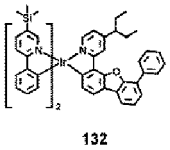

127

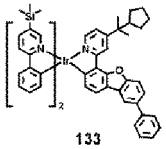

128

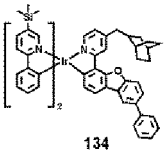

129

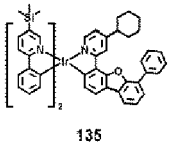

130

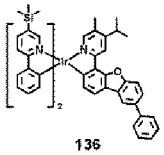

131

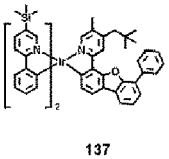

132

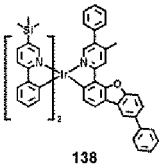

133

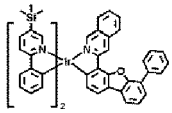

134

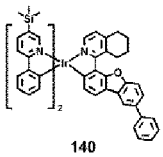

135

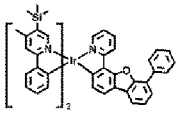

136

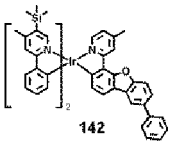

137

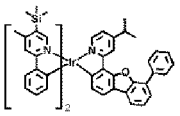

138

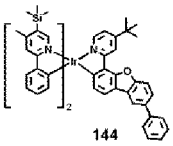

139

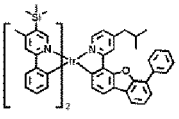

140

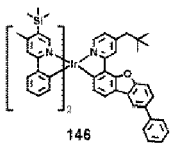

141

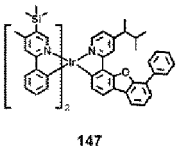

142

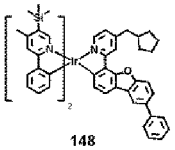

143

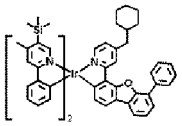

144

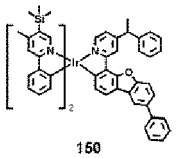

145

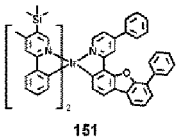

146

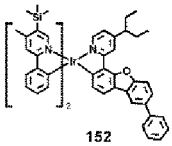

147

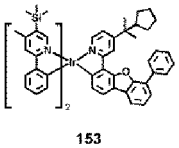

148

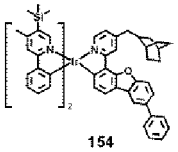

148

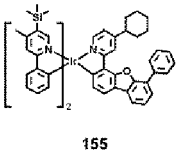

150

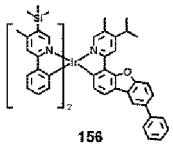

151

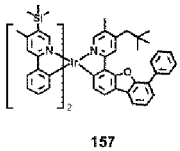

152

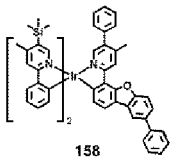

153

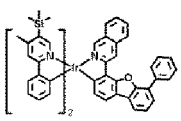

154

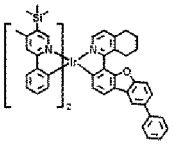

155

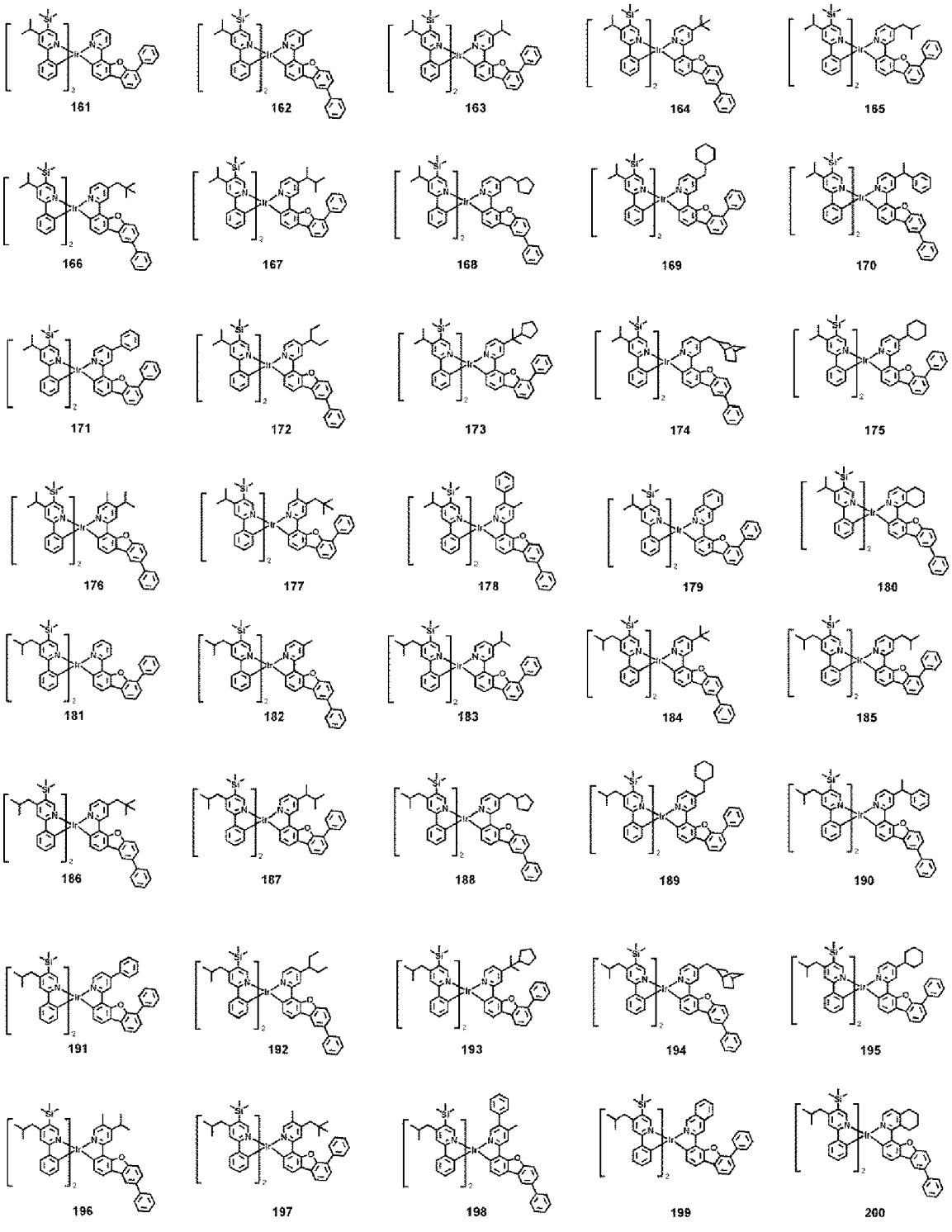

156

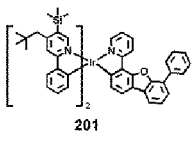

157

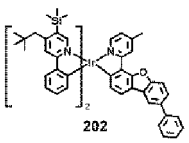

158

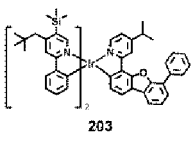

159

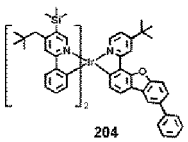

160

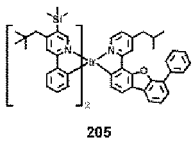

161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200

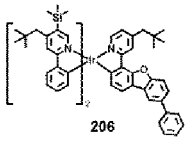

201

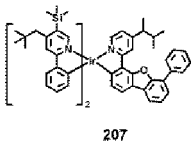

202

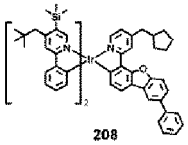

203

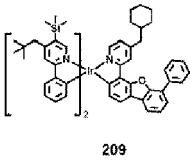

204

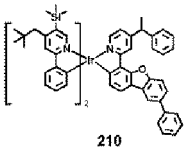

205

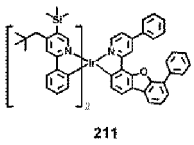

206

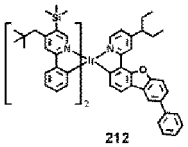

207

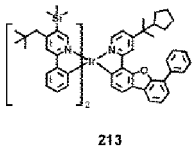

208

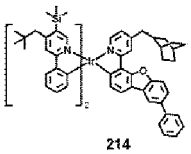

209

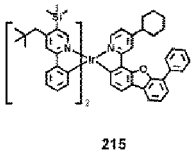

210

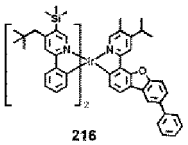

211

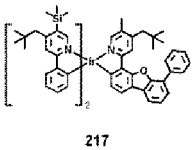

212

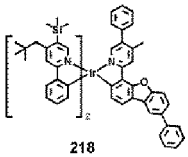

213

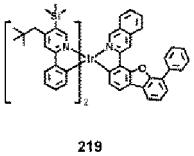

214

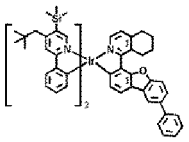

215

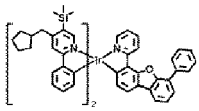

216

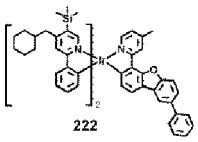

217

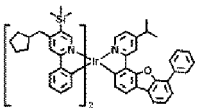

218

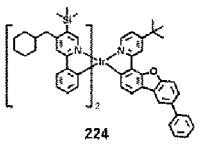

219

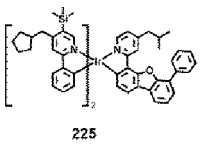

220

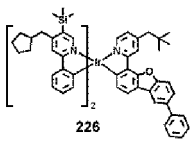

221

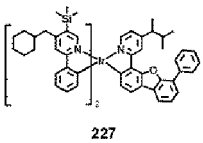

222

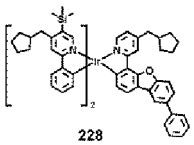

223

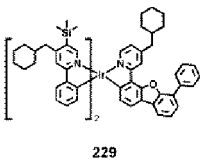

224

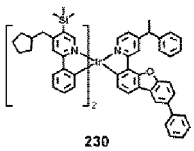

225

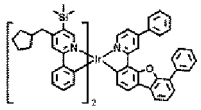

226

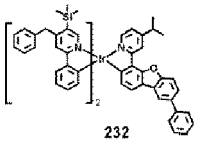

227

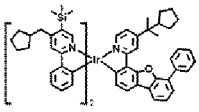

228

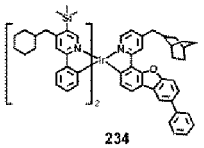

229

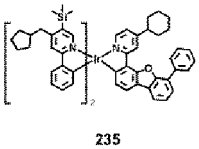

230

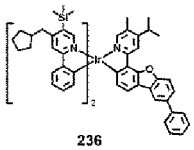

231

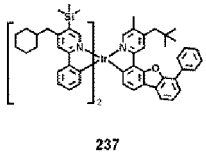

232

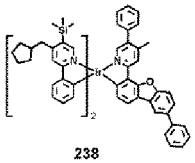

233

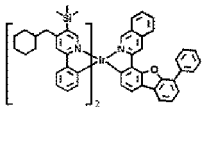

234

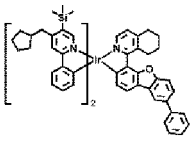

235

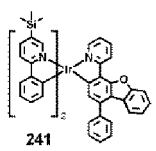

236

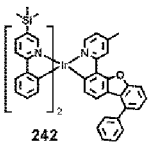

237

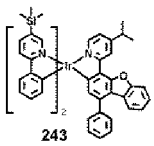

238

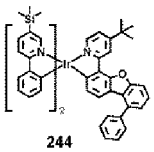

239

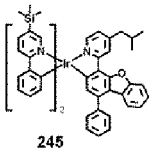

240

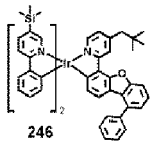

241

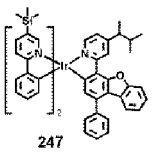

242

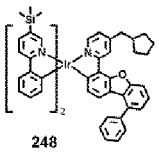

243

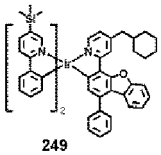

244

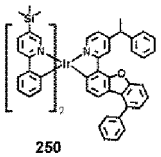

245

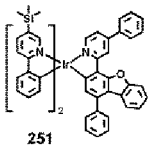

246

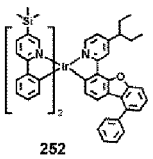

247

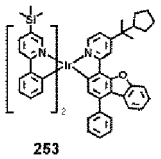

248

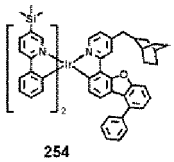

249

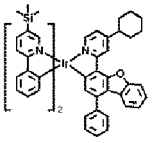

250

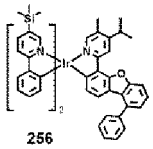

251

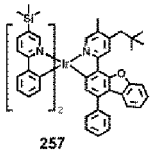

252

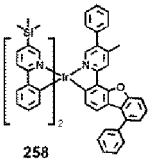

253

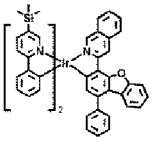

254

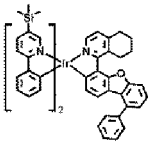

255

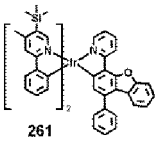

256

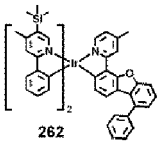

257

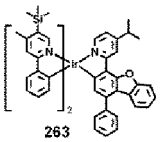

258

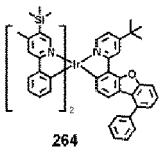

259

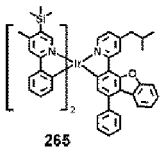

260

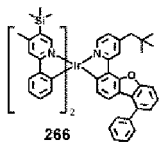

261

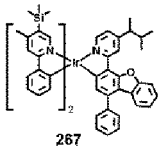

262

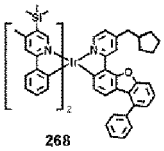

263

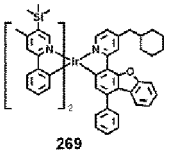

264

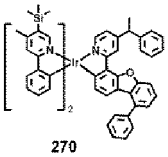

265

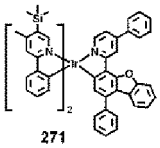

266

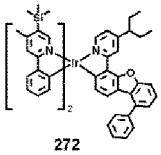

267

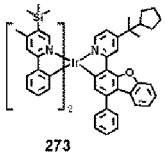

268

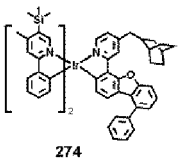

269

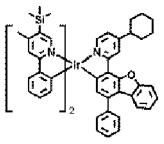

270

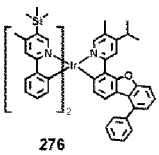

271

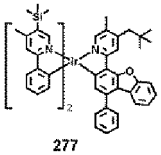

272

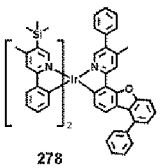

273

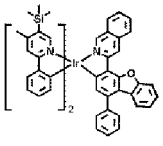

274

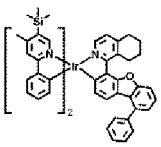

275

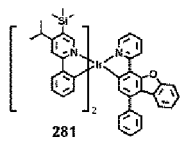

276

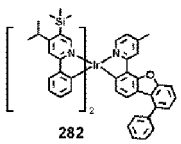

277

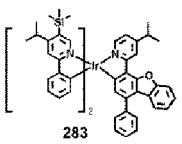

278

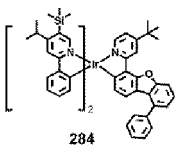

279

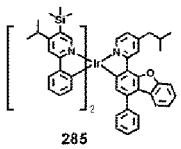

280

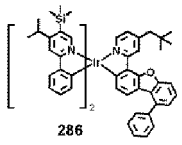

281

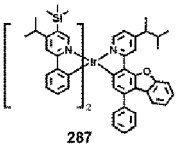

282

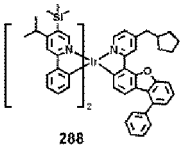

283

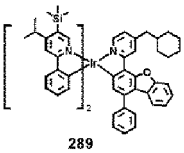

284

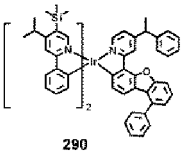

285

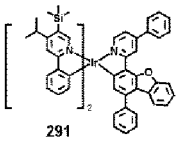

286

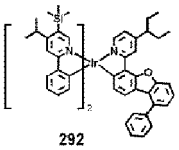

287

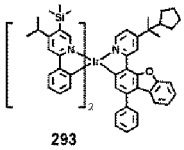

288

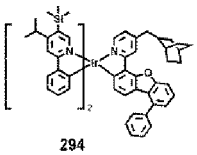

289

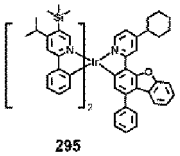

290

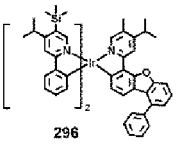

291

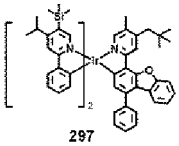

292

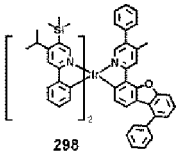

293

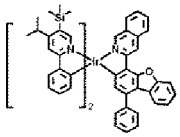

294

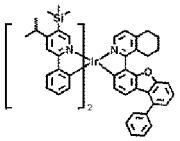

295

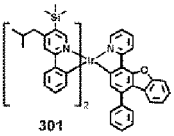

296

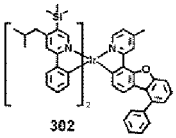

297

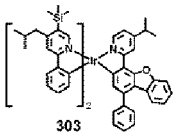

298

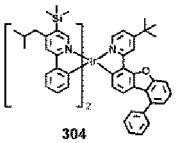

299

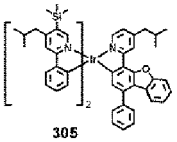

300

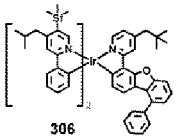

301

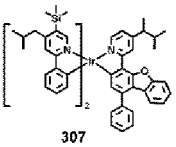

302

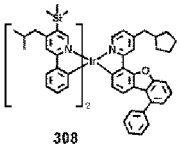

303

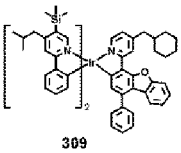

304

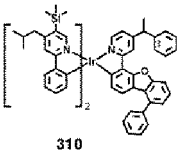

305

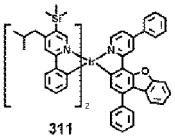

306

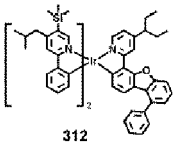

307

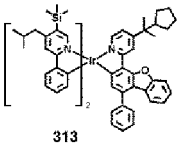

308

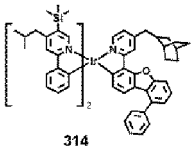

309

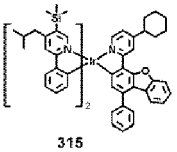

310

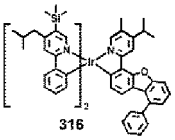

311

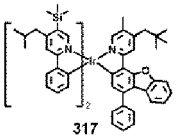

312

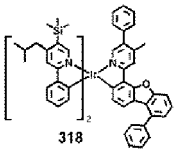

313

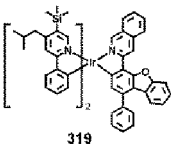

314

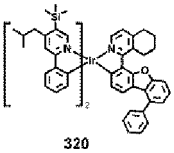

315

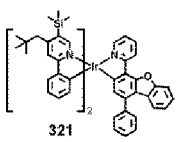

316

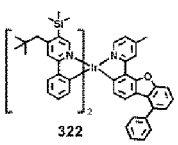

317

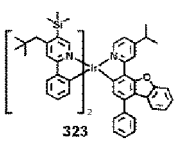

318

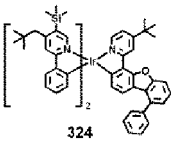

319

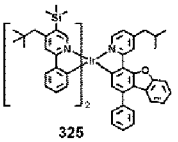

320

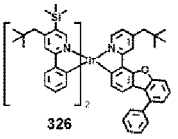

321

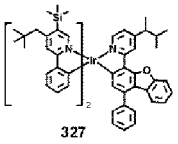

322

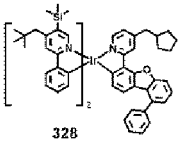

323

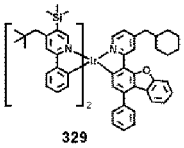

324

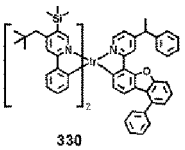

325

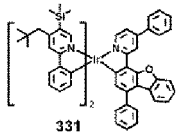

326

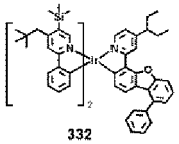

327

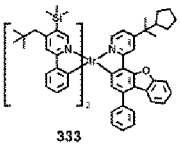

328

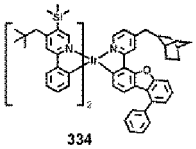

329

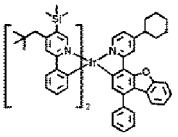

330

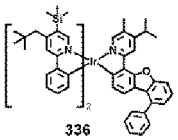

331

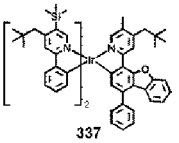

332

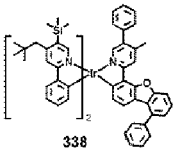

333

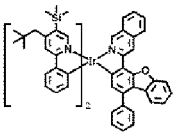

334

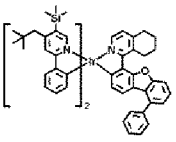

335

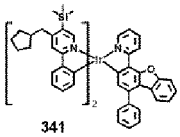

336

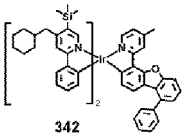

337

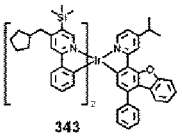

338

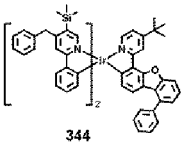

339

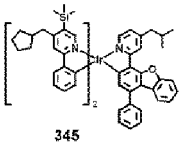

340

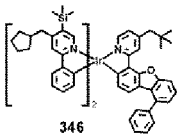

341

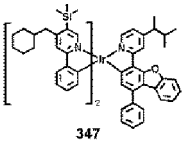

342

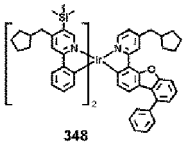

343

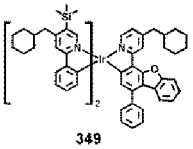

344

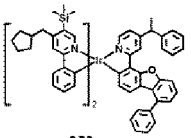

345

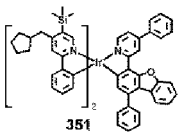

346

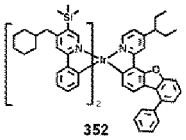

347

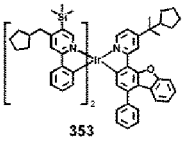

348

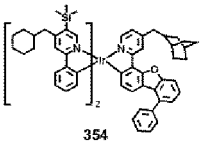

349

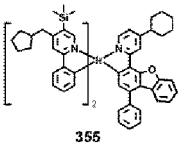

350

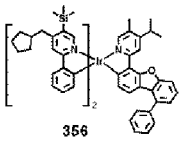

351

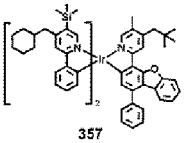

352

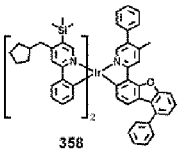

353

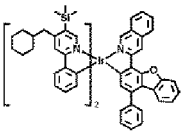

354

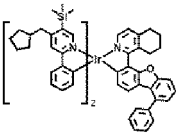

355

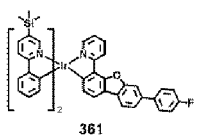

356

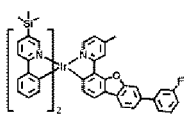

357

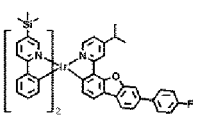

358

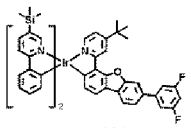

359

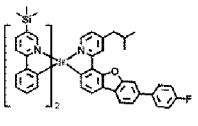

360

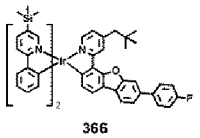

361

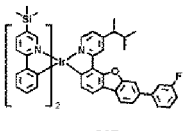

362

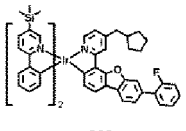

363

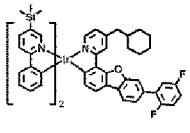

364

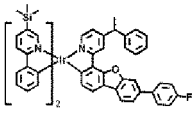

365

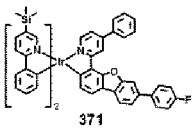

366

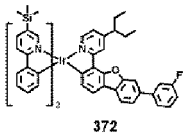

367

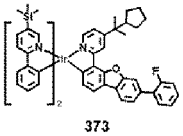

368

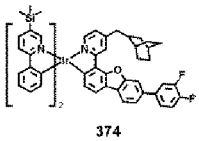

369

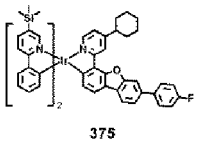

370

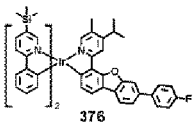

371

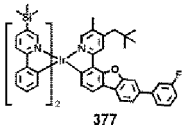

372

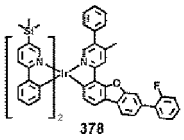

373

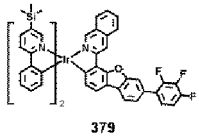

374

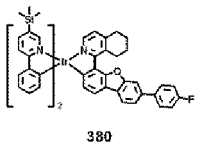

375

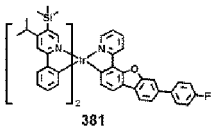

376

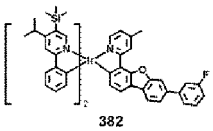

377

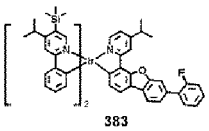

378

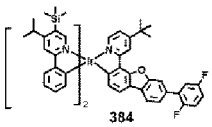

379

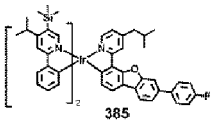

380

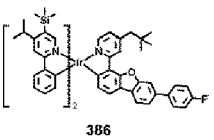

381

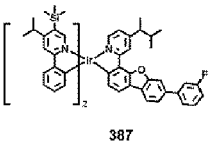

382

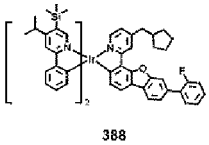

383

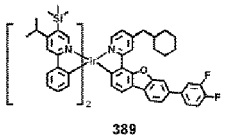

384

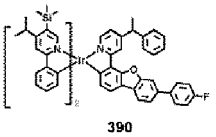

385

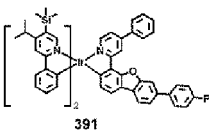

386

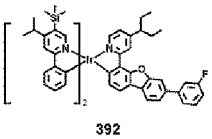

387

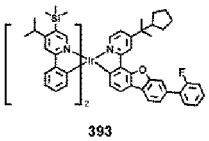

388

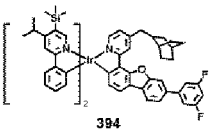

389

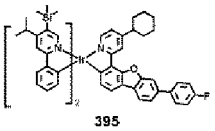

390

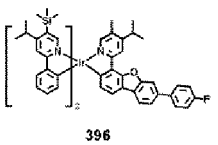

391

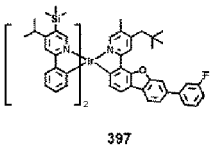

392

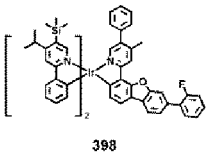

393

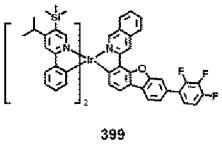

394

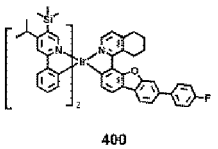

395

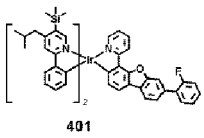

396

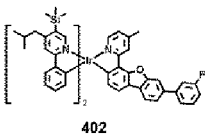

397

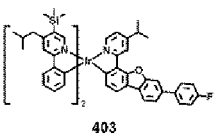

398

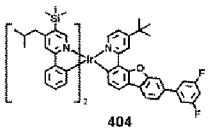

399

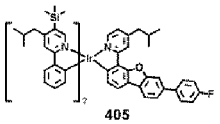

400

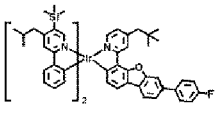

401

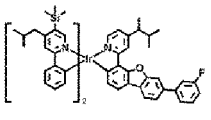

402

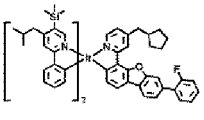

403

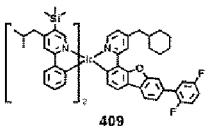

404

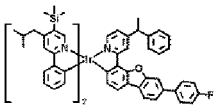

405

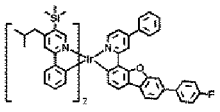

406

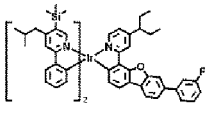

407

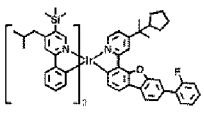

408

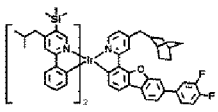

409

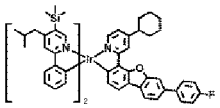

410

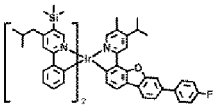

411

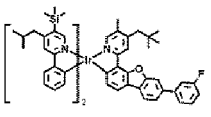

412

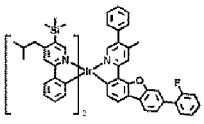

413

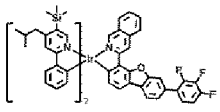

414

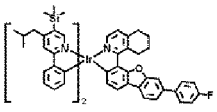

415

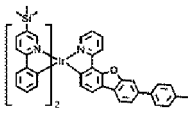

416

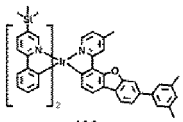

417

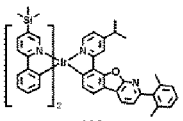

418

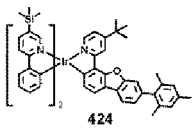

419

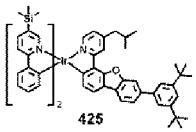

420

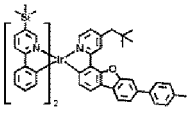

421

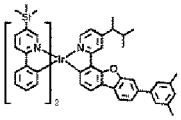

422

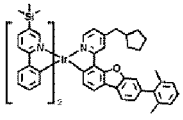

423

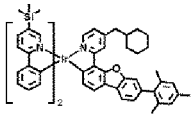

424

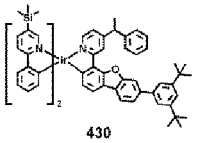

425

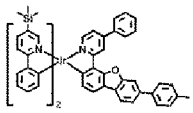

426

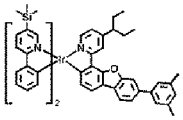

427

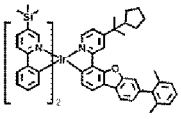

428

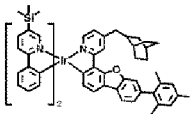

429

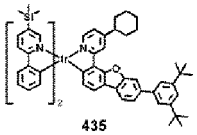

430

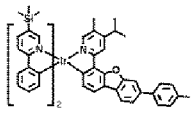

431

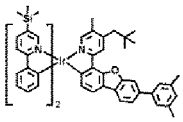

432

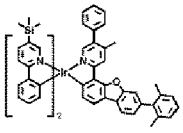

433

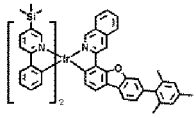

434

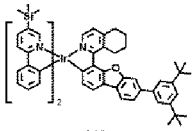

435

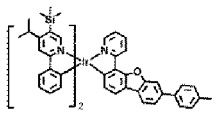

436

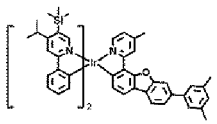

437

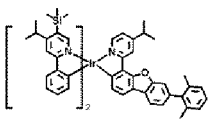

438

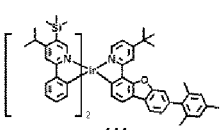

439

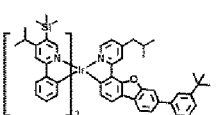

440

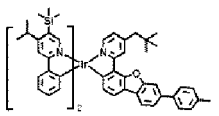

441

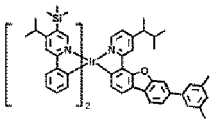

442

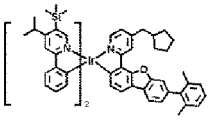

443

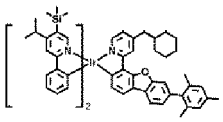

444

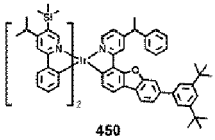

445

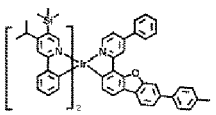

446

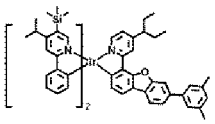

447

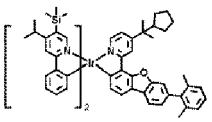

448

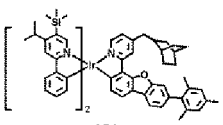

449

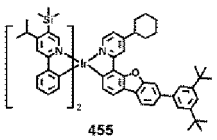

450

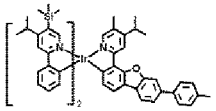

451

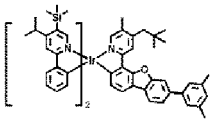

452

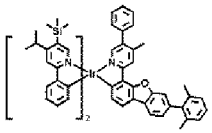

453

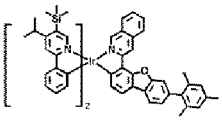

454

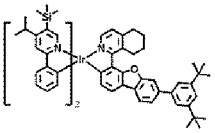

455

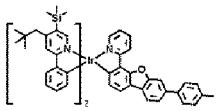

456

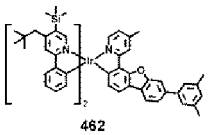

457

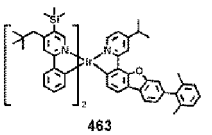

458

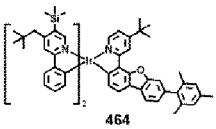

459

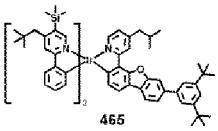

460

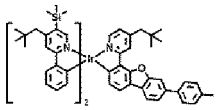

461

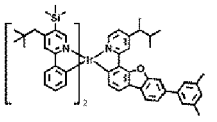

462

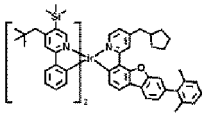

463

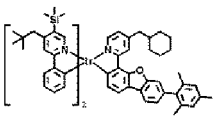

464

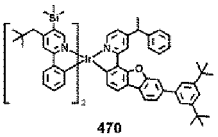

465

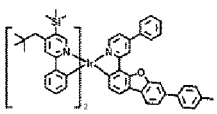

466

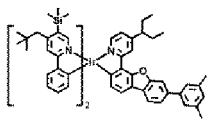

467

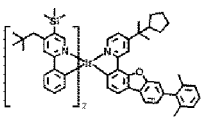

468

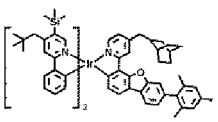

469

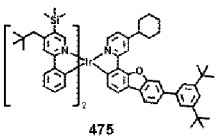

470

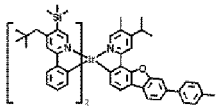

471

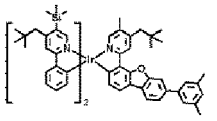

472

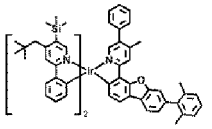

473

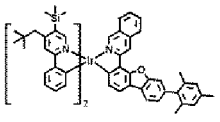

474

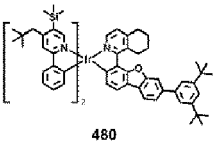

475

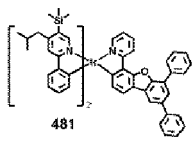

476

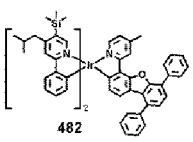

477

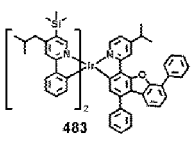

478

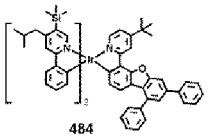

479

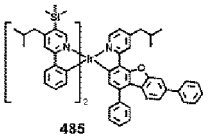

480

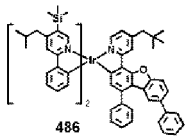

481

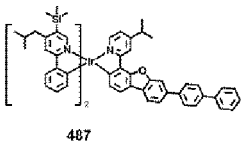

482

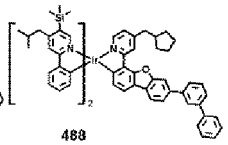

483

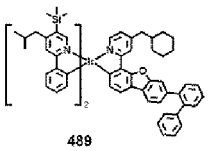

484

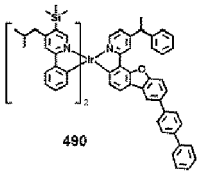

485

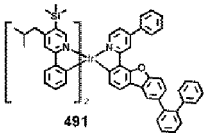

486

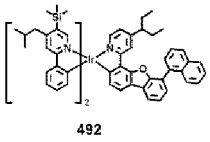

487

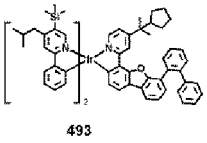

488

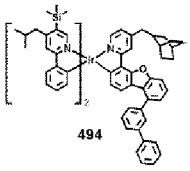

489

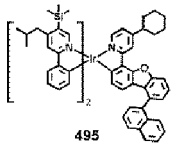

490

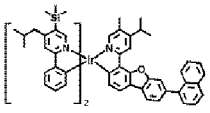

491

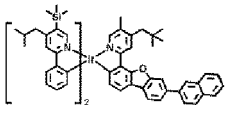

492

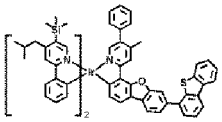

493

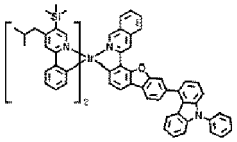

494

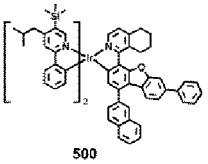

495

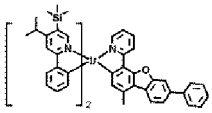

496

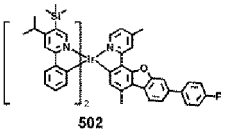

497

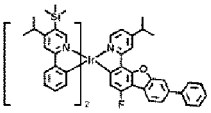

498

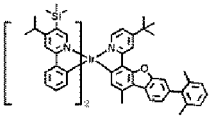

499

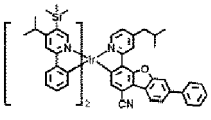

500

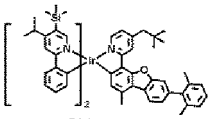

501

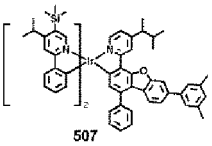

502

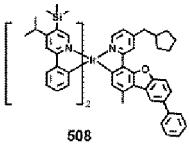

503

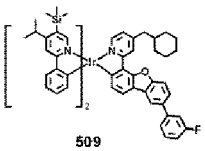

504

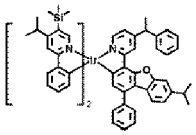

505

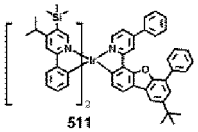

506

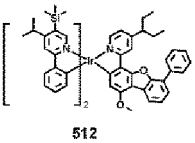

507

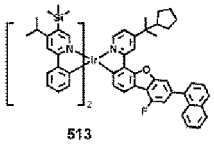

508

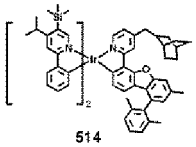

509

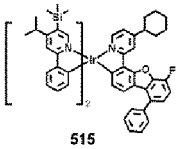

510

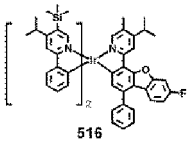

511

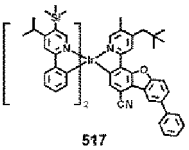

512

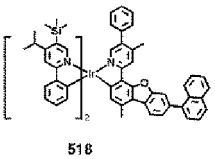

513

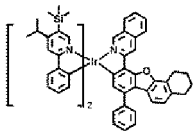

514

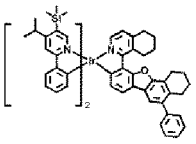

515

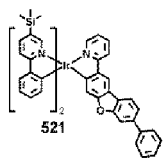

516

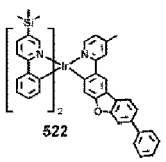

517

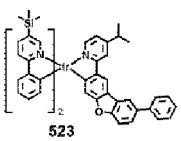

518

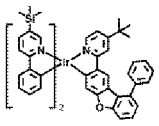

519

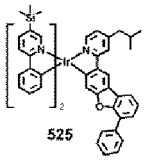

520

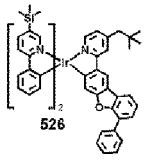

521

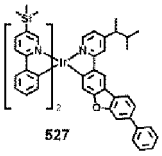

522

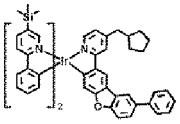

523

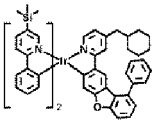

524

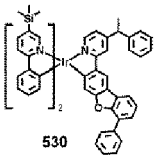

525

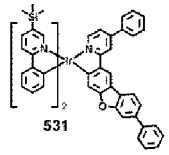

526

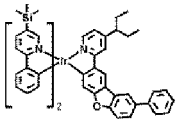

527

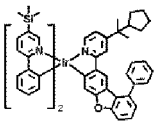

528

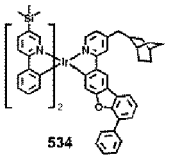

529

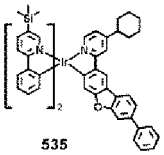

530

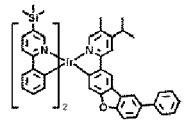

531

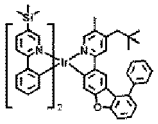

532

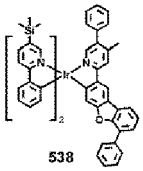

533

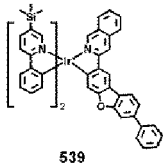

534

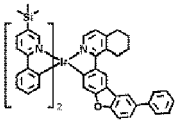

535

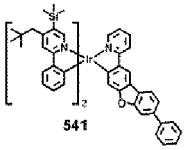

536

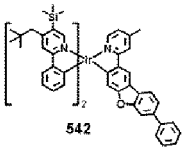

537

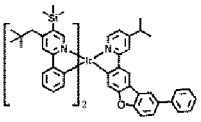

538

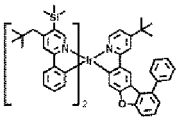

539

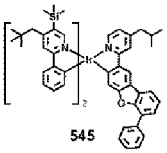

540

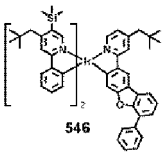

541

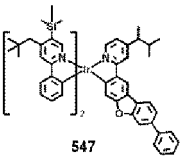

542

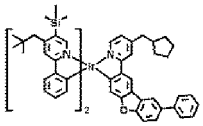

543

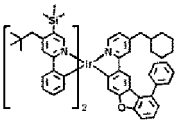

544

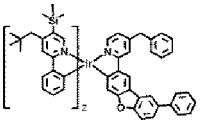

545

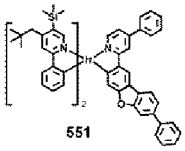

546

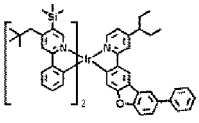

547

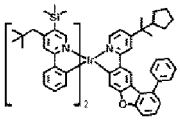

548

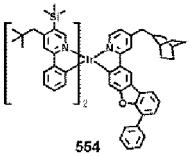

549

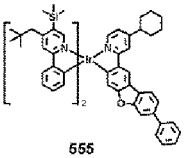

550

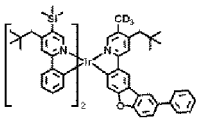

551

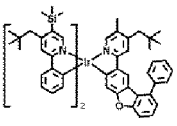

552

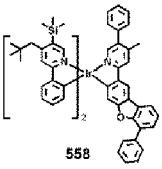

553

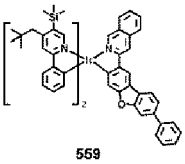

554

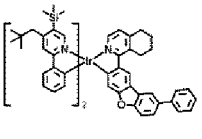

555

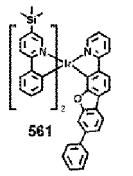

556

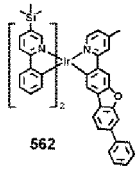

557

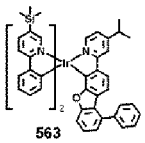

558

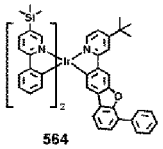

559

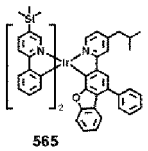

560

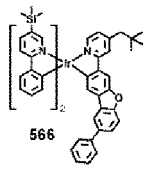

561

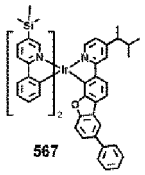

562

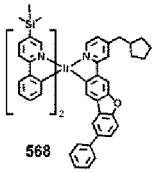

563

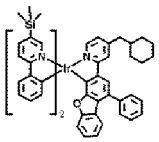

564

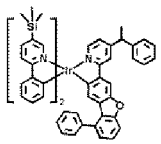

565

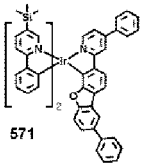

566

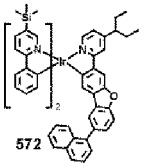

567

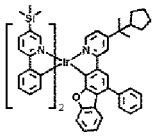

568

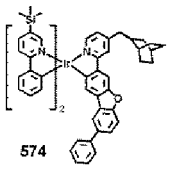

569

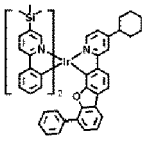

570

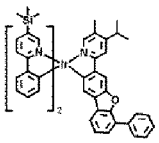

571

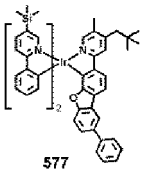

572

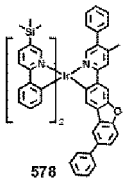

573

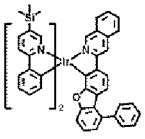

574

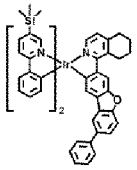

575

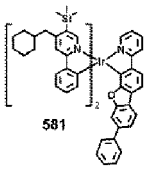

576

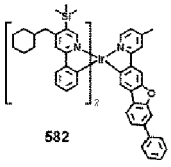

577

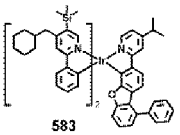

578

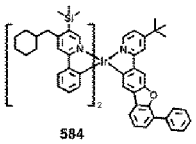

579

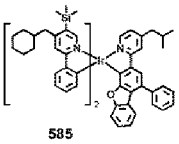

580

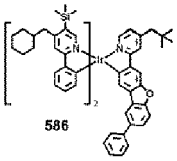

581

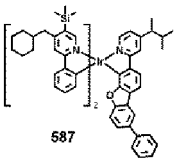

582

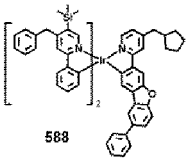

583

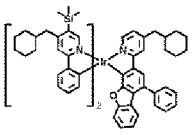

584

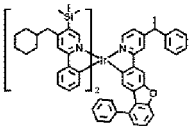

585

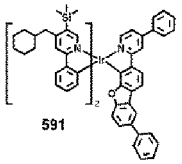

586

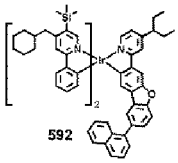

587

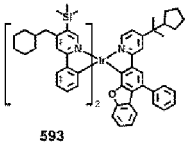

588

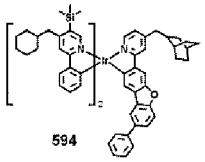

589

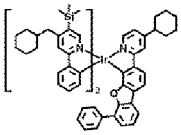

590

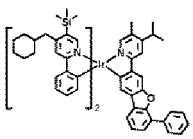

591

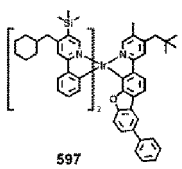

592

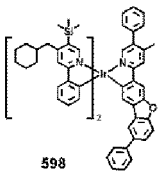

593

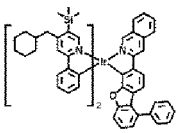

594

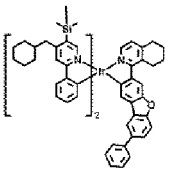

595

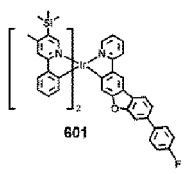

596

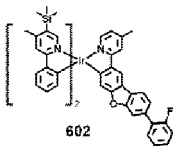

597

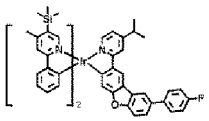

598

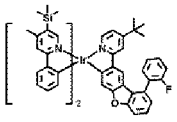

599

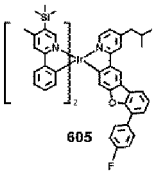

600

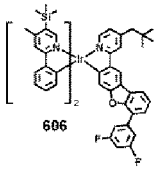

601

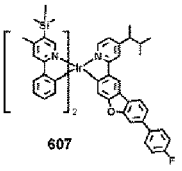

602

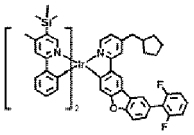

603

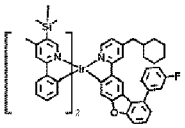

604

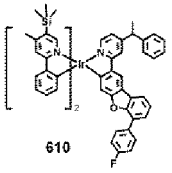

605

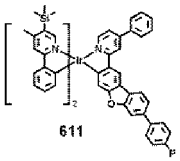

606

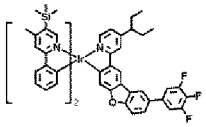

607

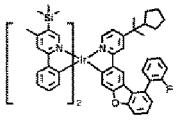

608

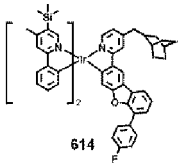

609

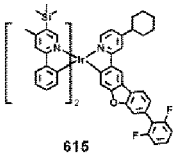

610

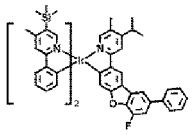

611

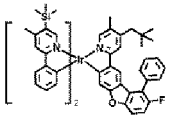

612

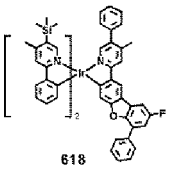

613

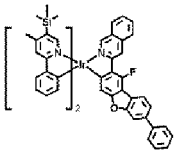

614

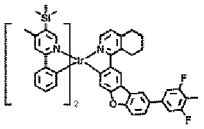

615

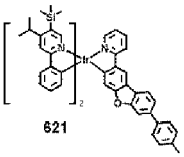

616

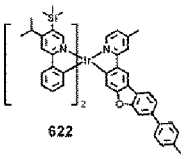

617

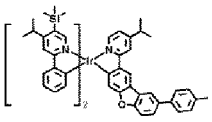

618

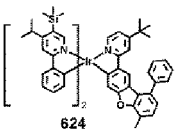

619

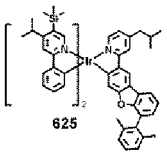

620

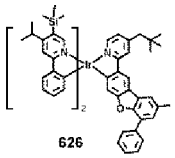

621

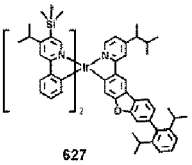

622

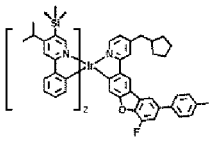

623

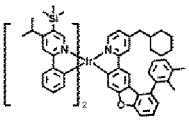

624

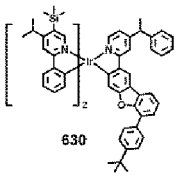

625

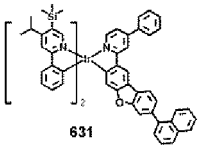

626

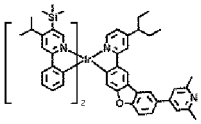

627

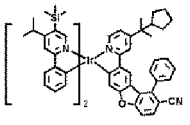

628

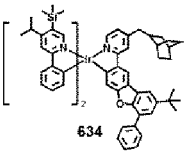

629

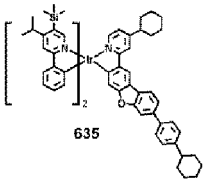

630

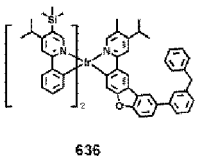

631

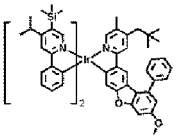

632

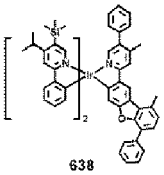

633

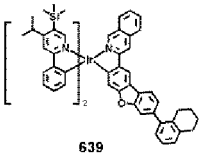

634

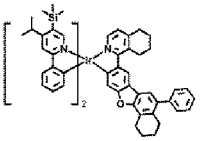

635

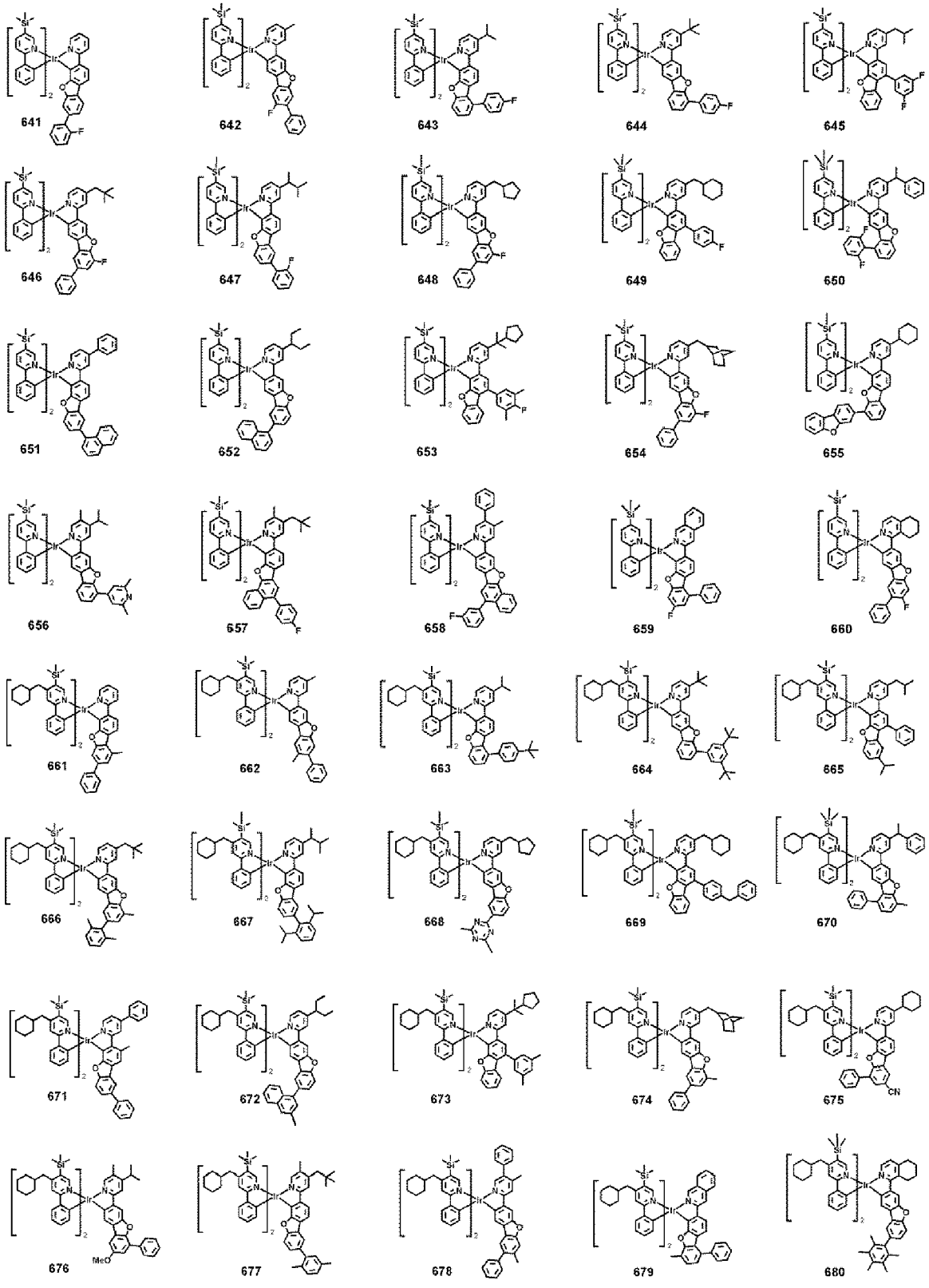

636

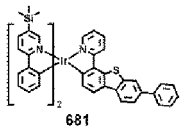

637

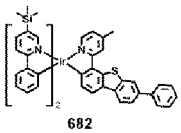

638

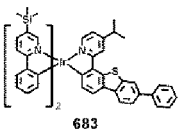

639

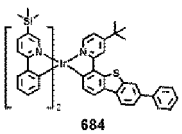

640

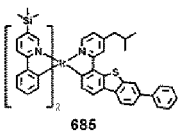

641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
MeO
677
678
679
680

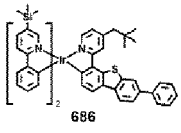

681

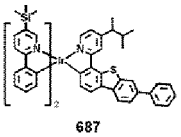

682

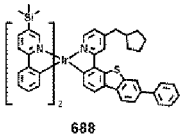

683

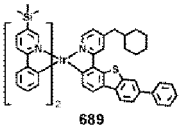

684

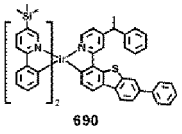

685

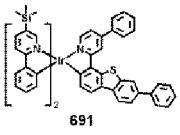

686

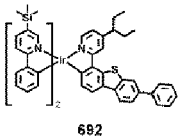

687

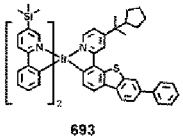

688

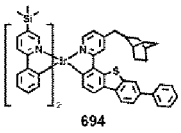

689

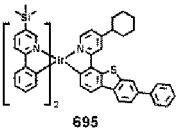

690

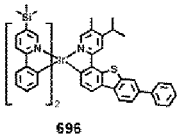

691

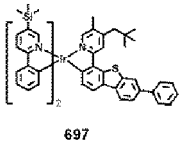

692

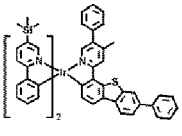

693

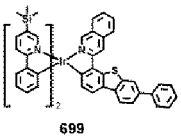

694

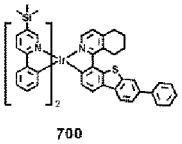

695

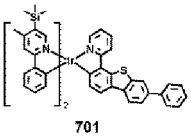

696

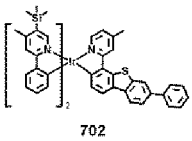

697

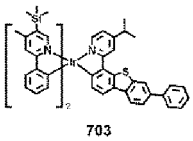

698

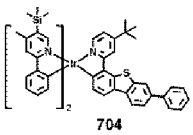

699

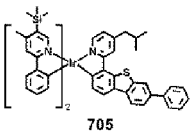

700

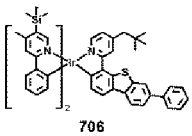

701

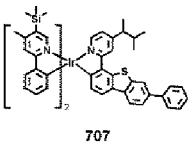

702

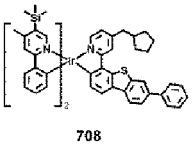

703

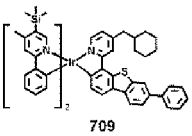

704

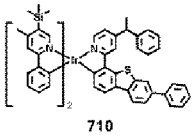

705

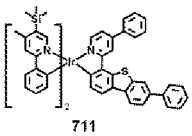

706

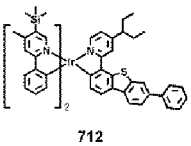

707

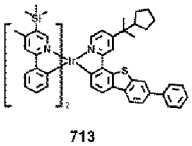

708

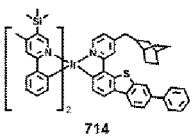

709

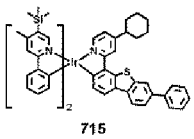

710

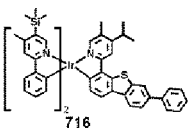

711

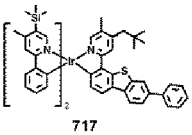

712

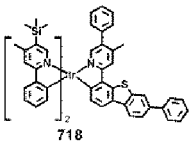

713

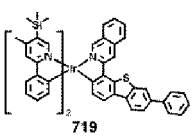

714

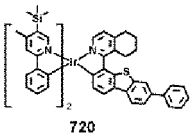

715

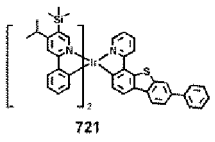

716

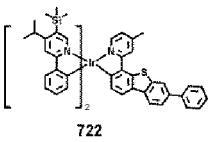

717

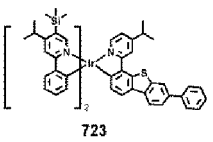

718

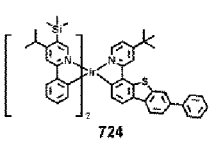

719

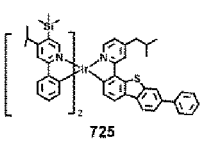

720

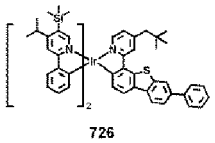

721

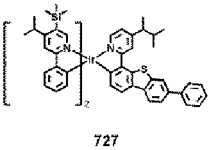

722

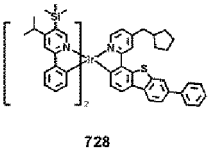

723

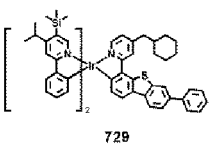

724

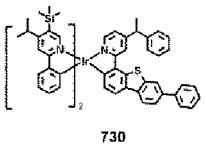

725

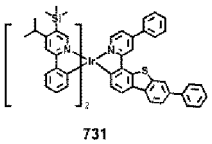

726

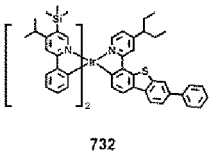

727

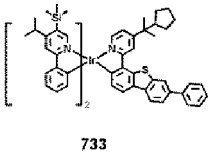

728

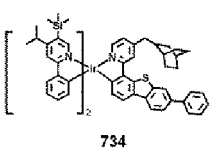

729

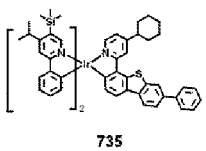

730

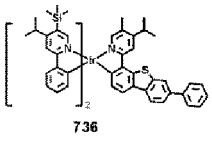

731

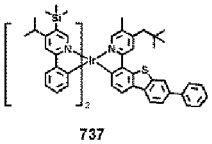

732

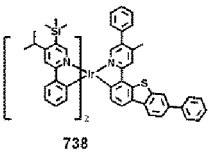

733

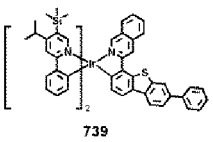

734

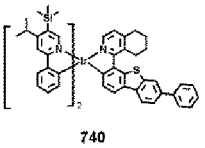

735

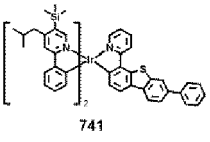

736

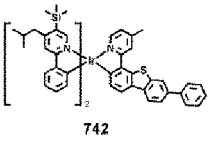

737

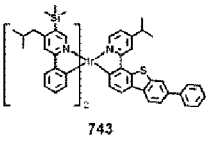

738

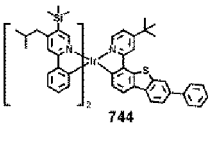

739

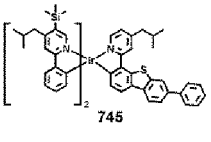

740

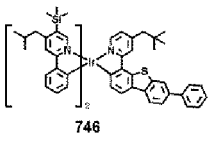

741

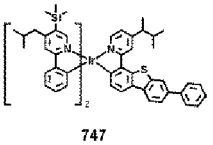

742

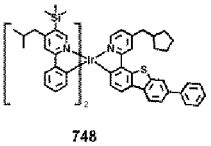

743

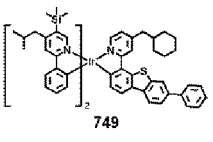

744

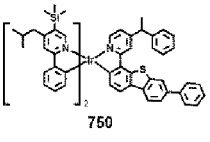

745

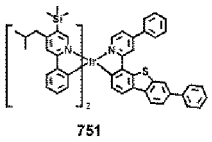

746

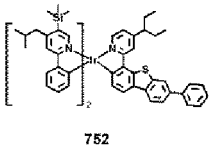

747

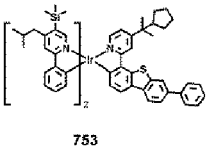

748

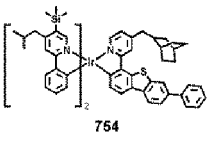

749

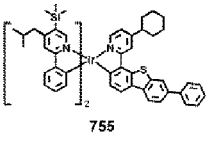

750

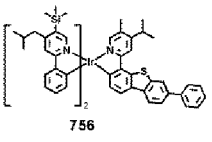

751

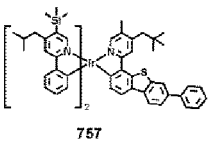

752

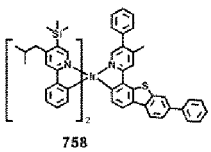

753

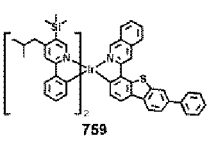

754

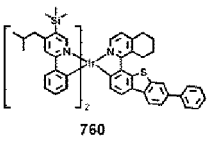

755

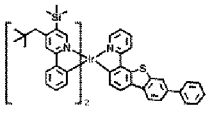

756

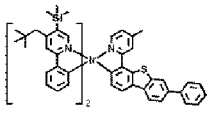

757

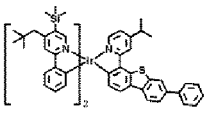

758

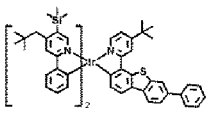

759

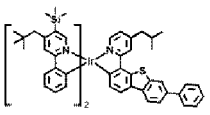

760

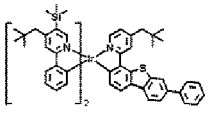

761

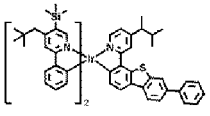

762

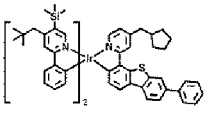

763

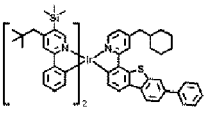

764

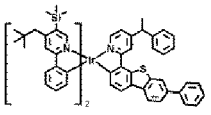

765

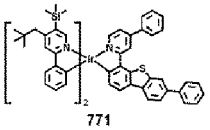

766

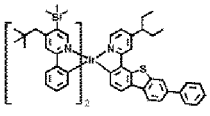

767

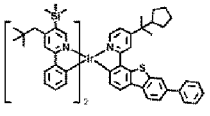

768

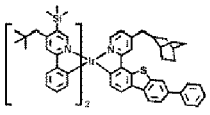

769

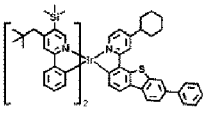

770

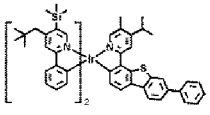

771

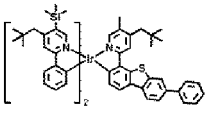

772

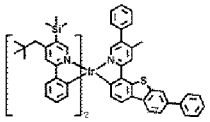

773

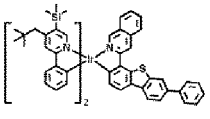

774

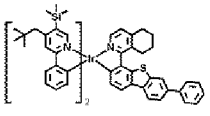

775

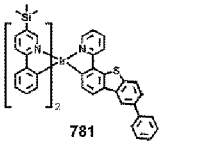

776

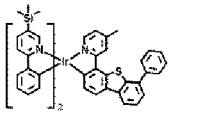

777

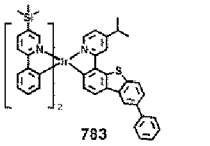

778

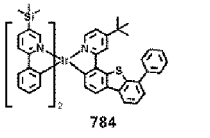

779

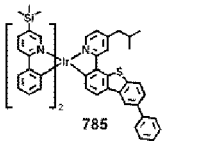

780

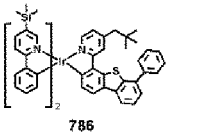

781

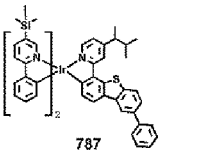

782

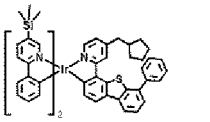

783

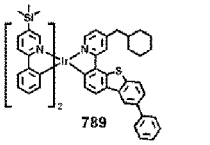

784

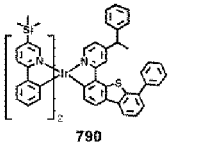

785

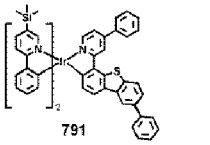

786

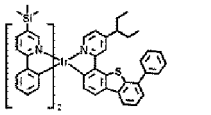

787

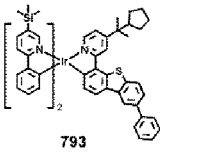

788

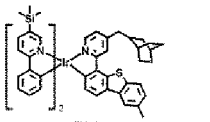

789

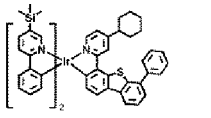

790

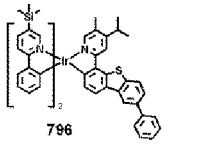

791

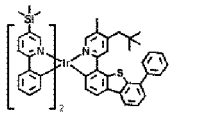

792

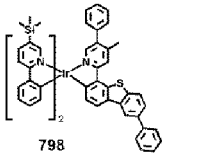

793

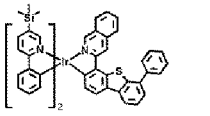

794

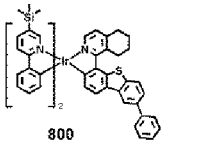

795

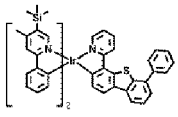

796

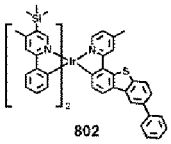

797

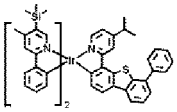

798

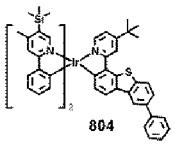

799

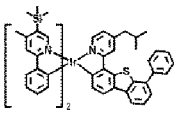

800

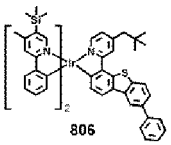

801

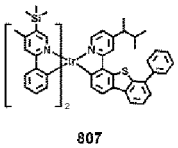

802

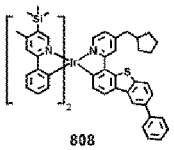

803

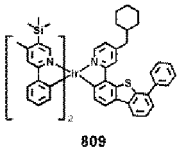

804

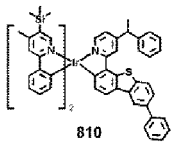

805

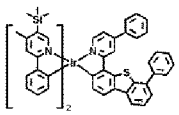

806

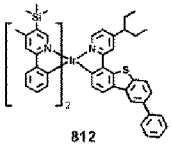

807

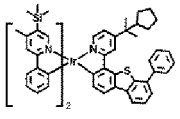

808

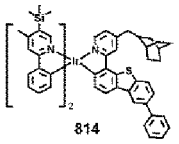

809

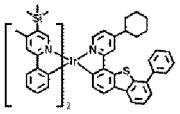

810

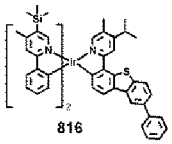

811

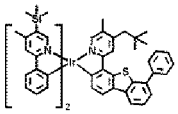

812

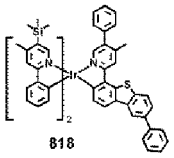

813

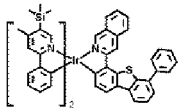

814

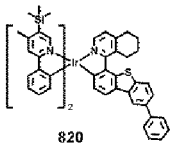

815

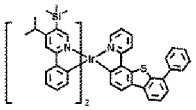

816

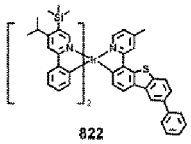

817

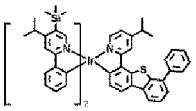

818

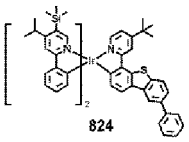

819

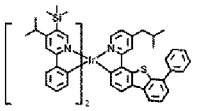

820

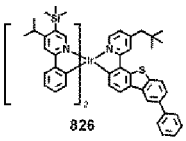

821

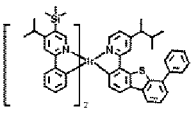

822

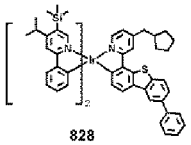

823

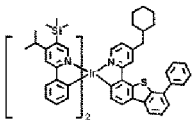

824

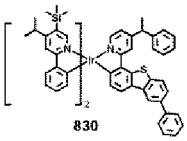

825

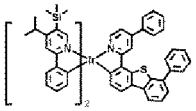

826

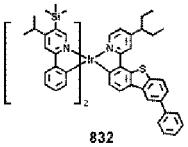

827

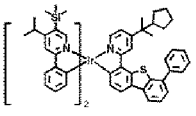

828

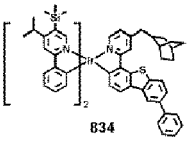

829

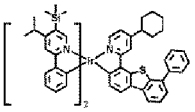

830

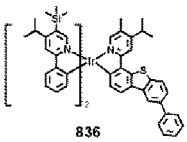

831

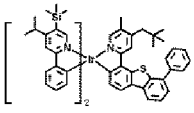

832

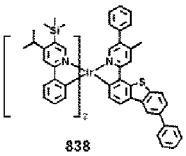

833

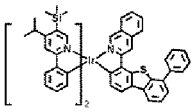

834

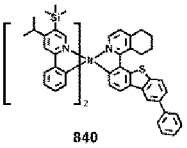

835

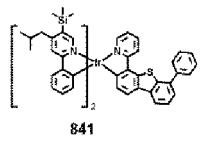

836

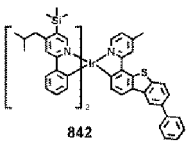

837

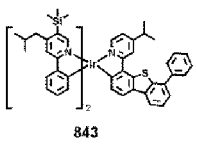

838

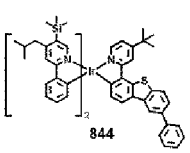

839

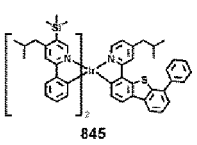

840

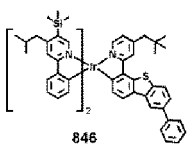

841

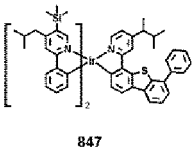

842

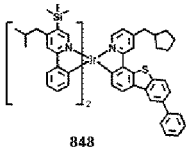

843

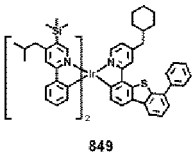

844

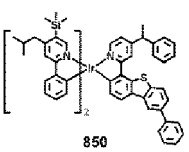

845

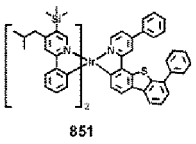

846

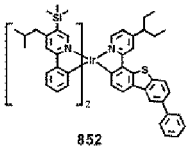

847

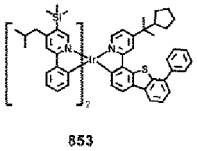

848

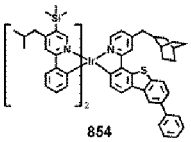

849

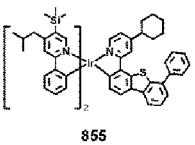

850

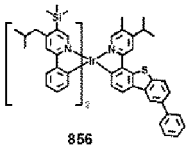

851

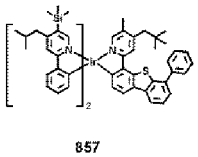

852

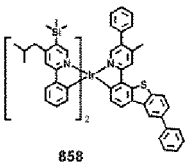

853

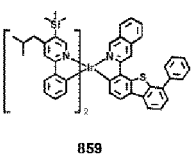

854

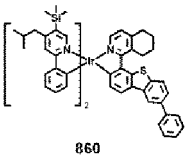

855

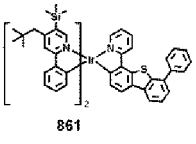

856

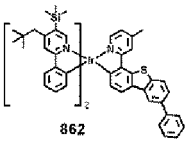

857

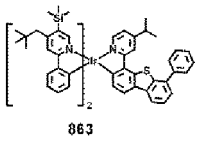

858

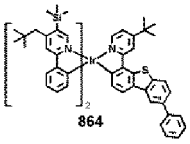

859

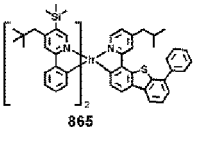

860

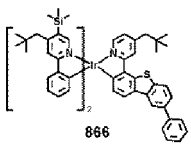

861

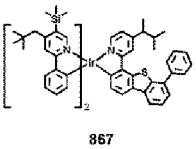

862

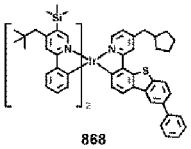

863

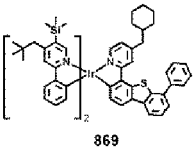

864

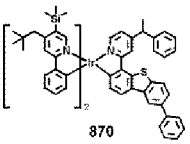

865

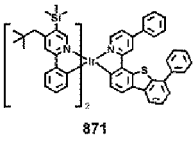

866

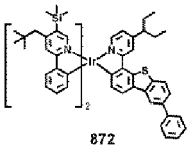

867

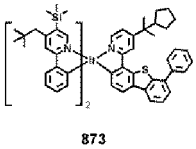

868

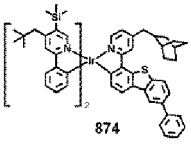

869

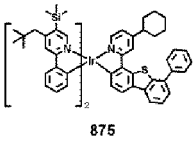

870

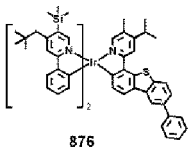

871

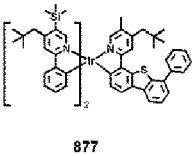

872

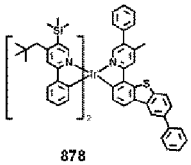

873

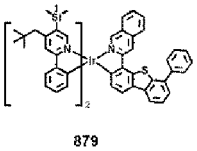

874

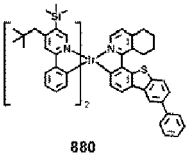

875

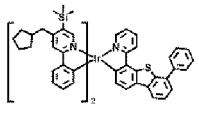

876

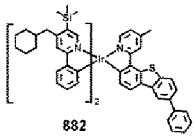

877

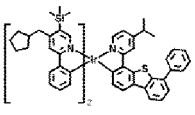

878

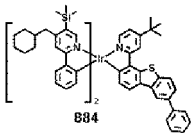

879

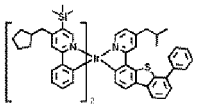

880

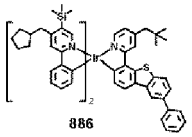

881

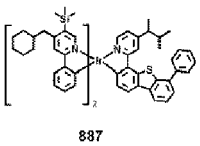

882

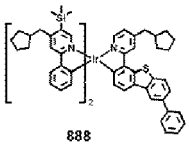

883

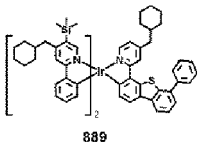

884

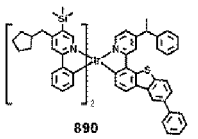

885

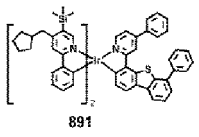

886

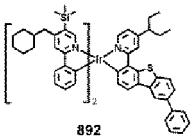

887

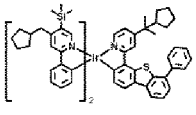

888

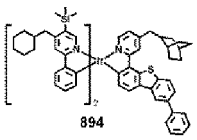

889

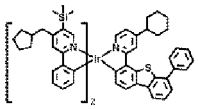

890

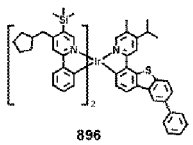

891

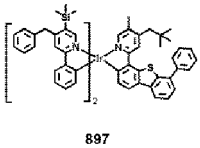

892

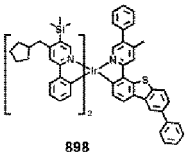

893

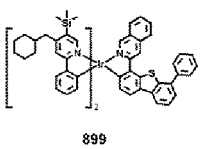

894

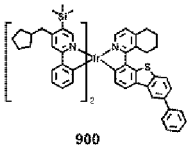

895

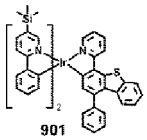

896

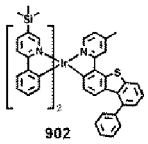

897

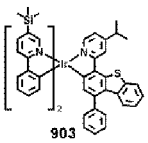

898

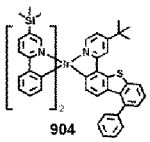

899

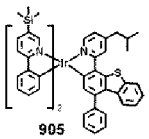

900

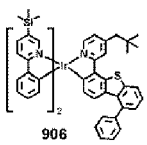

901

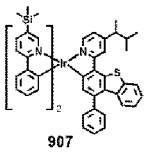

902

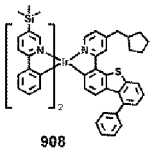

903

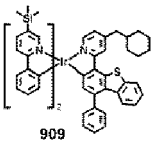

904

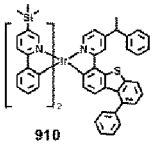

905

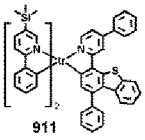

906

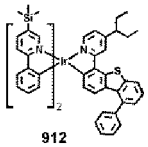

907

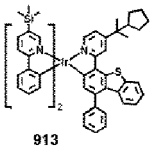

908

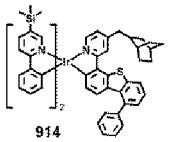

909

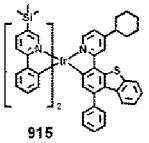

910

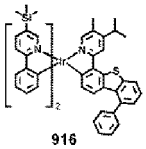

911

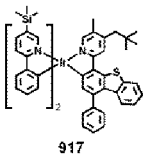

912

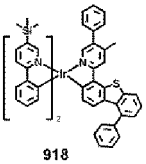

913

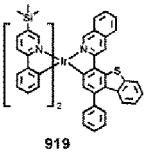

914

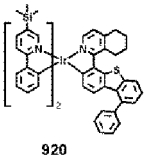

915

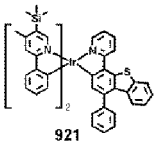

916

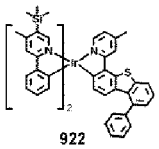

917

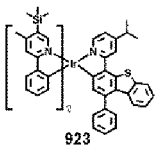

918

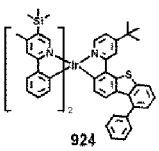

919

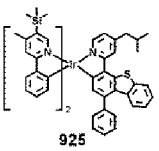

920

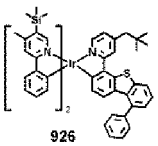

921

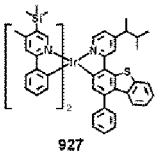

922

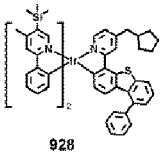

923

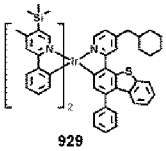

924

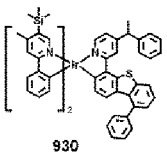

925

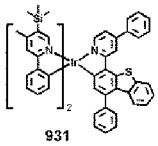

926

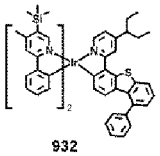

927

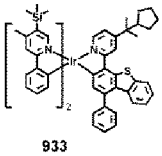

928

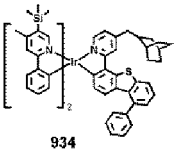

929

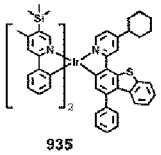

930

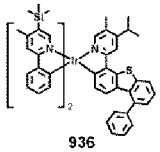

931

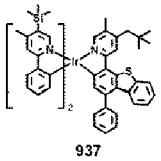

932

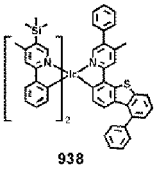

933

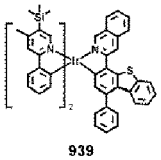

934

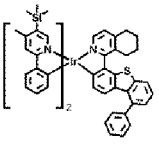

935

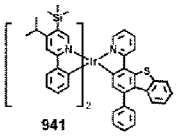

936

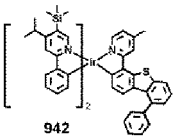

937

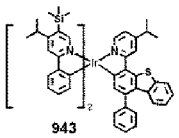

938

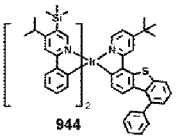

939

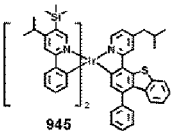

940

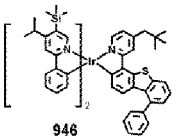

941

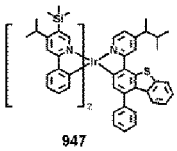

942

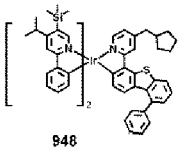

943

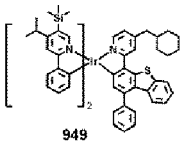

944

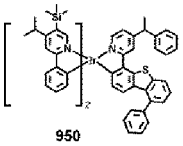

945

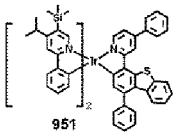

946

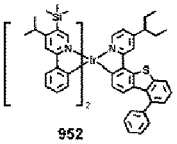

947

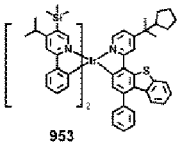

948

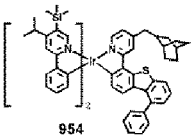

949

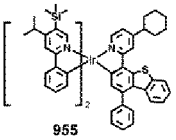

950

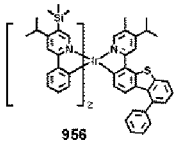

951

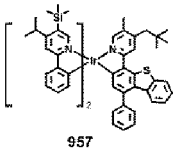

952

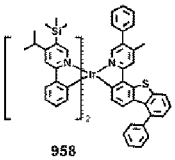

953

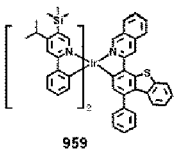

954

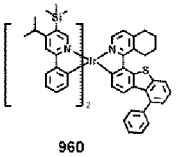

955

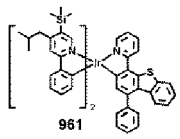

956

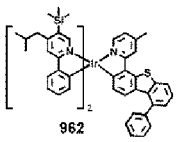

957

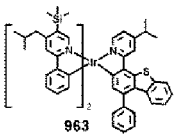

958

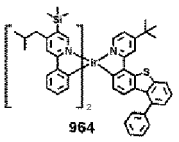

959

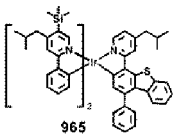

960

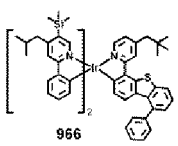

961

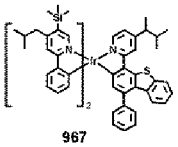

962

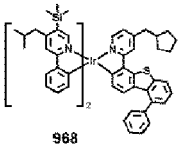

963

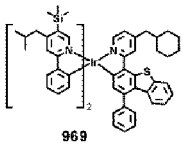

964

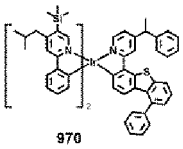

965

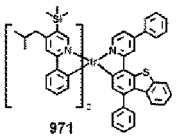

966

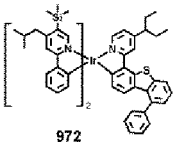

967

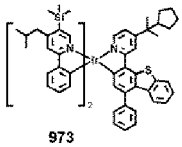

968

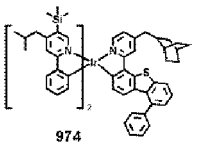

969

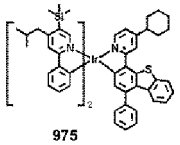

970

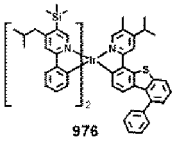

971

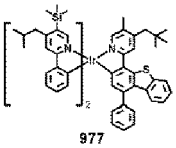

972

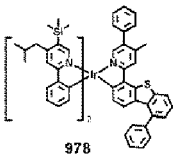

973

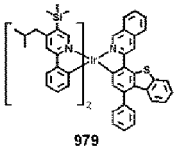

974

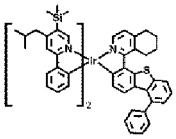

975

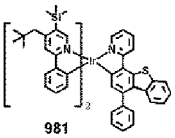

976

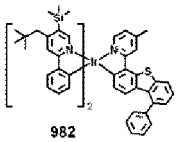

977

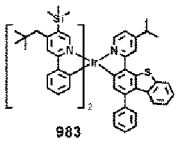

978

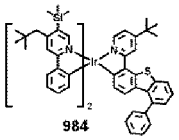

979

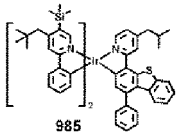

980

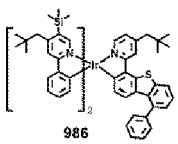

981

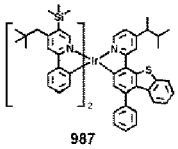

982

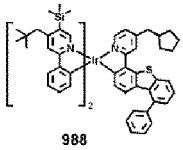

983

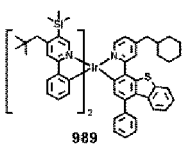

984

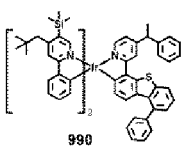

985

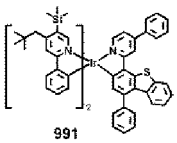

986

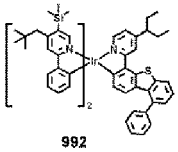

987

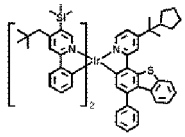

988

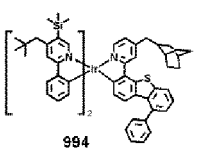

989

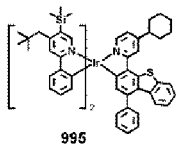

990

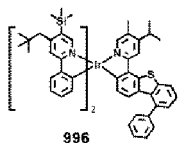

991

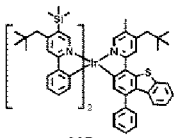

992

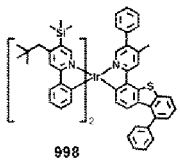

993

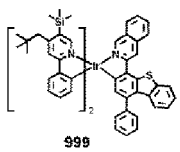

994

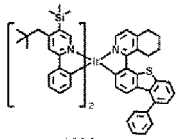

995

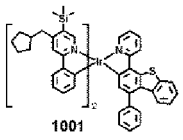

996

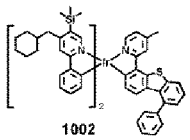

997

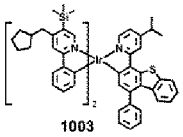

998

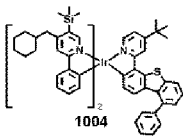

999

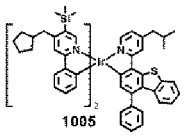

1000

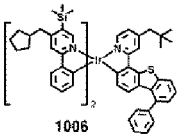

1001

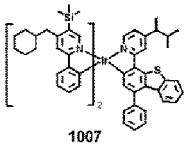

1002

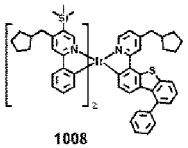

1003

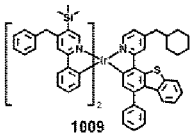

1004

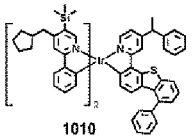

1005

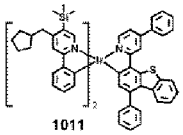

1006

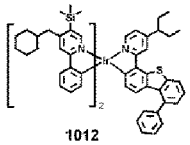

1007

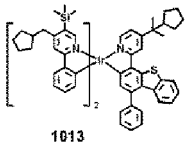

1008

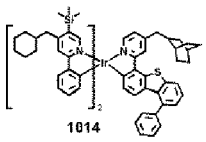

1009

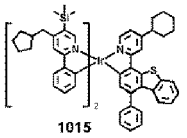

1010

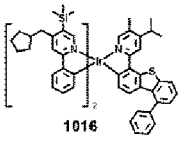

1011

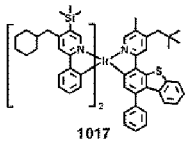

1012

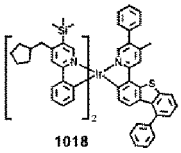

1013

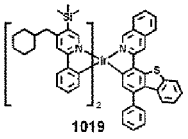

1014

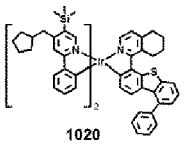

1015

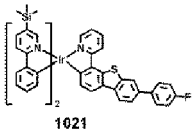

1016

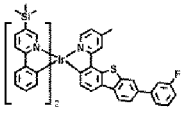

1017

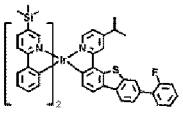

1018

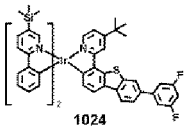

1019

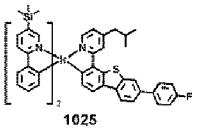

1020

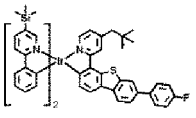

1021

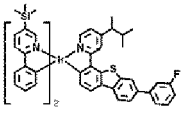

1022

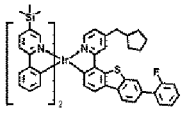

1023

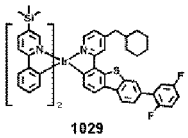

1024

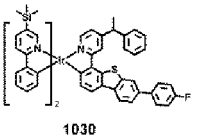

1025

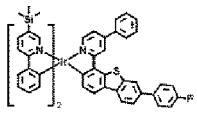

1026

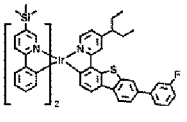

1027

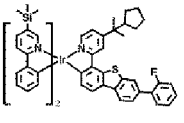

1028

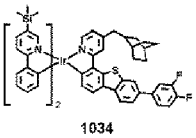

1029

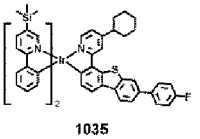

1030

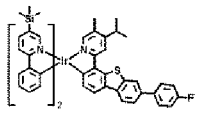

1031

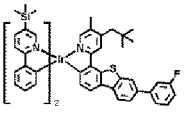

1032

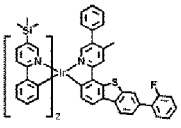

1033

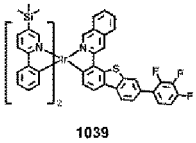

1034

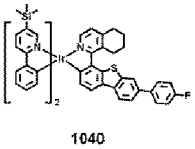

1035

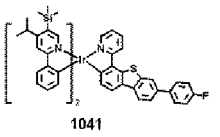

1036

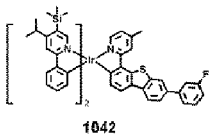

1037

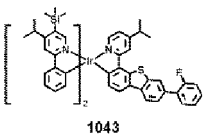

1038

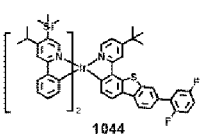

1039

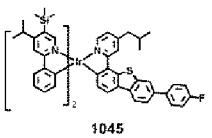

1040

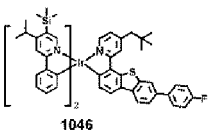

1041

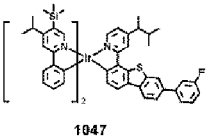

1042

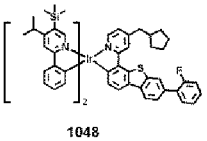

1043

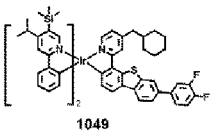

1044

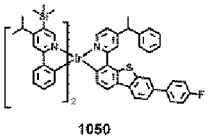

1045

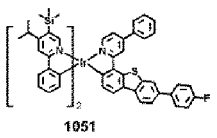

1046

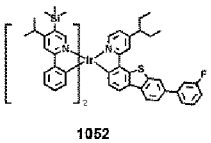

1047

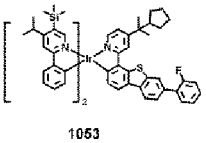

1048

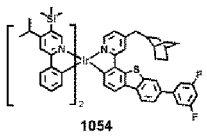

1049

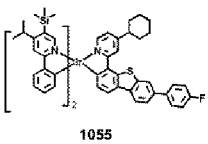

1050

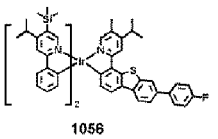

1051

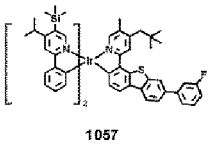

1052

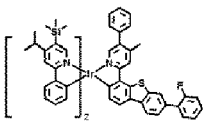

1053

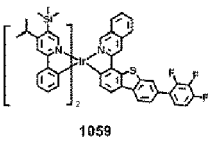

1054

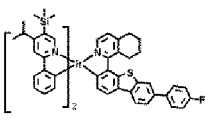

1055

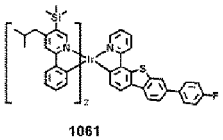

1056

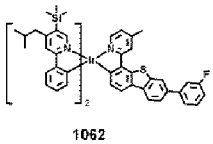

1057

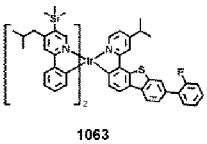

1058

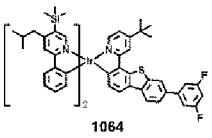

1059

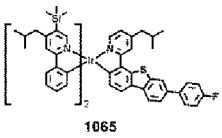

1060

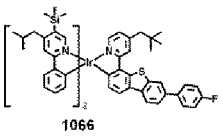

1061

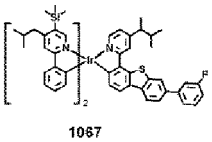

1062

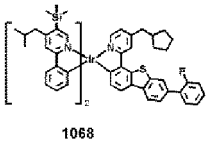

1063

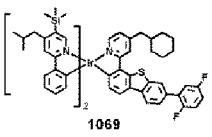

1064

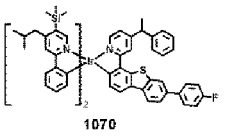

1065

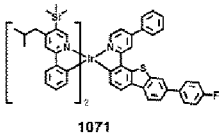

1066

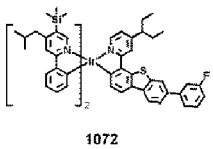

1067

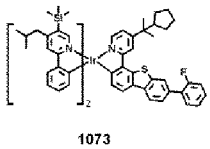

1068

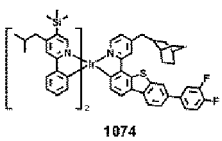

1069

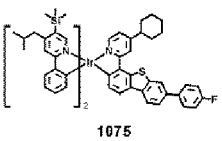

1070

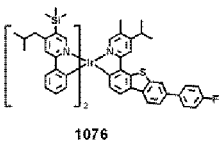

1071

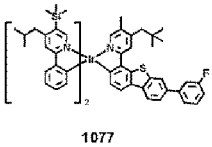

1072

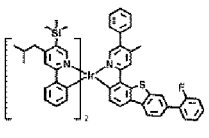

1073

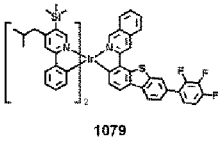

1074

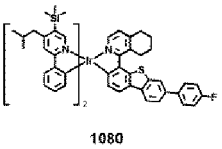

1075

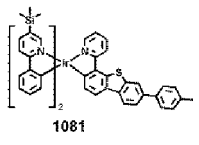

1076

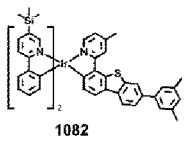

1077

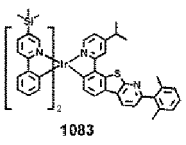

1078

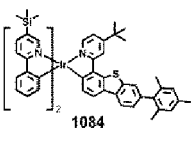

1079

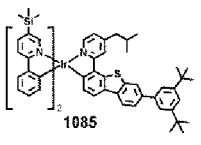

1080

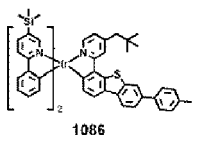

1081

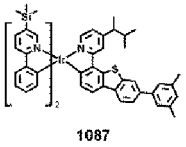

1082

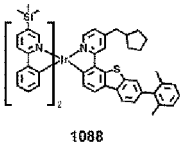

1083

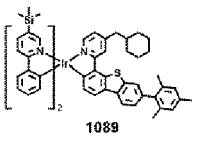

1084

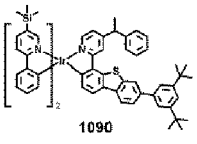

1085

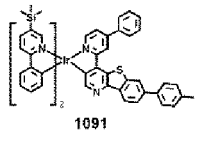

1086

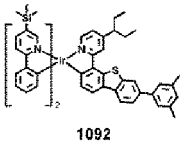

1087

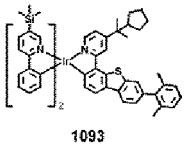

1088

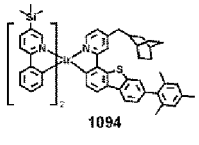

1089

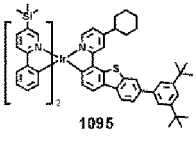

1090

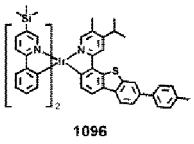

1091

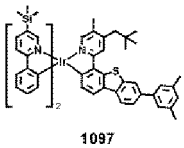

1092

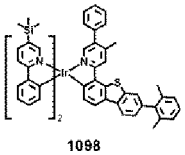

1093

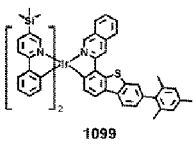

1094

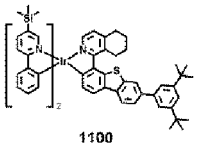

1095

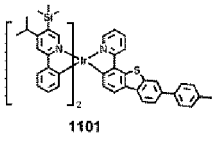

1096

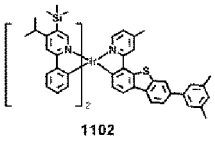

1097

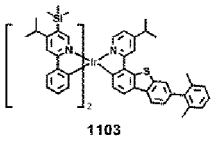

1098

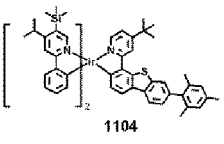

1099

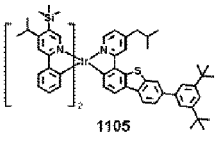

1100

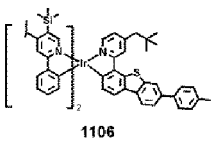

1101

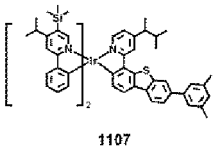

1102

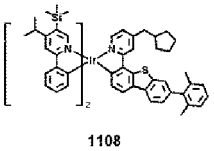

1103

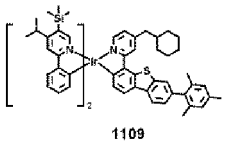

1104

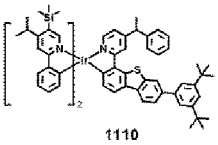

1105

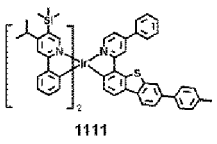

1106

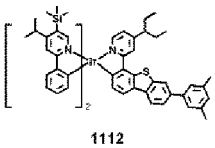

1107

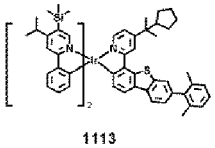

1108

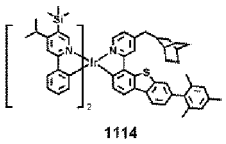

1109

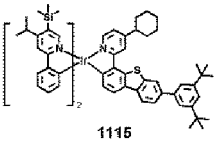

1110

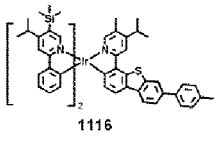

1111

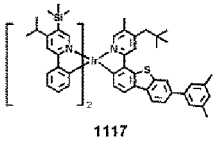

1112

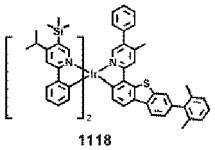

1113

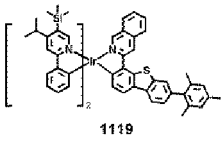

1114

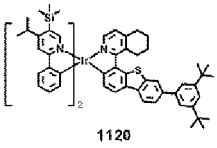

1115

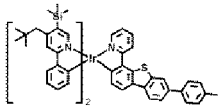

1116

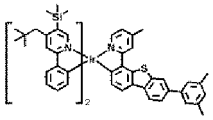

1117

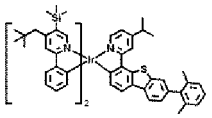

1118

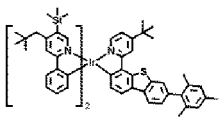

1119

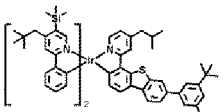

1120

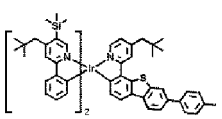

1121

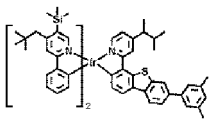

1122

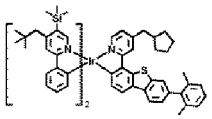

1123

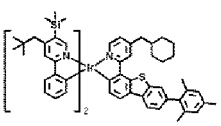

1124

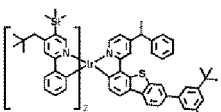

1125

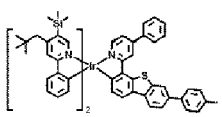

1126

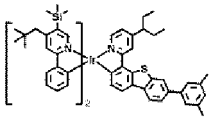

1127

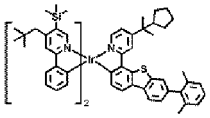

1128

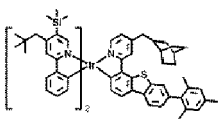

1129

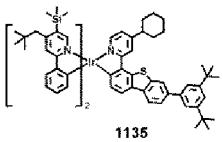

1130

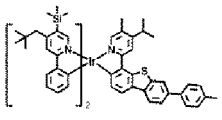

1131

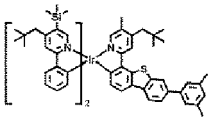

1132

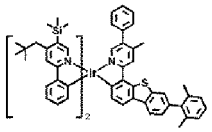

1133

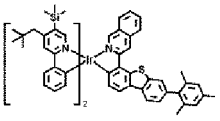

1134

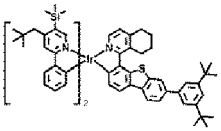

1135

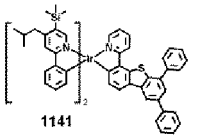

1136

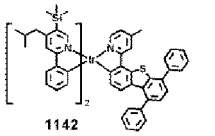

1137

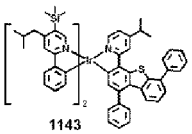

1138

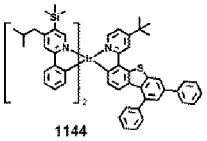

1139

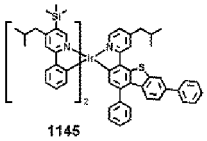

1140

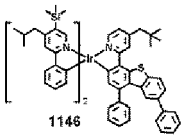

1141

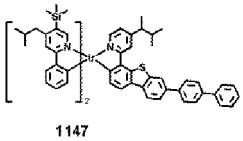

1142

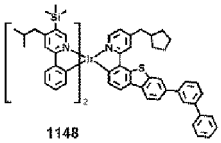

1143

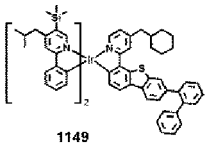

1144

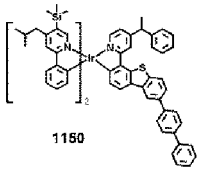

1145

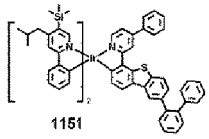

1146

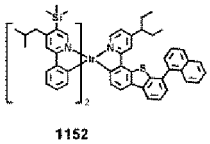

1147

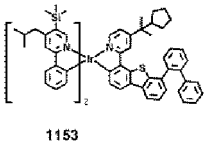

1148

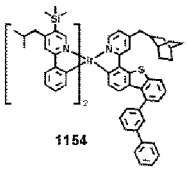

1149

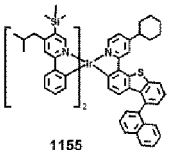

1150

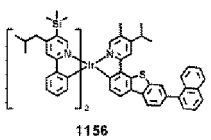

1151

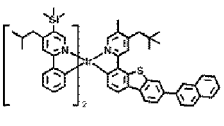

1152

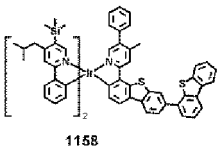

1153

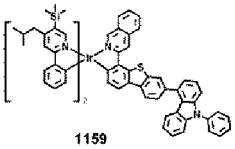

1154

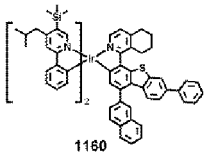

1155

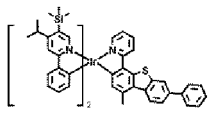

1156

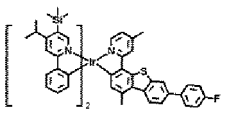

1157

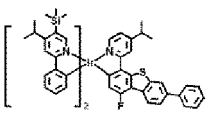

1158

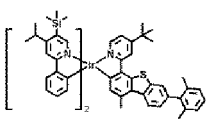

1159

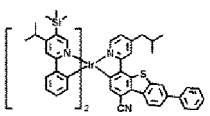

1160

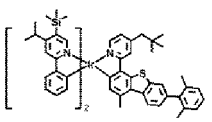

1161

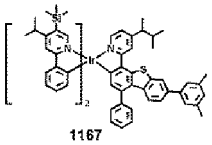

1162

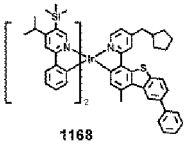

1163

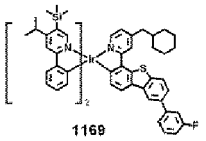

1164

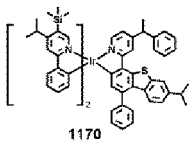

1165

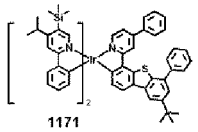

1166

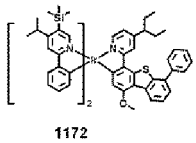

1167

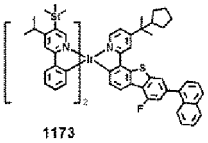

1168

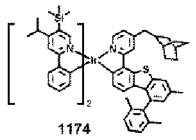

1169

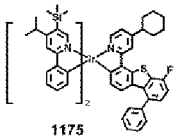

1170

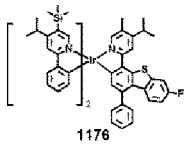

1171

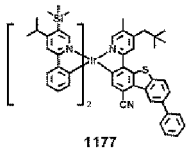

1172

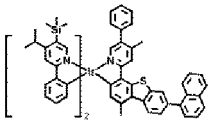

1173

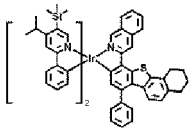

1174

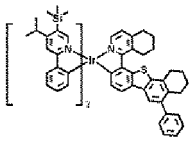

1175

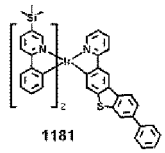

1176

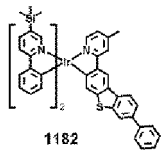

1177

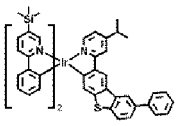

1178

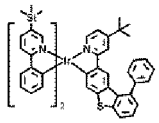

1179

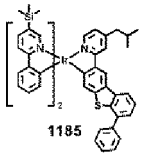

1180

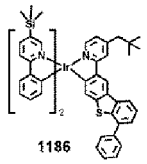

1181

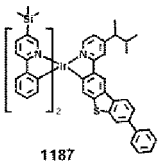

1182

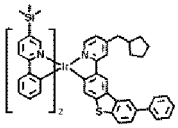

1183

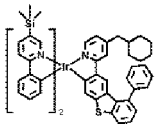

1184

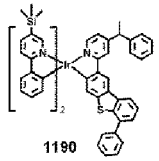

1185

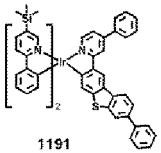

1186

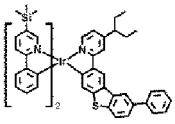

1187

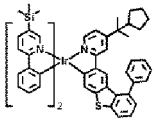

1188

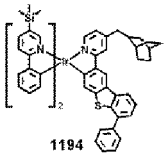

1189

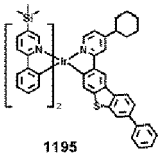

1190

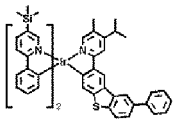

1191

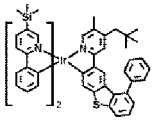

1192

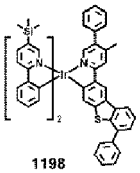

1193

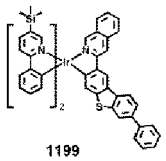

1194

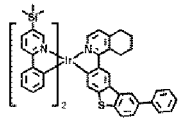

1195

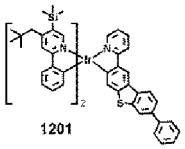

1196

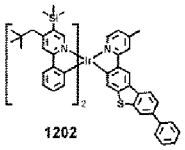

1197

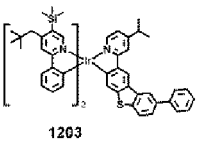

1198

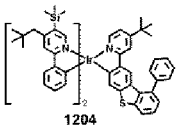

1199

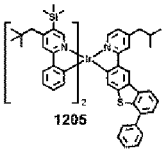

1200

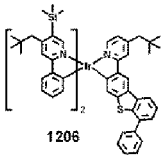

1201

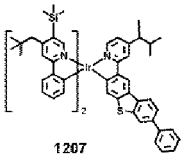

1202

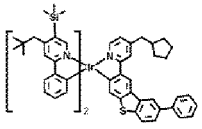

1203

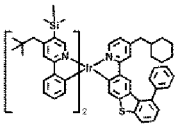

1204

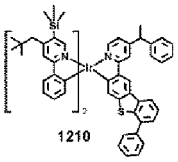

1205

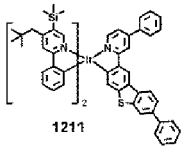

1206

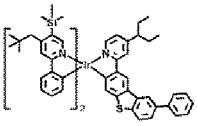

1207

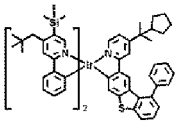

1208

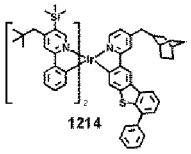

1209

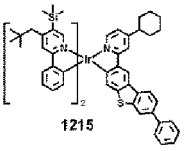

1210

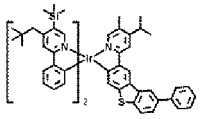

1211

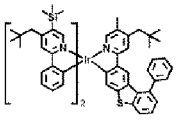

1212

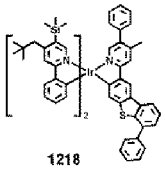

1213

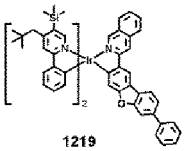

1214

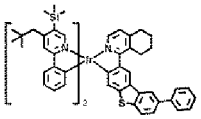

1215

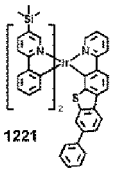

1216

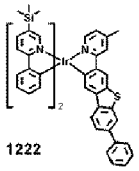

1217

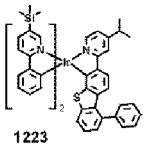

1218

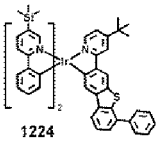

1219

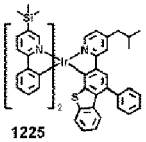

1220

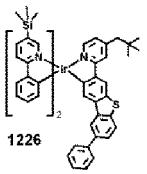

1221

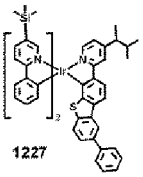

1222

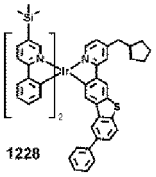

1223

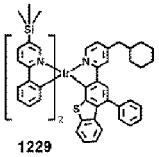

1224

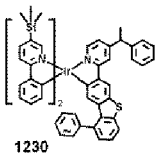

1225

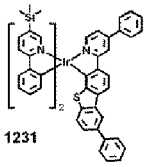

1226

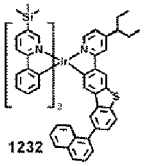

1227

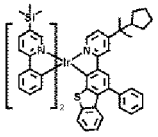

1228

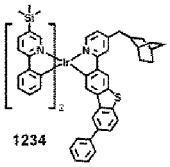

1229

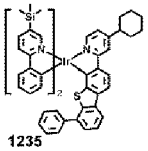

1230

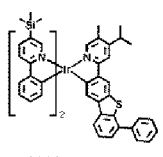

1231

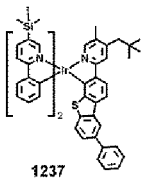

1232

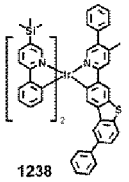

1233

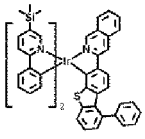

1234

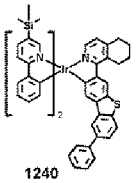

1235

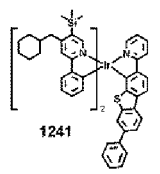

1236

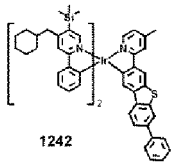

1237

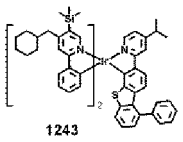

1238

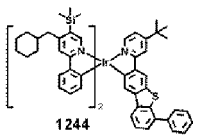

1239

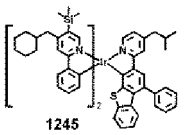

1240

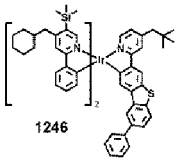

1241

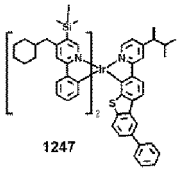

1242

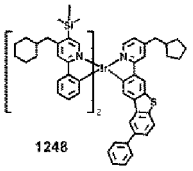

1243

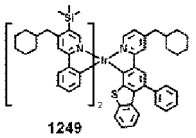

1244

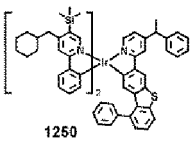

1245

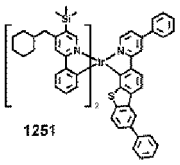

1246

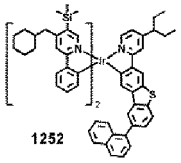

1247

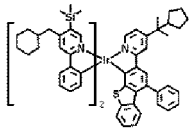

1248

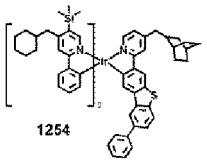

1249

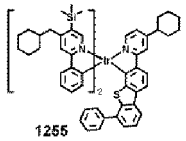

1250

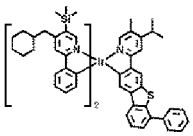

1251

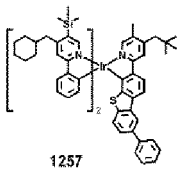

1252

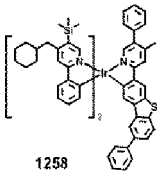

1253

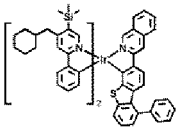

1254

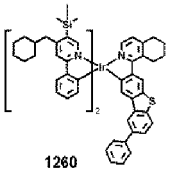

1255

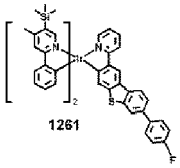

1256

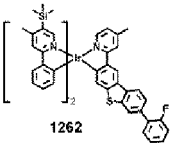

1257

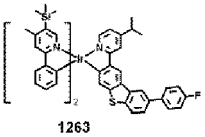

1258

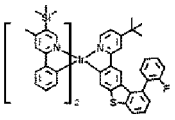

1259

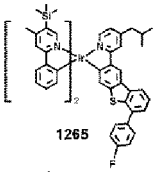

1260

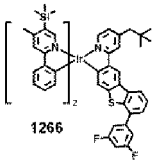

1261

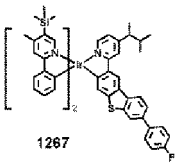

1262

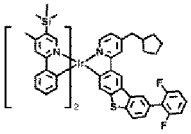

1263

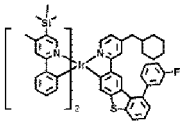

1264

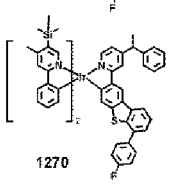

1265

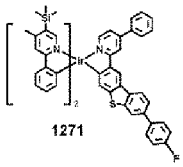

1266

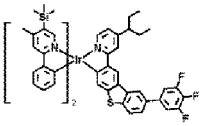

1267

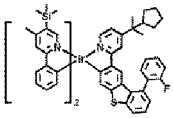

1268

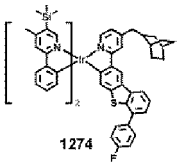

1269

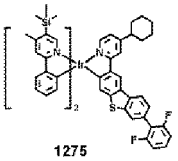

1270

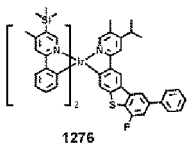

1271

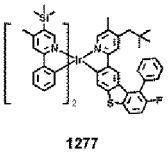

1272

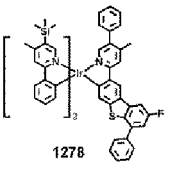

1273

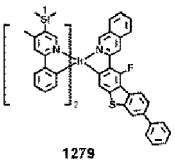

1274

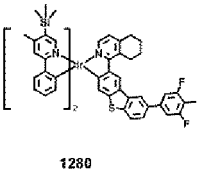

1275

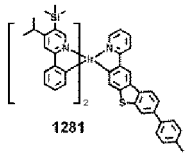

1276

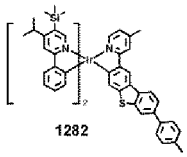

1277

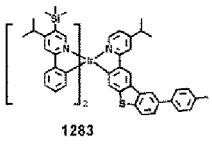

1278

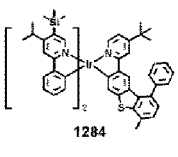

1279

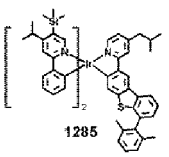

1280

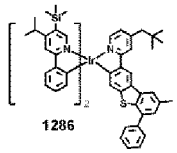

1281

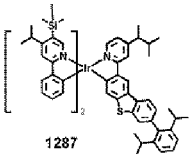

1282

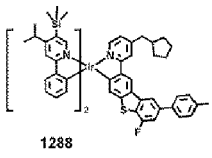

1283

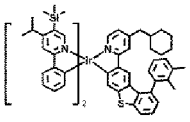

1284

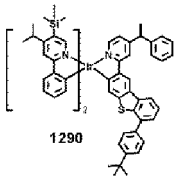

1285

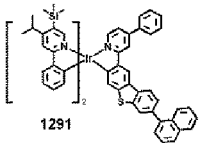

1286

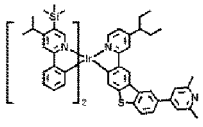

1287

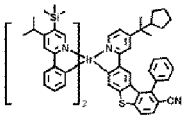

1288

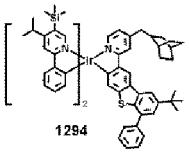

1289

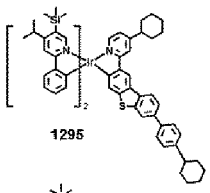

1290

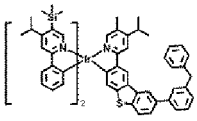

1291

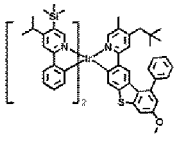

1292

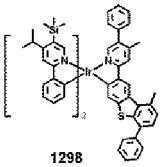

1293

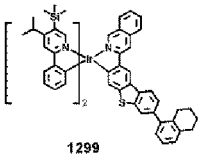

1294

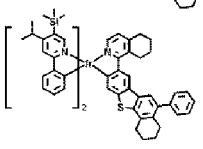

1295

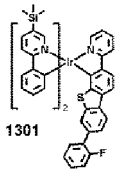

1296

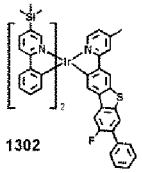

1297

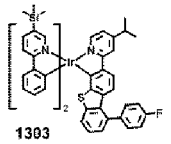

1298

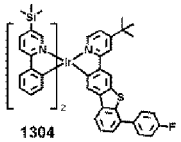

1299

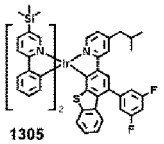

1300

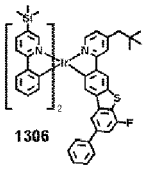

1301

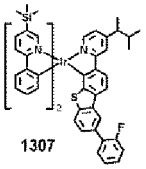

1302

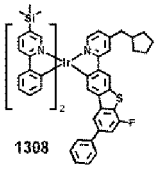

1303

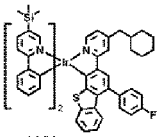

1304

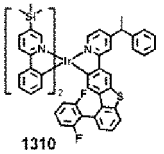

1305

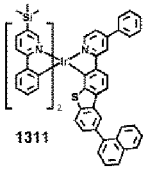

1306

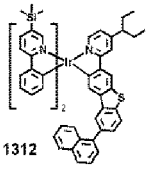

1307

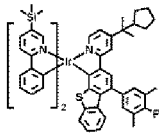

1308

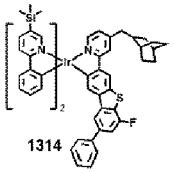

1309

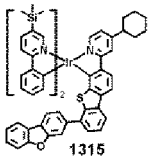

1310

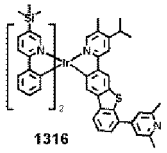

1311

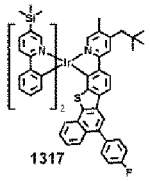

1312

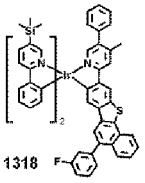

1313

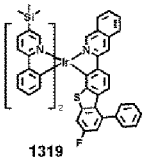

1314

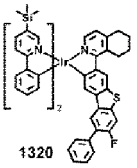

1315

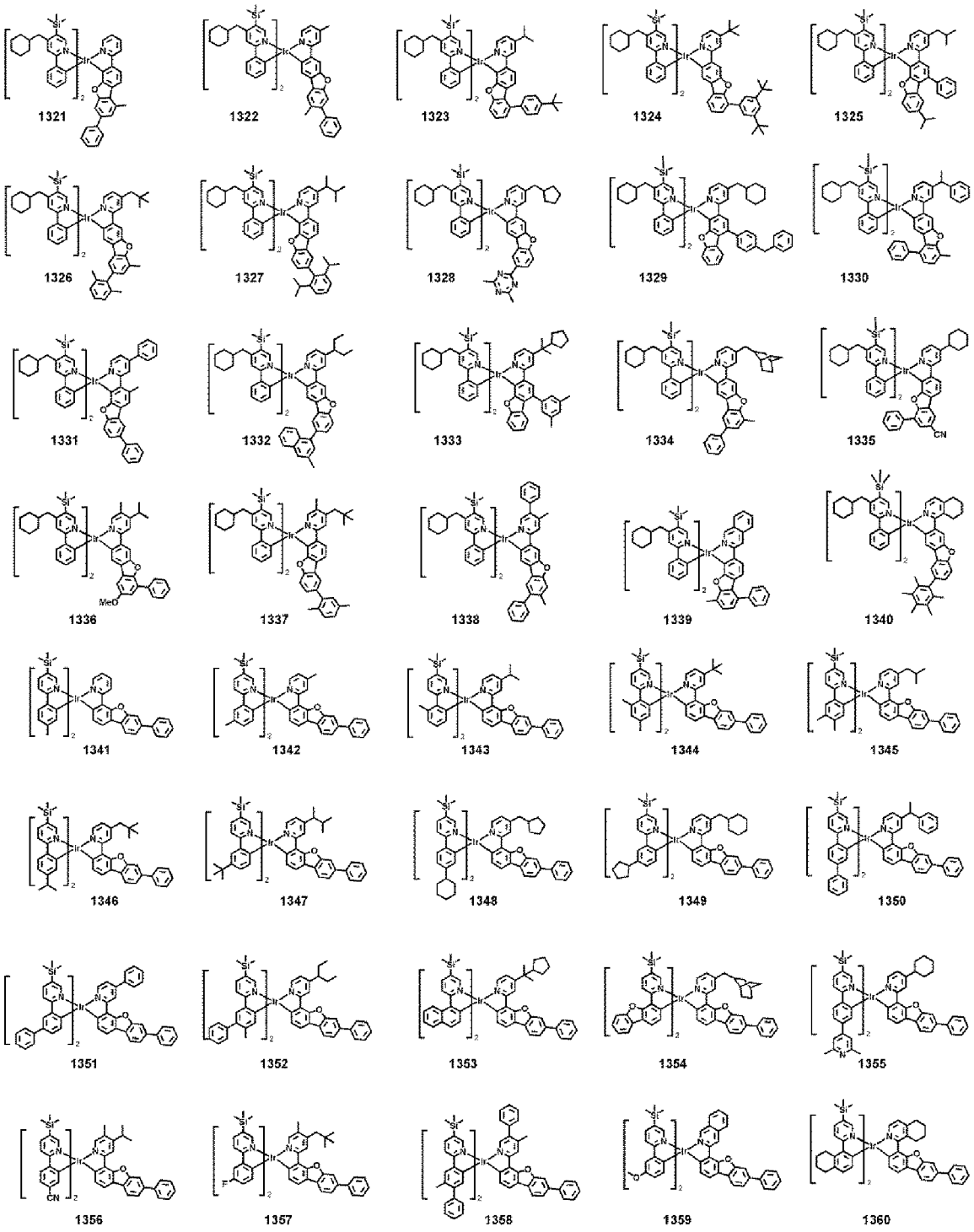

1316

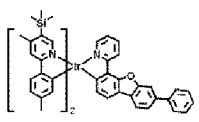

1317

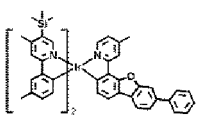

1318

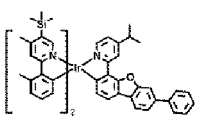

1319

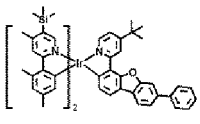

1320

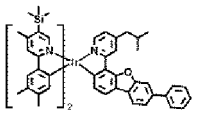

1321
1322
1323
1324
1325
1326
1327
1328
1329
1330
1331
1332
1333
1334
1335
1336
1337
1338
1339
1340
1341
1342
1343
1344
1345
1346
1347
1348
1349
1350
1351
1352
1353
1354
1355
1356
1357
1358
1359
1360

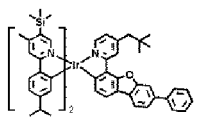

1361

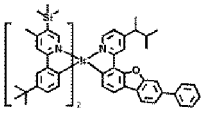

1362

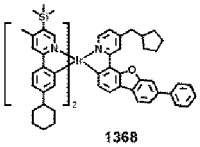

1363

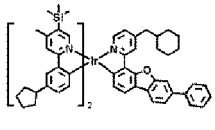

1364

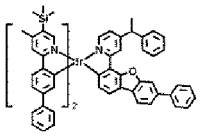

1365

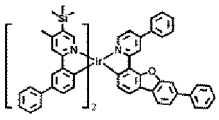

1366

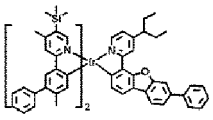

1367

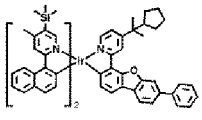

1368

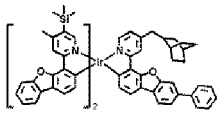

1369

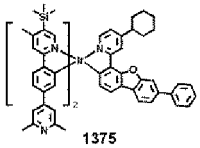

1370

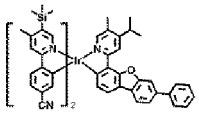

1371

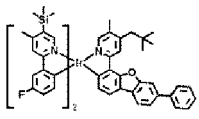

1372

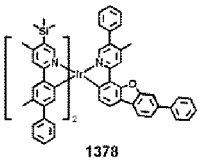

1373

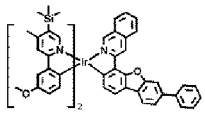

1374

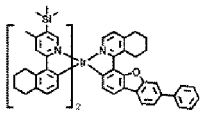

1375

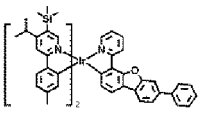

1376

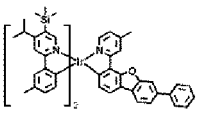

1377

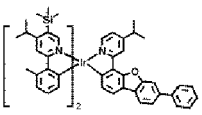

1378

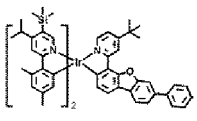

1379

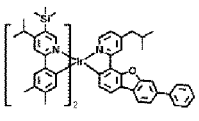

1380

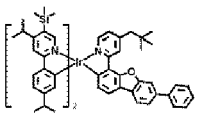

1381

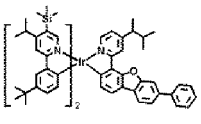

1382

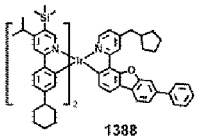

1383

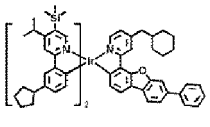

1384

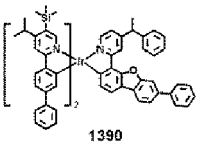

1385

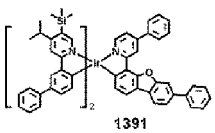

1386

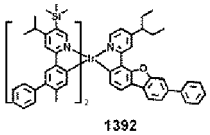

1387

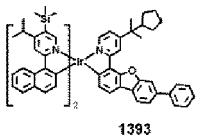

1388

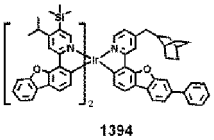

1389

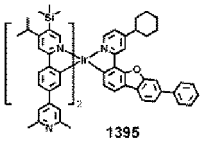

1390

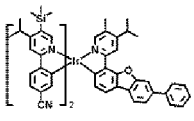

1391

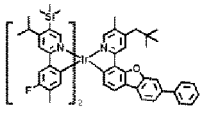

1392

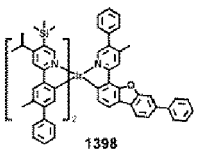

1393

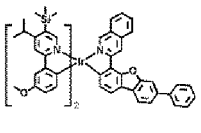

1394

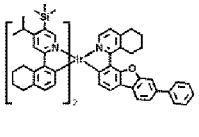

1395

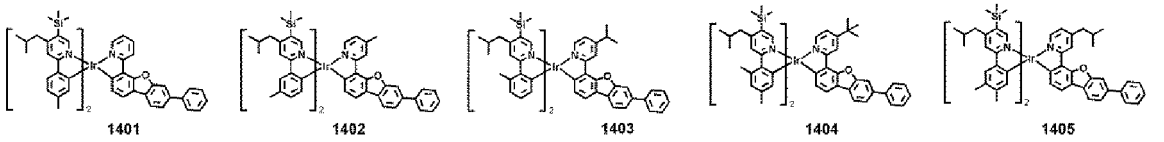

1396

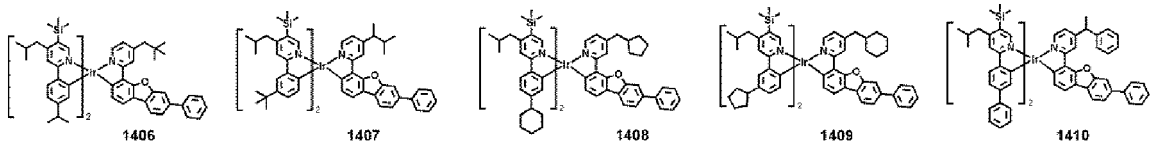

1397

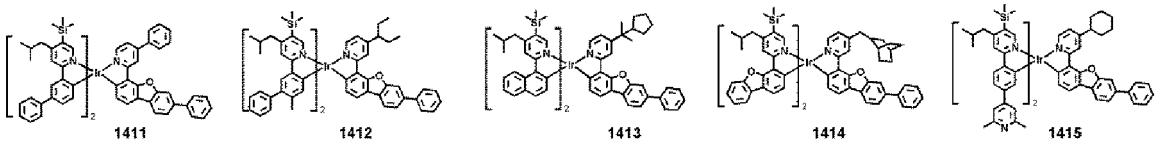

1398

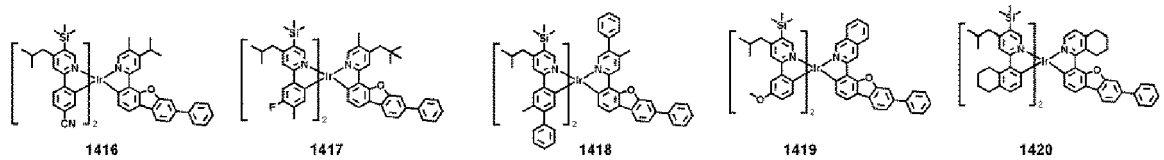

1399

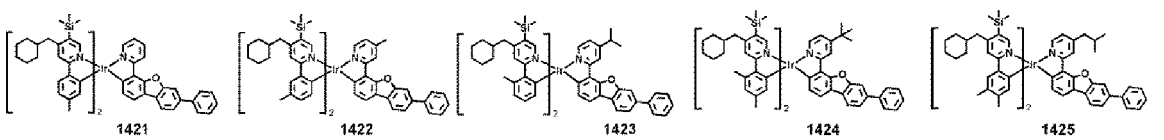

1400

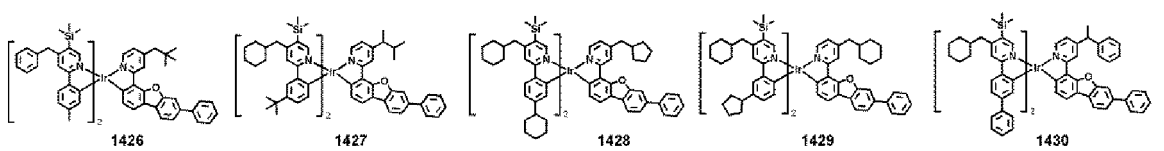

1401 1402 1403 1404 1405

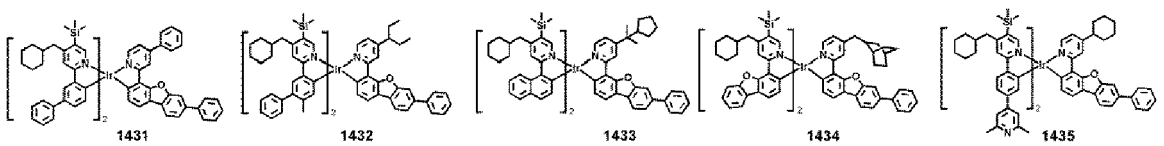

1406 1407 1408 1409 1410

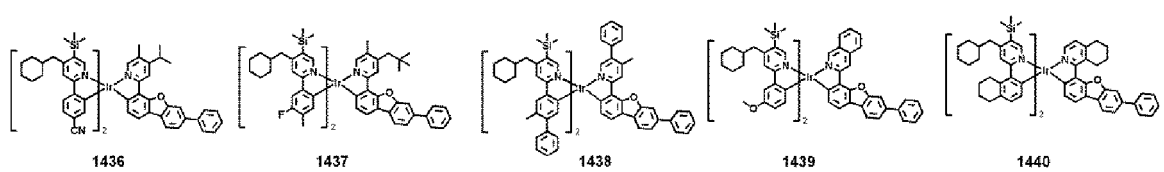

1411 1412 1413 1414 1415

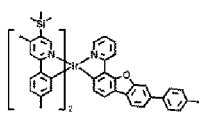

1416 1417 1418 1419 1420

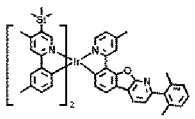

1421 1422 1423 1424 1425

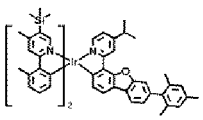

1426 1427 1428 1429 1430

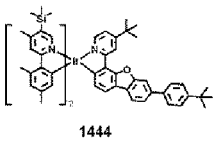

1431 1432 1433 1434 1435

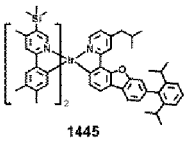

1436 1437 1438 1439 1440

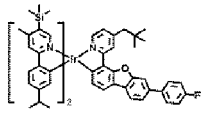

1441

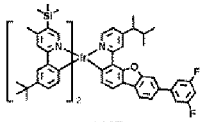

1442

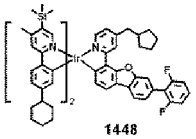

1443

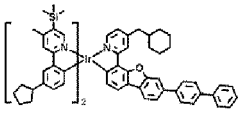

1444

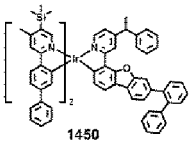

1445

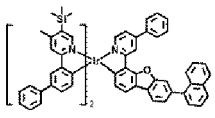

1446

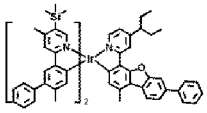

1447

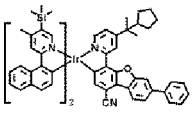

1448

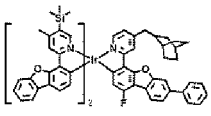

1449

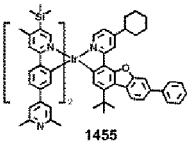

1450

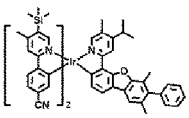

1451

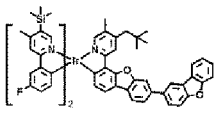

1452

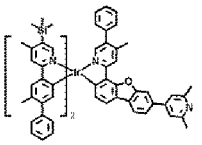

1453

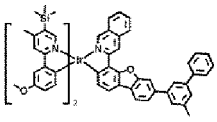

1454

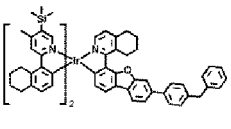

1455

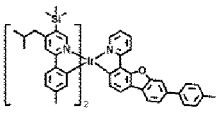

1456

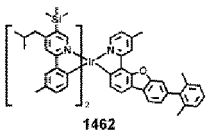

1457

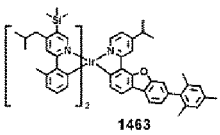

1458

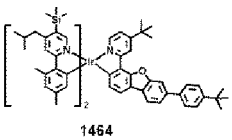

1459

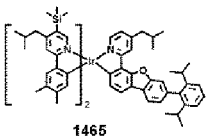

1460

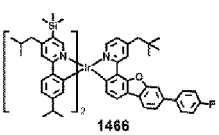

1461

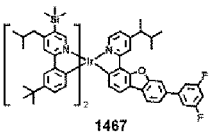

1462

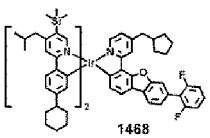

1463

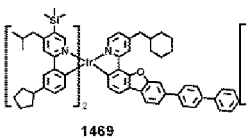

1464

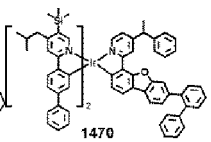

1465

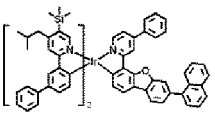

1466

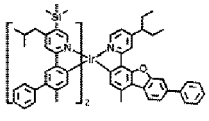

1467

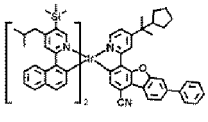

1468

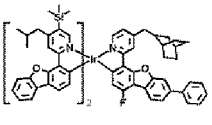

1469

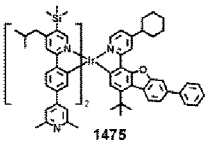

1470

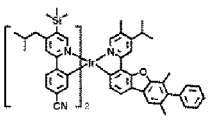

1471

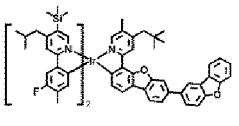

1472

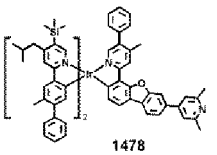

1473

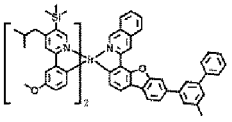

1474

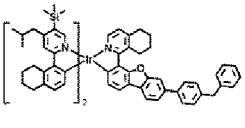

1475

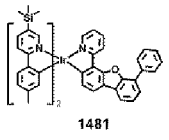

1476

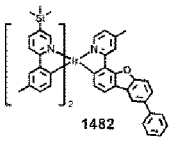

1477

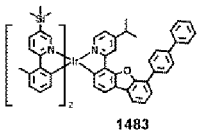

1478

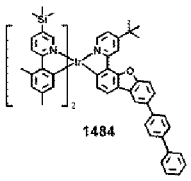

1479

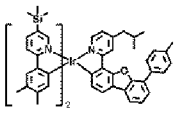

1480

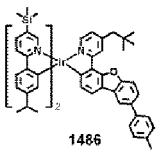

1481

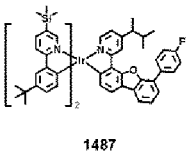

1482

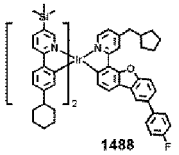

1483

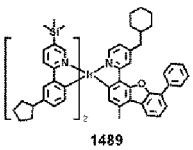

1484

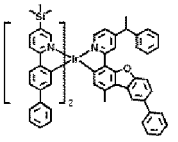

1485

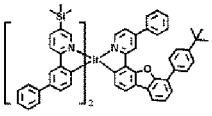

1486

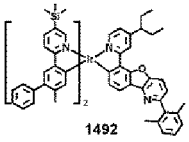

1487

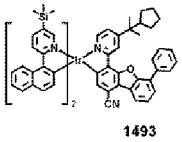

1488

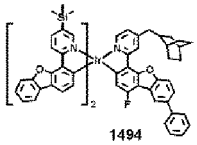

1489

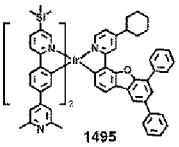

1490

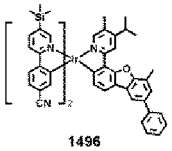

1491

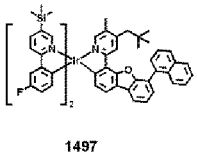

1492

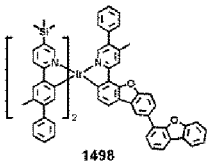

1493

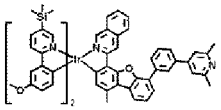

1494

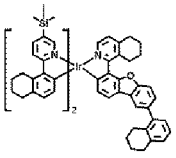

1495

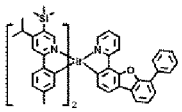

1496

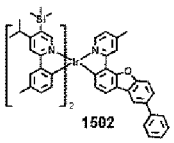

1497

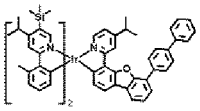

1498

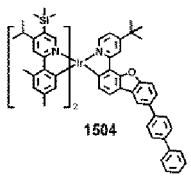

1499

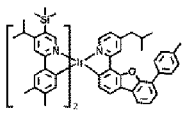

1500

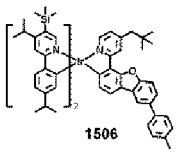

1501

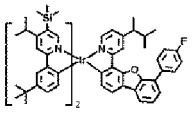

1502

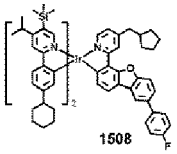

1503

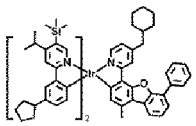

1504

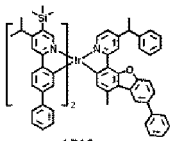

1505

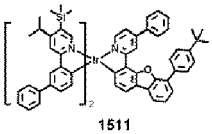

1506

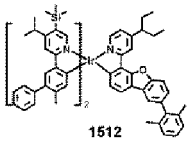

1507

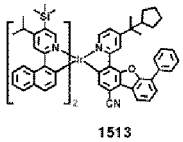

1508

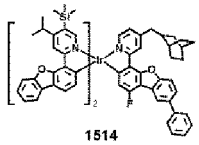

1509

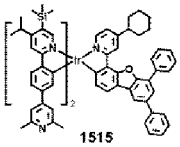

1510

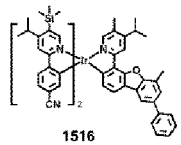

1511

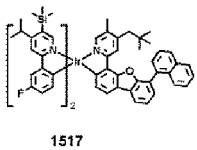

1512

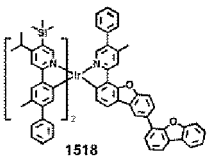

1513

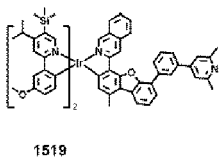

1514

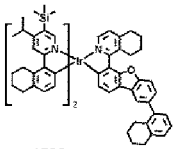

1515

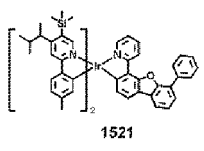

1516

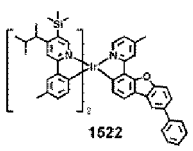

1517

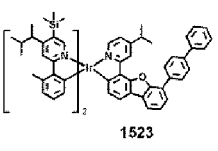

1518

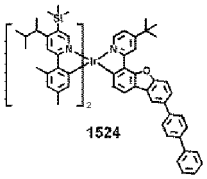

1519

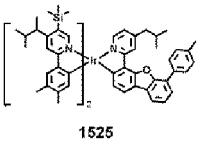

1520

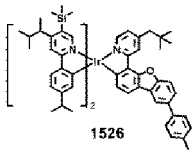

1521

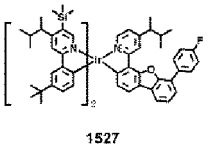

1522

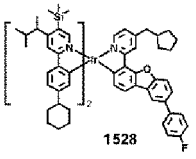

1523

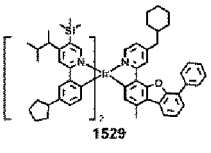

1524

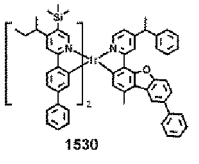

1525

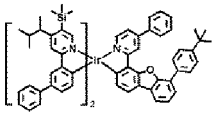

1526

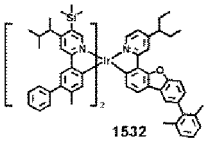

1527

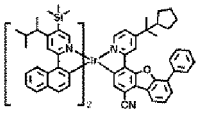

1528

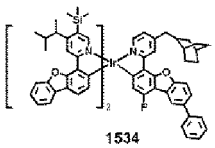

1529

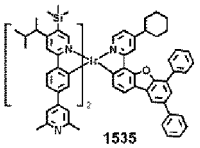

1530

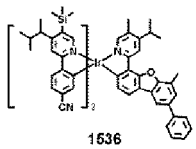

1531

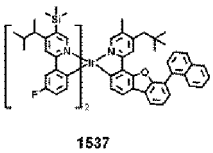

1532

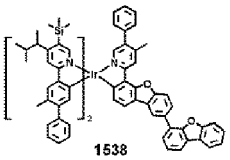

1533

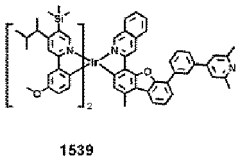

1534

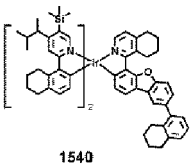

1535

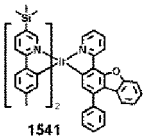

1536

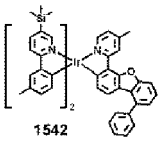

1537

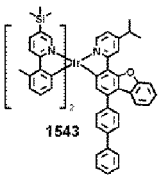

1538

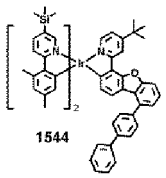

1539

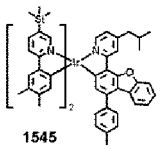

1540

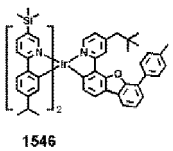

1541

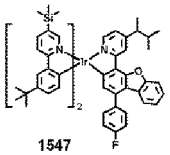

1542

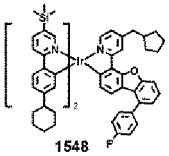

1543

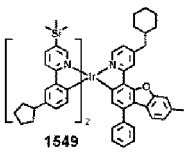

1544

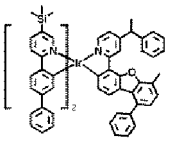

1545

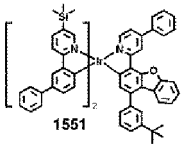

1546

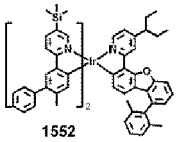

1547

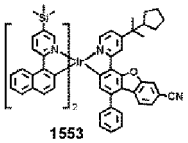

1548

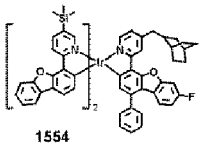

1549

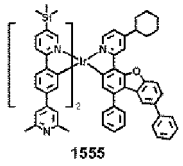

1550

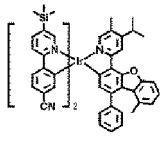

1551

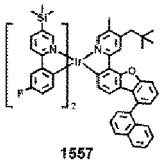

1552

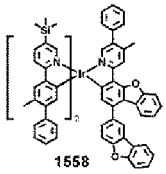

1553

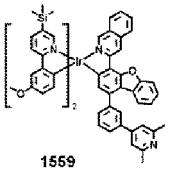

1554

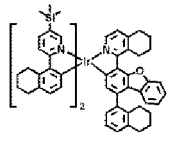

1555

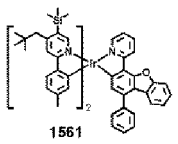

1556

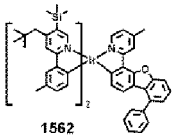

1557

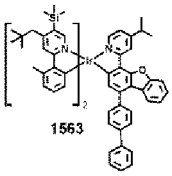

1558

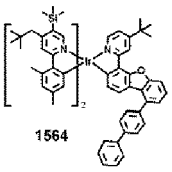

1559

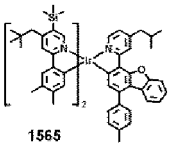

1560

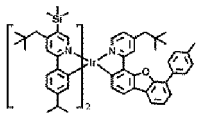

1561

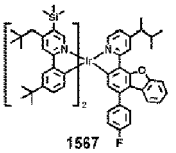

1562

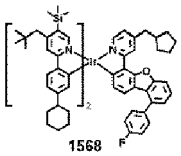

1563

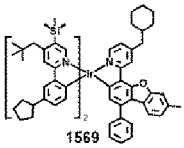

1564

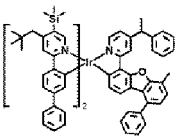

1565

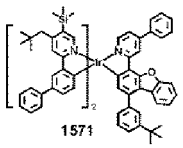

1566

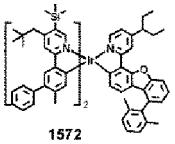

1567

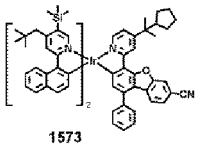

1568

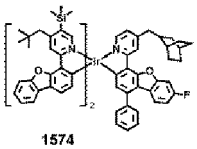

1569

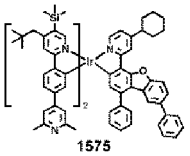

1570

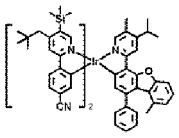

1571

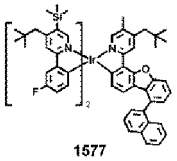

1572

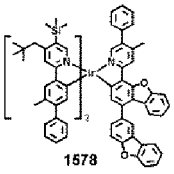

1573

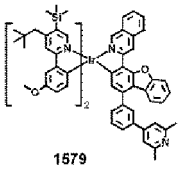

1574

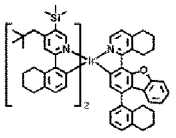

1575

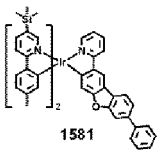

1576

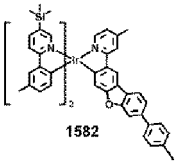

1577

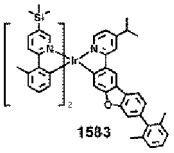

1578

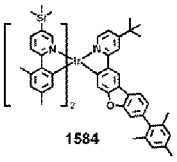

1579

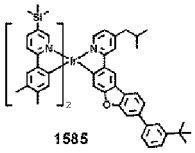

1580

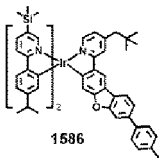

1581

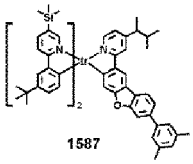

1582

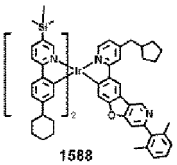

1583

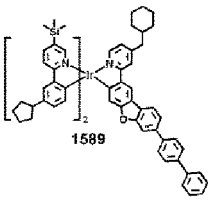

1584

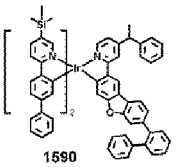

1585

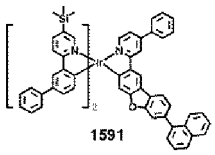

1586

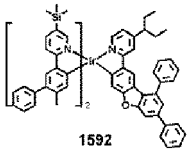

1587

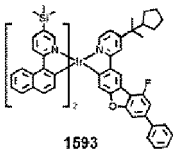

1588

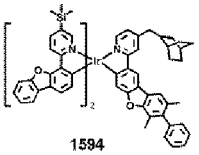

1589

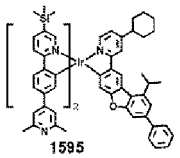

1590

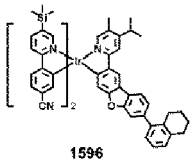

1591

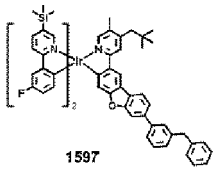

1592

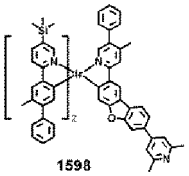

1593

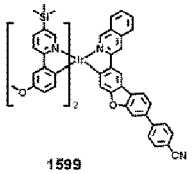

1594

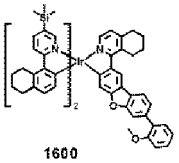

1595

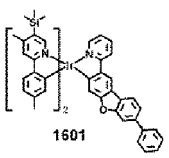

1596

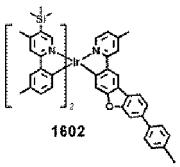

1597

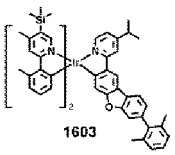

1598

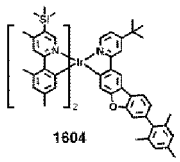

1599

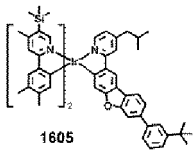

1600

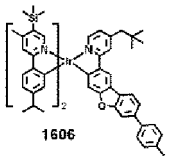

1601

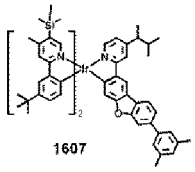

1602

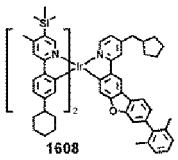

1603

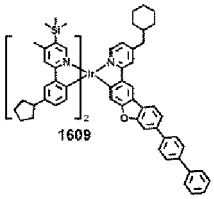

1604

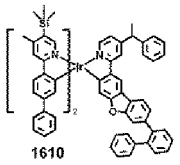

1605

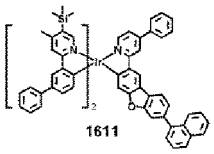

1606

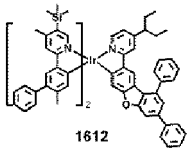

1607

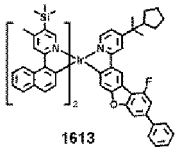

1608

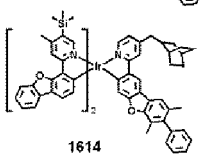

1609

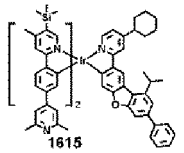

1610

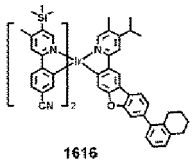

1611

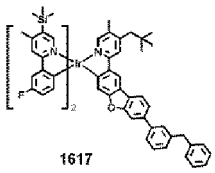

1612

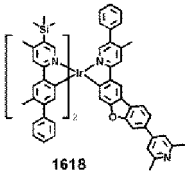

1613

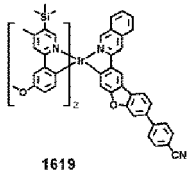

1614

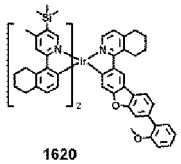

1615

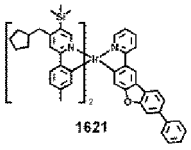

1616

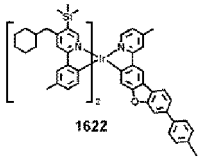

1617

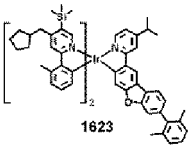

1618

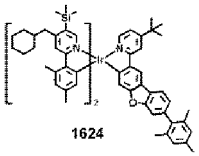

1619

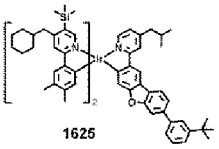

1620

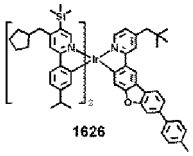

1621

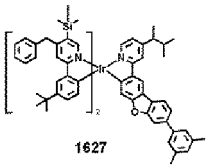

1622

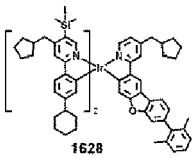

1623

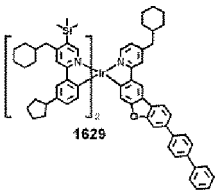

1624

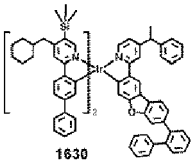

1625

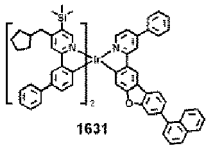

1626

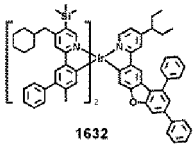

1627

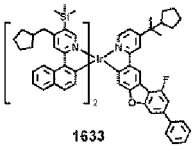

1628

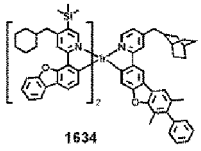

1629

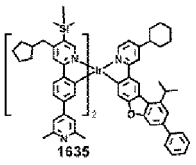

1630

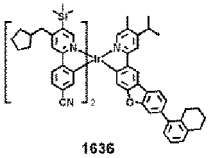

1631

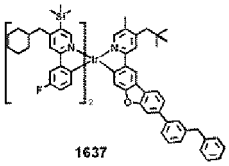

1632

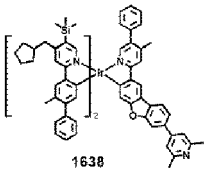

1633

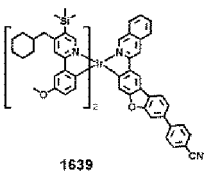

1634

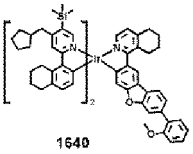

1635

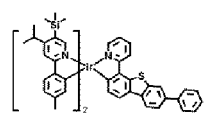

1636

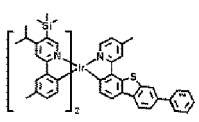

1637

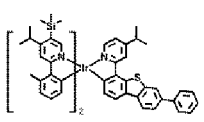

1638

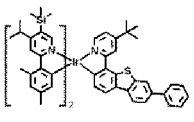

1639

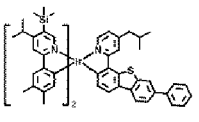

1640

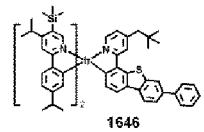

1641

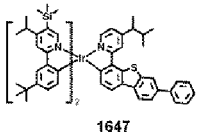

1642

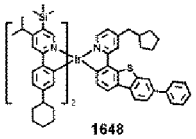

1643

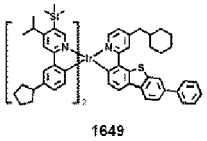

1644

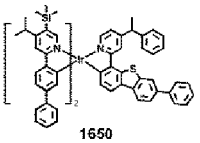

1645

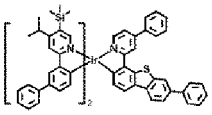

1646

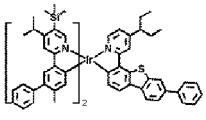

1647

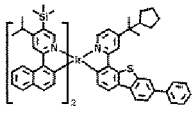

1648

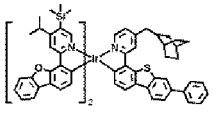

1649

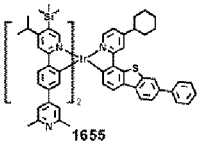

1650

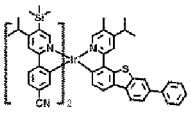

1651

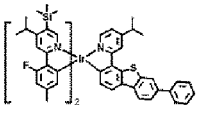

1652

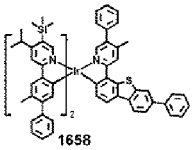

1653

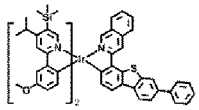

1654

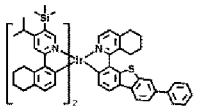

1655

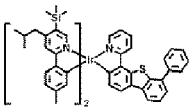

1656

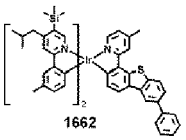

1657

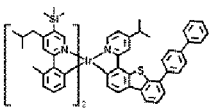

1658

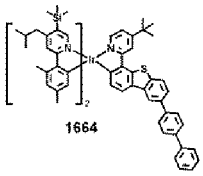

1659

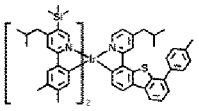

1660

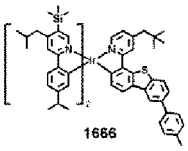

1661

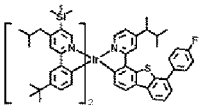

1662

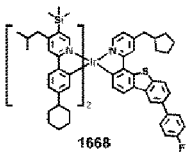

1663

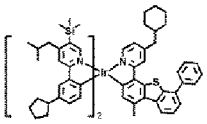

1664

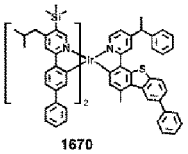

1665

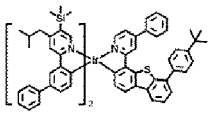

1666

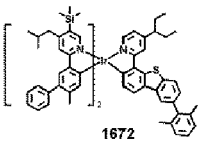

1667

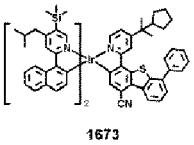

1668

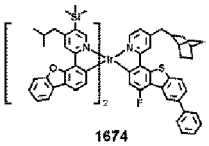

1669

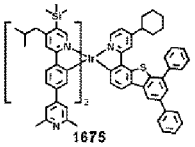

1670

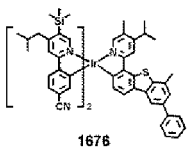

1671

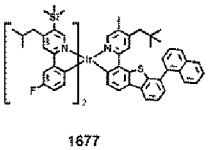

1672

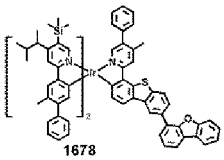

1673

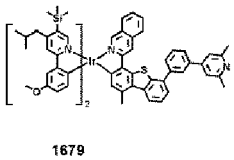

1674

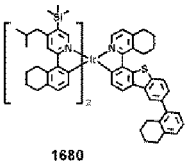

1675

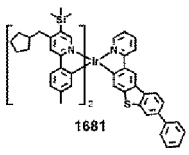

1676

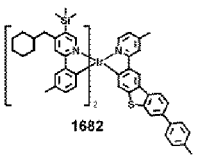

1677

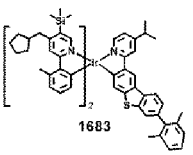

1678

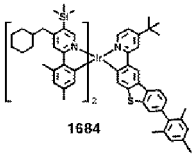

1679

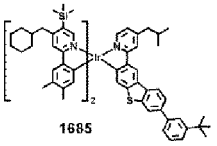

1680

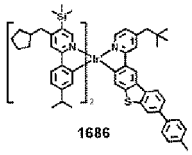

1681

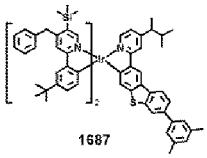

1682

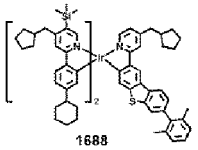

1683

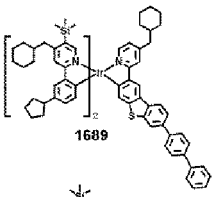

1684

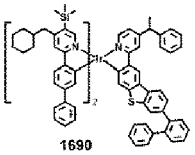

1685

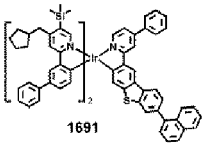

1686

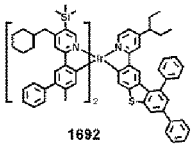

1687

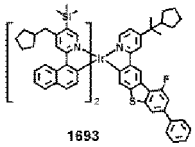

1688

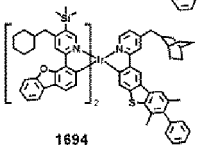

1689

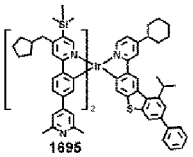

1690

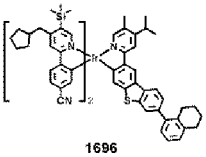

1691

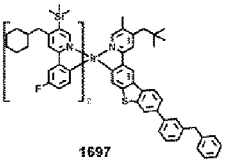

1692

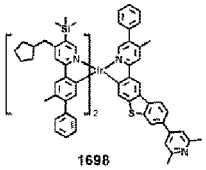

1693

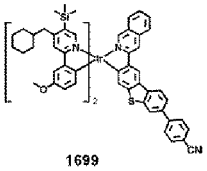

1694

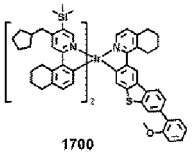

1695

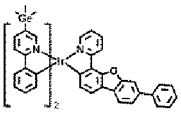

1696

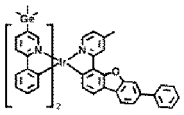

1697

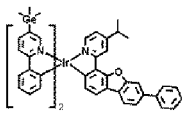

1698

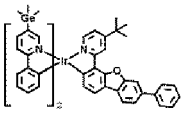

1699

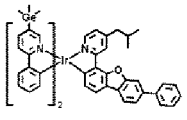

1700

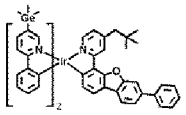

1701

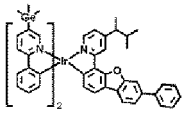

1702

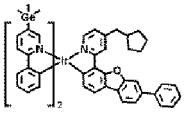

1703

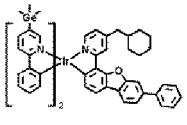

1704

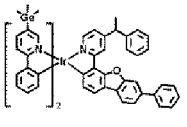

1705

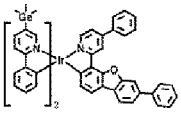

1706

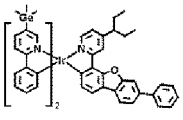

1707

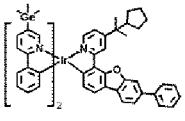

1708

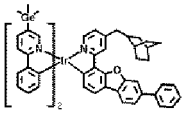

1709

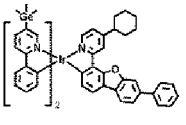

1710

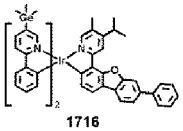

1711

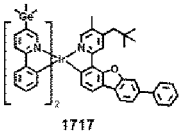

1712

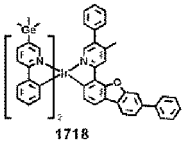

1713

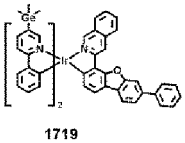

1714

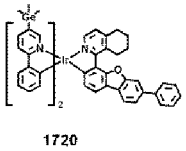

1715

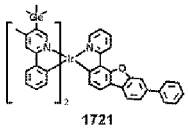

1716

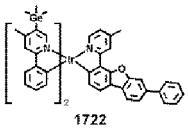

1717

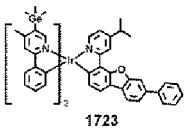

1718

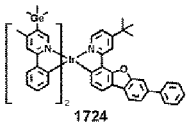

1719

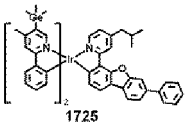

1720

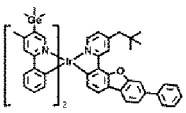

1721

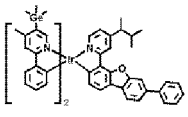

1722

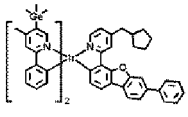

1723

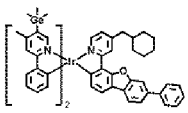

1724

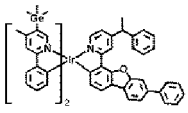

1725

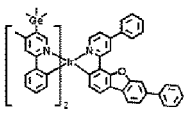

1726

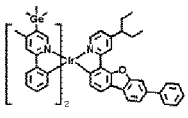

1727

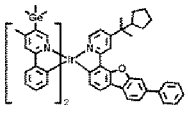

1728

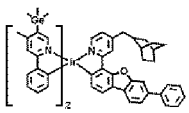

1729

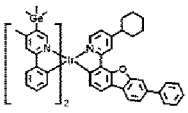

1730

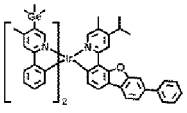

1731

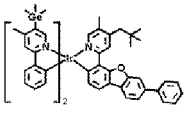

1732

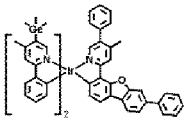

1733

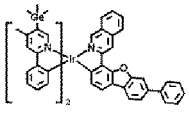

1734

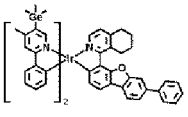

1735

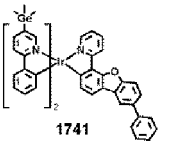

1736

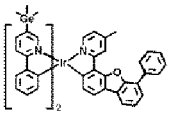

1737

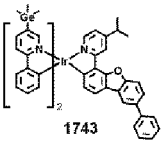

1738

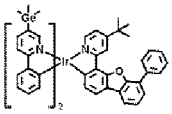

1739

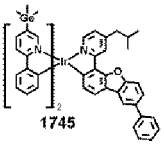

1740

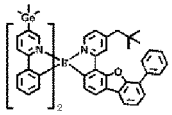

1741

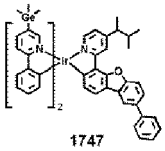

1742

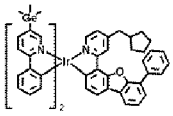

1743

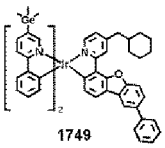

1744

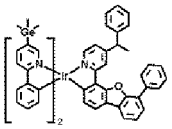

1745

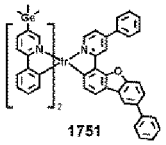

1746

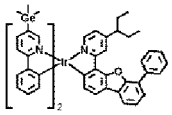

1747

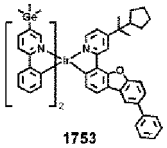

1748

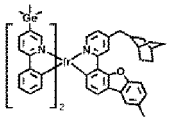

1749

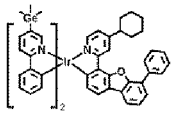

1750

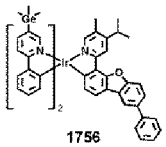

1751

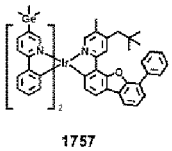

1752

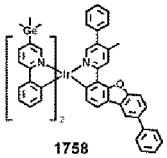

1753

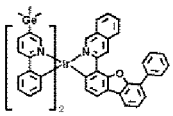

1754

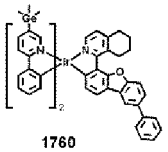

1755

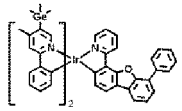

1756

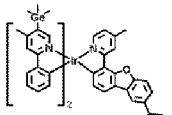

1757

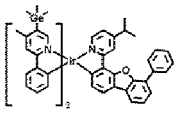

1758

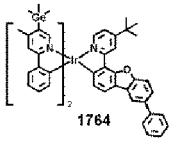

1759

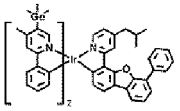

1760

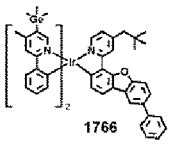

1761

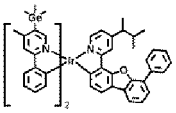

1762

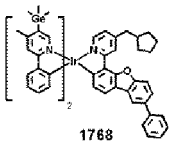

1763

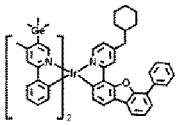

1764

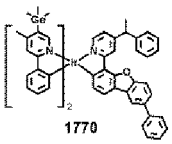

1765

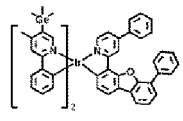

1766

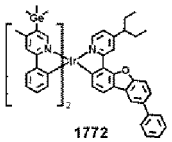

1767

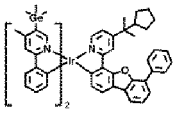

1768

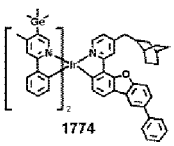

1769

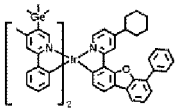

1770

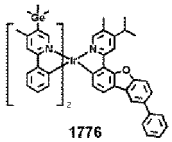

1771

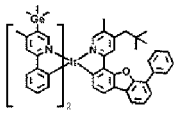

1772

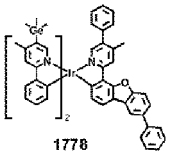

1773

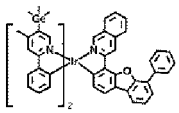

1774

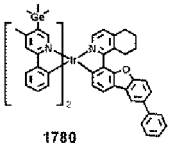

1775

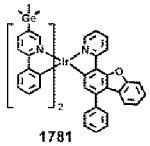

1776

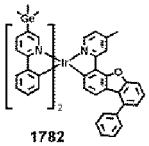

1777

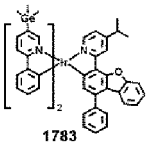

1778

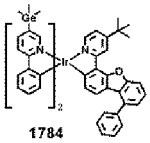

1779

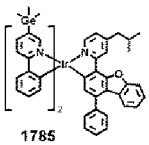

1780

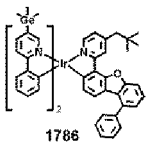

1781

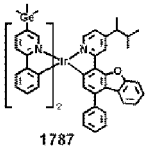

1782

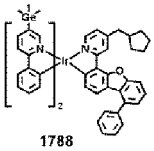

1783

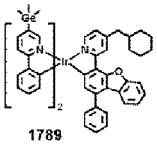

1784

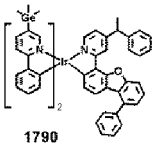

1785

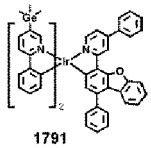

1786

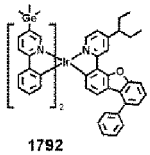

1787

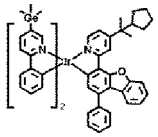

1788

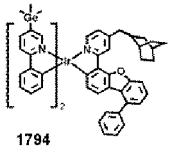

1789

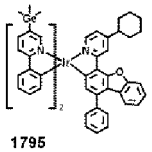

1790

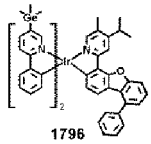

1791

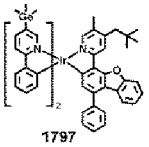

1792

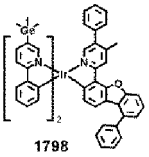

1793

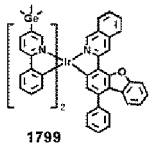

1794

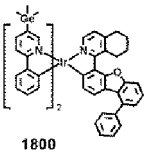

1795

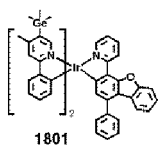

1796

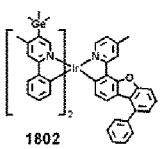

1797

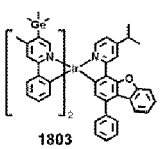

1798

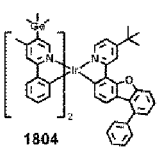

1799

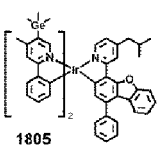

1800

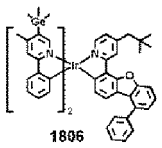

1801

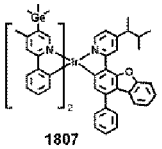

1802

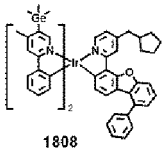

1803

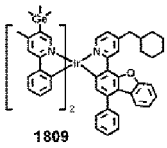

1804

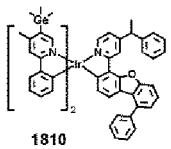

1805

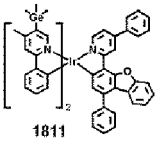

1806

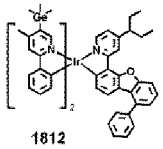

1807

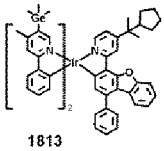

1808

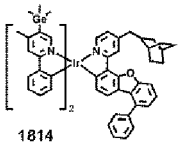

1809

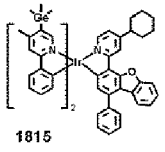

1810

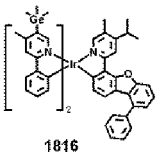

1811

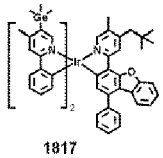

1812

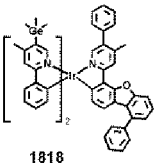

1813

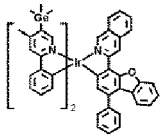

1814

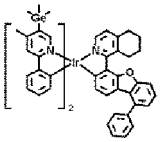

1815

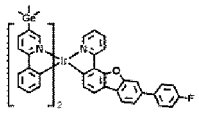

1816

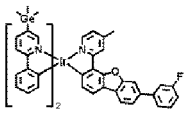

1817

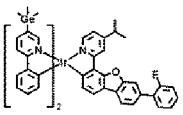

1818

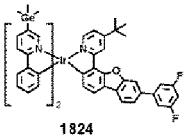

1819

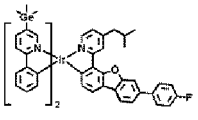

1820

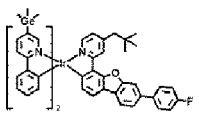

1821

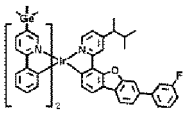

1822

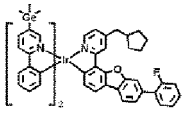

1823

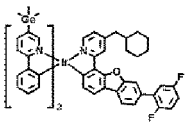

1824

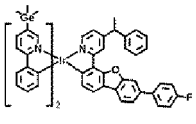

1825

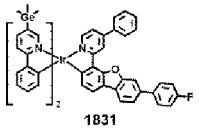

1826

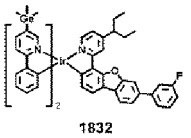

1827

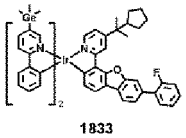

1828

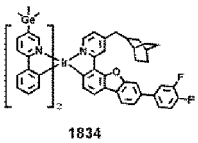

1829

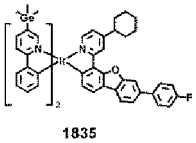

1830

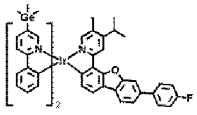

1831

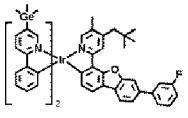

1832

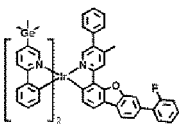

1833

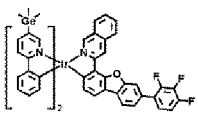

1834

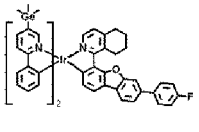

1835

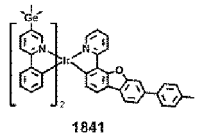

1836

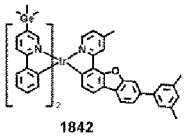

1837

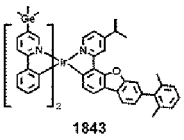

1838

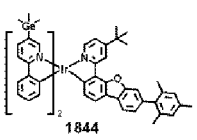

1839

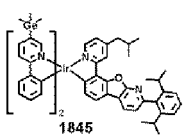

1840

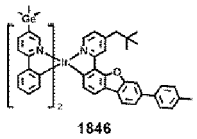

1841

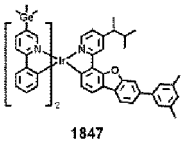

1842

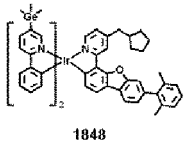

1843

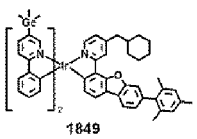

1844

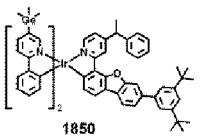

1845

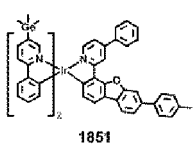

1846

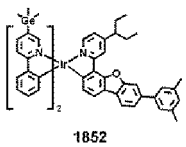

1847

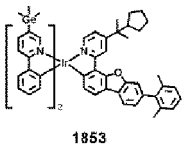

1848

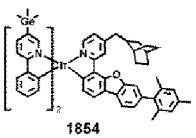

1849

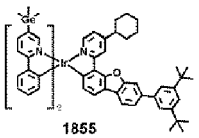

1850

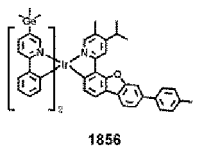

1851

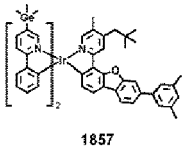

1852

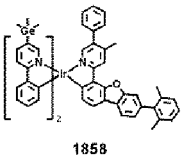

1853

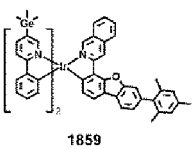

1854

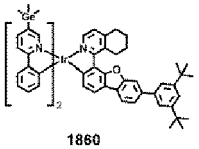

1855

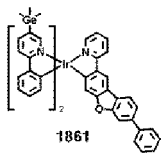

1856

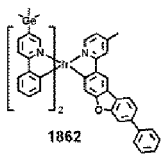

1857

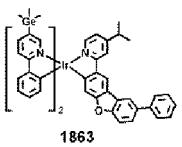

1858

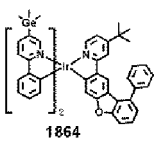

1859

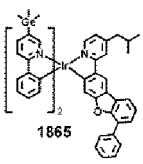

1860

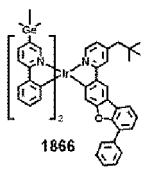

1861

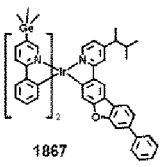

1862

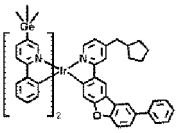

1863

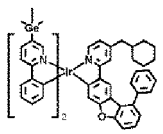

1864

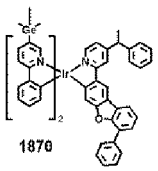

1865

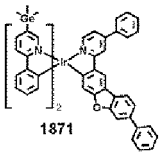

1866

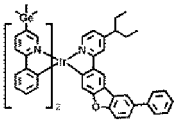

1867

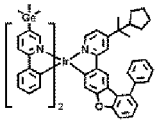

1868

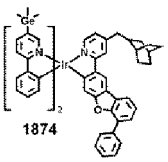

1869

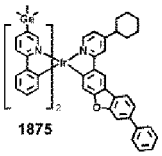

1870

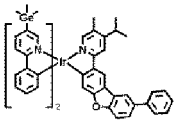

1871

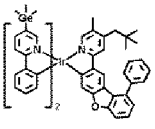

1872

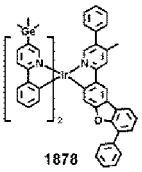

1873

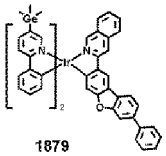

1874

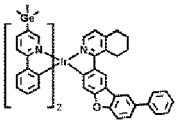

1875

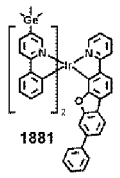

1876

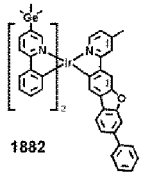

1877

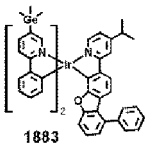

1878

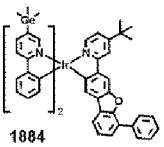

1879

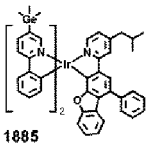

1880

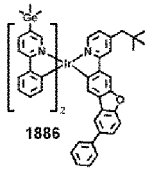

1881

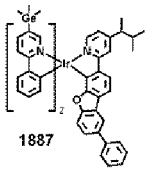

1882

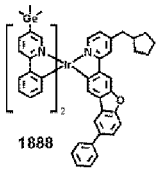

1883

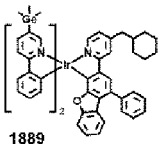

1884

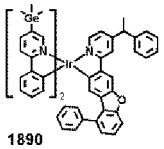

1885

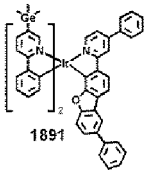

1886

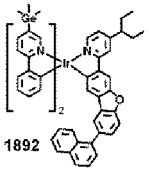

1887

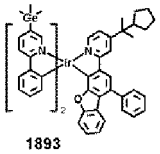

1888

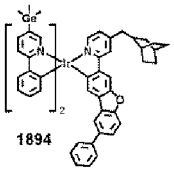

1889

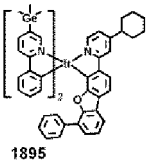

1890

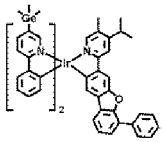

1891

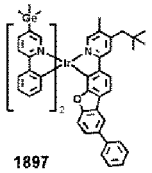

1892

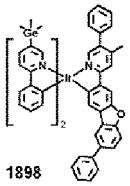

1893

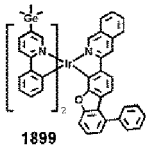

1894

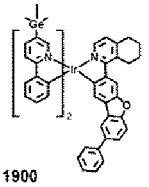

1895

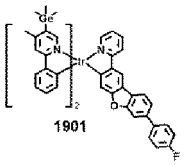

1896

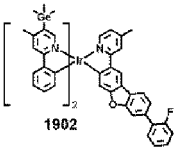

1897

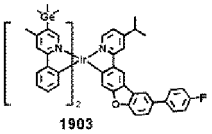

1898

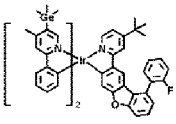

1899

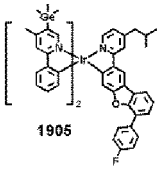

1900

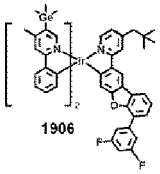

1901

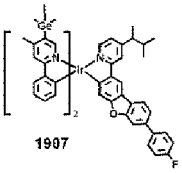

1902

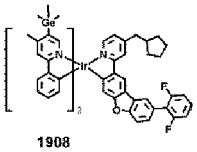

1903

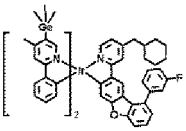

1904

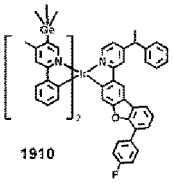

1905

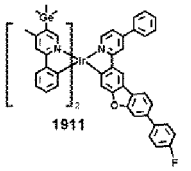

1906

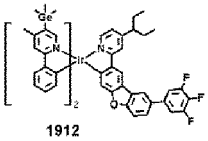

1907

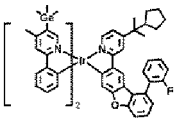

1908

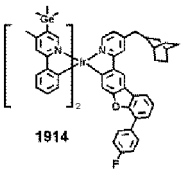

1909

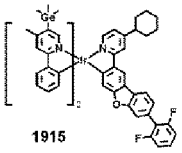

1910

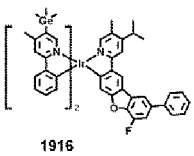

1911

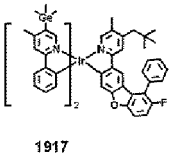

1912

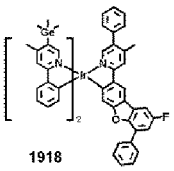

1913

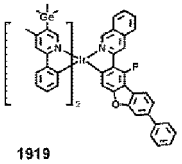

1914

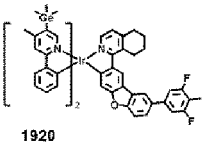

1915

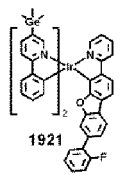

1916

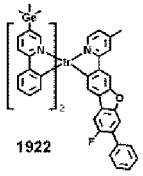

1917

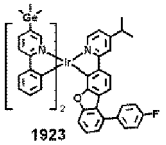

1918

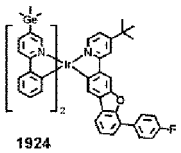

1919

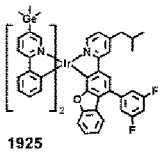

1920

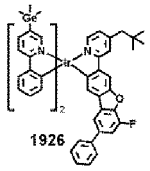

1921

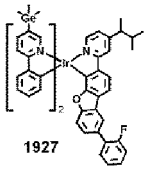

1922

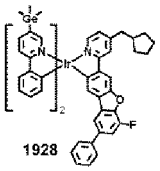

1923

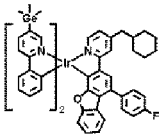

1924

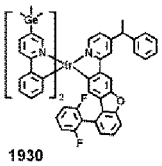

1925

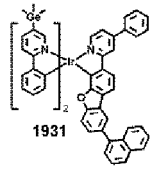

1926

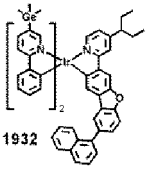

1927

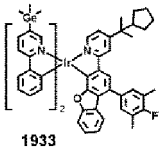

1928

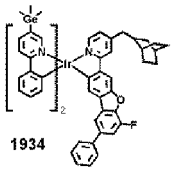

1929

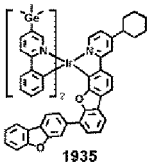

1930

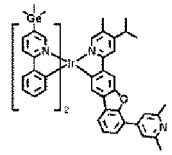

1931

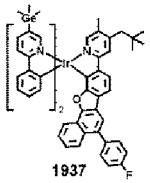

1932

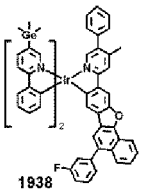

1933

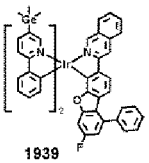

1934

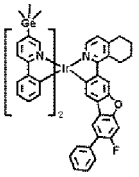

1935

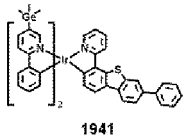

1936

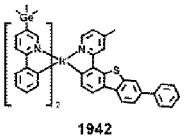

1937

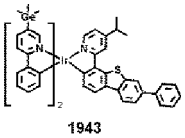

1938

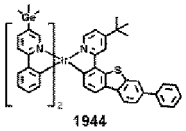

1939

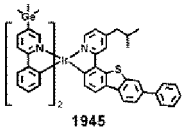

1940

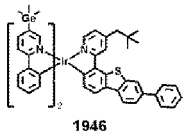

1941

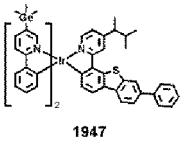

1942

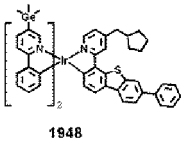

1943

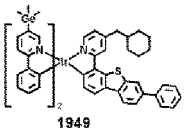

1944

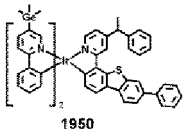

1945

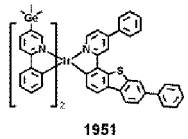

1946

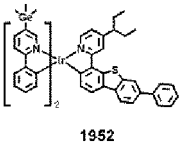

1947

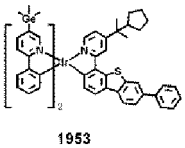

1948

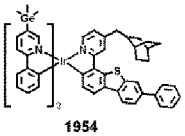

1949

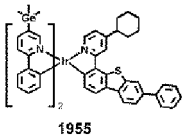

1950

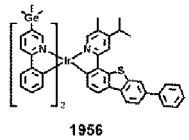

1951

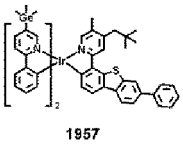

1952

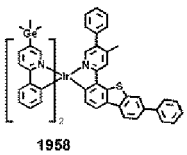

1953

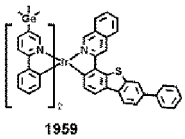

1954

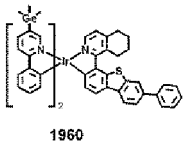

1955

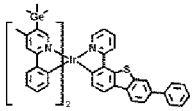

1956

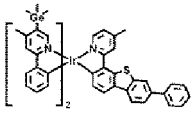

1957

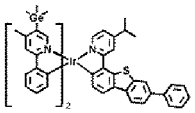

1958

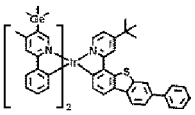

1959

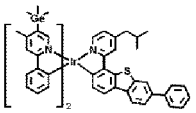

1960

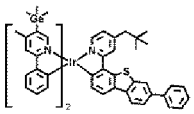

1961

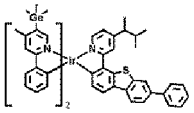

1962

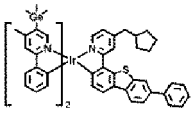

1963

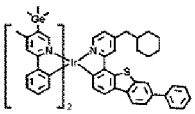

1964

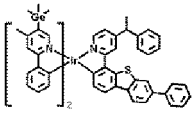

1965

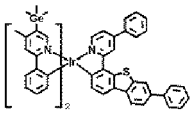

1966

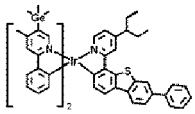

1967

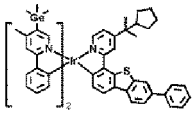

1968

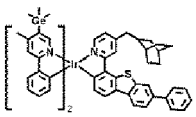

1969

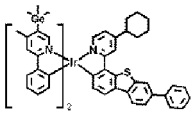

1970

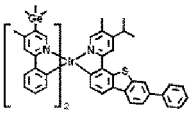

1971

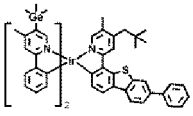

1972

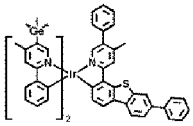

1973

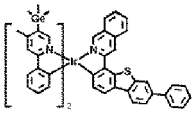

1974

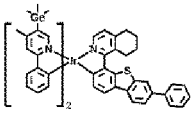

1975

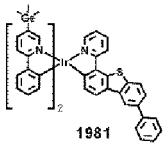

1976

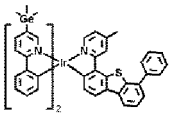

1977

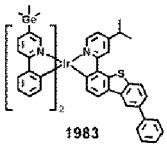

1978

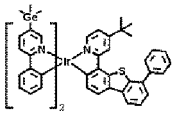

1979

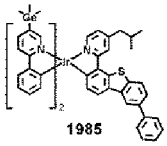

1980

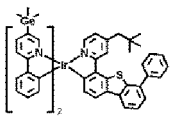

1981

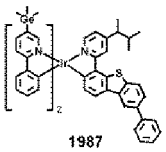

1982

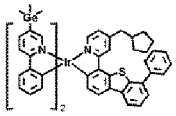

1983

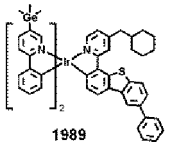

1984

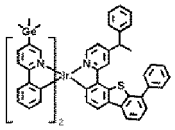

1985

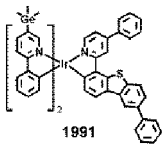

1986

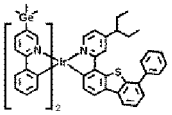

1987

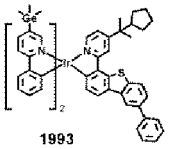

1988

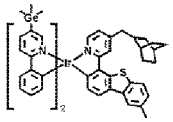

1989

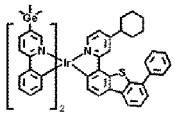

1990

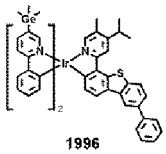

1991

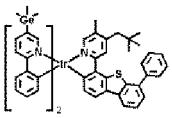

1992

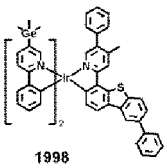

1993

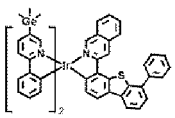

1994

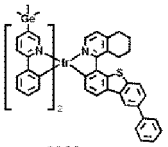

1995

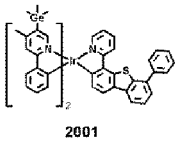

1996

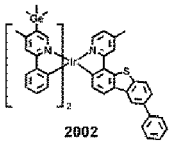

1997

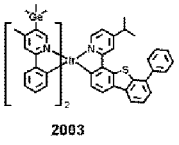

1998

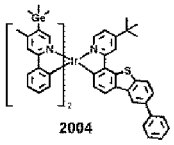

1999

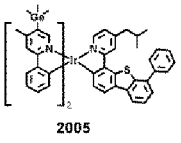

2000

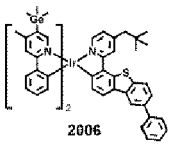

2001

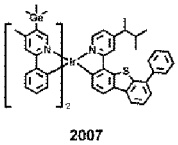

2002

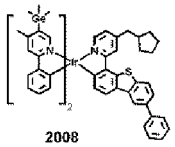

2003

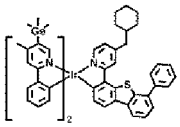

2004

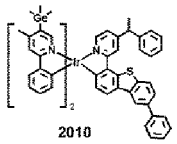

2005

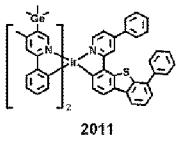

2006

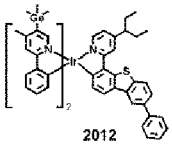

2007

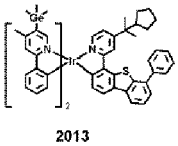

2008

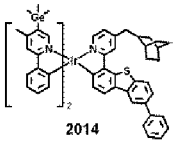

2009

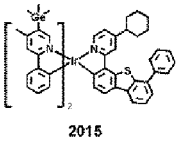

2010

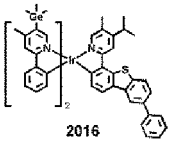

2011

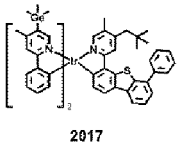

2012

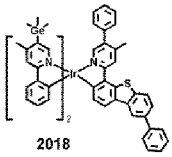

2013

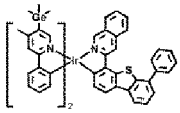

2014

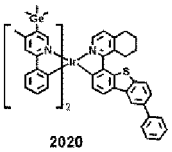

2015

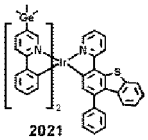

2016

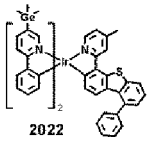

2017

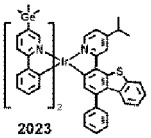

2018

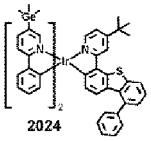

2019

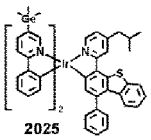

2020

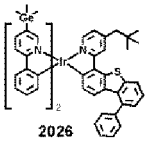

2021

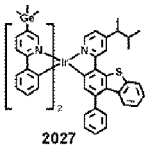

2022

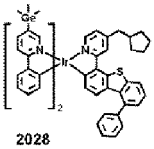

2023

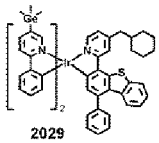

2024

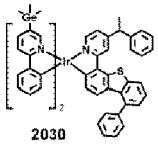

2025

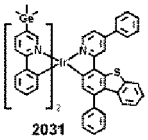

2026

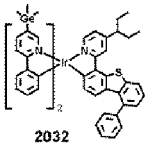

2027

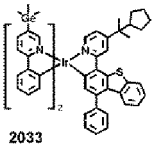

2028

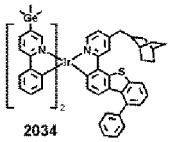

2029

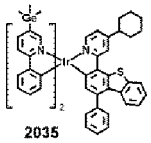

2030

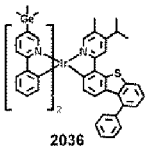

2031

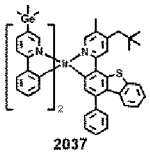

2032

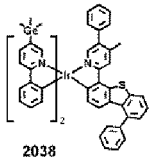

2033

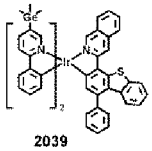

2034

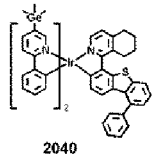

2035

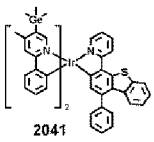

2036

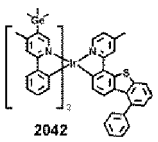

2037

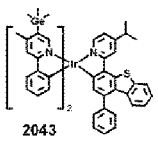

2038

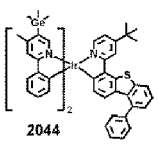

2039

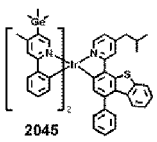

2040

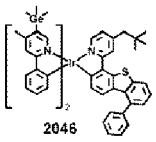

2041

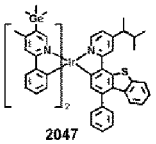

2042

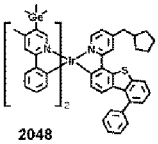

2043

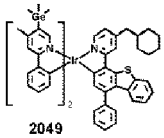

2044

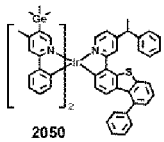

2045

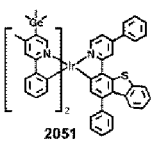

2046

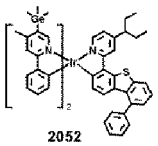

2047

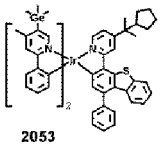

2048

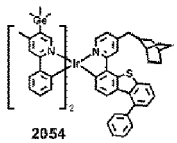

2049

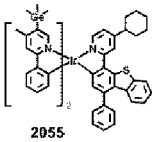

2050

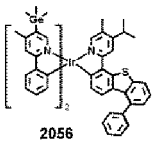

2051

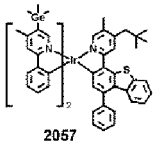

2052

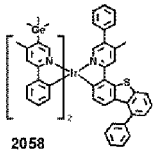

2053

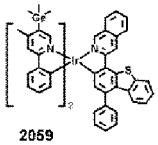

2054

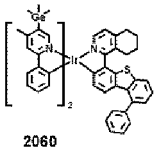

2055

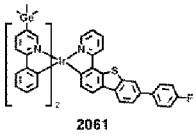

2056

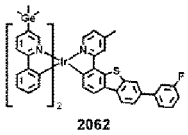

2057

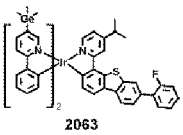

2058

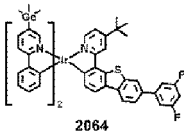

2059

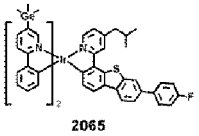

2060

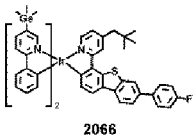

2061

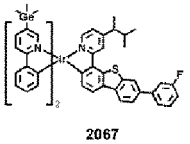

2062

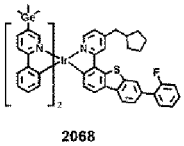

2063

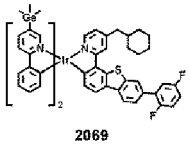

2064

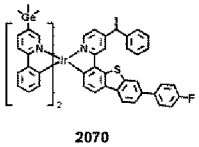

2065

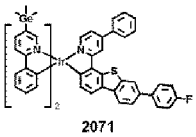

2066

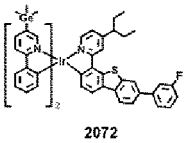

2067

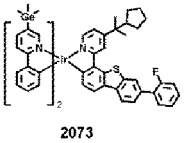

2068

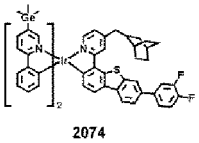

2069

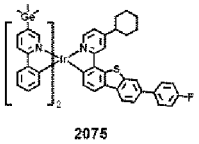

2070

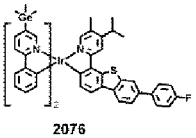

2071

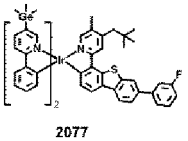

2072

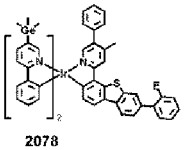

2073

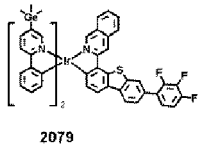

2074

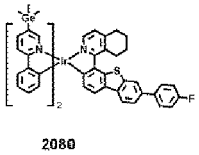

2075

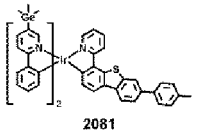

2076

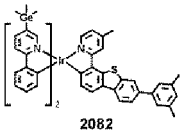

2077

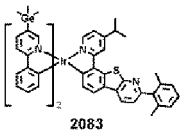

2078

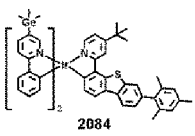

2079

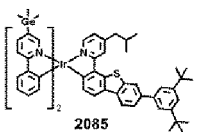

2080

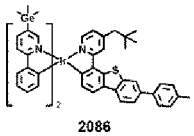

2081

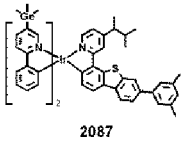

2082

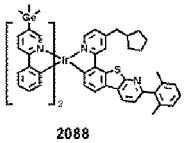

2083

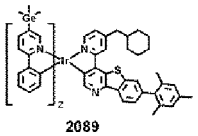

2084

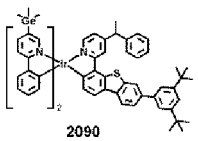

2085

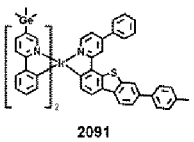

2086

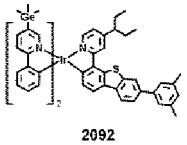

2087

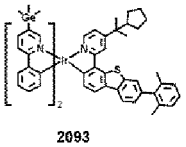

2088

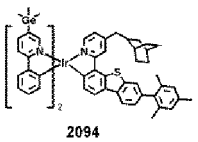

2089

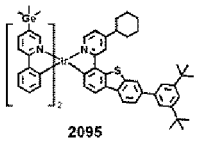

2090

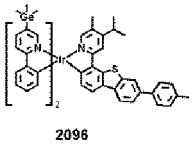

2091

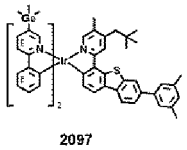

2092

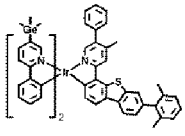

2093

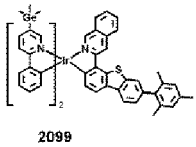

2094

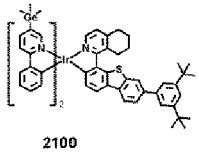

2095

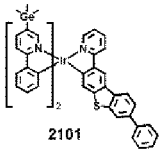

2096

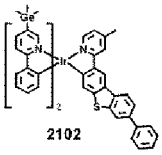

2097

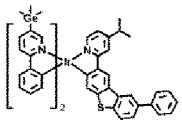

2098

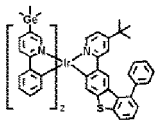

2099

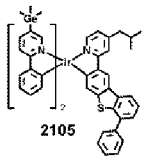

2100

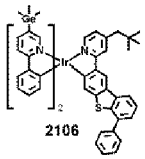

2101

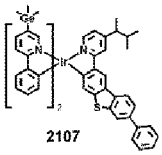

2102

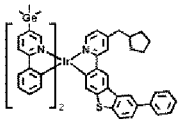

2103

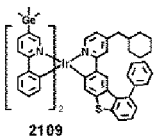

2104

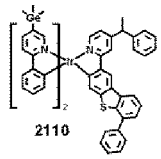

2105

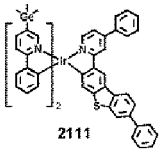

2106

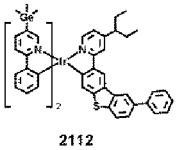

2107

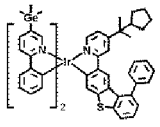

2108

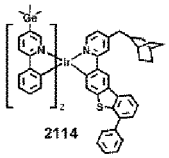

2109

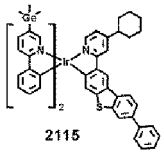

2110

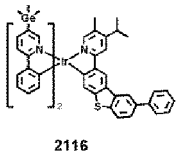

2111

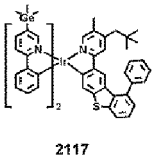

2112

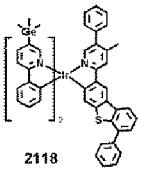

2113

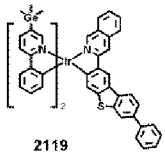

2114

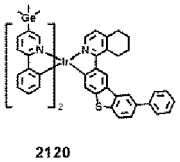

2115

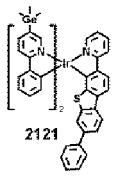

2116

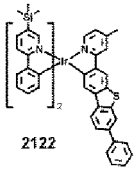

2117

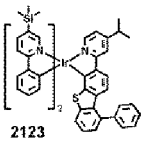

2118

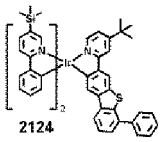

2119

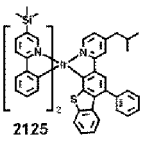

2120

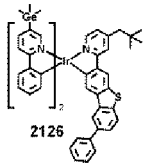

2121

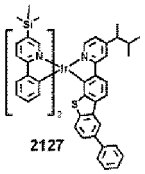

2122

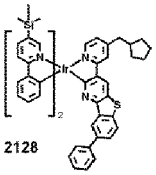

2123

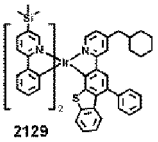

2124

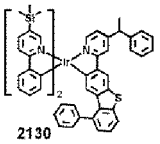

2125

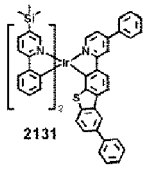

2126

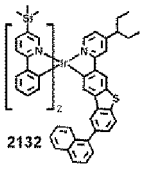

2127

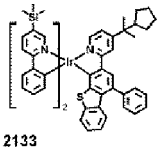

2128

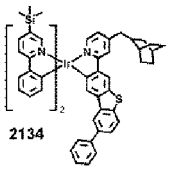

2129

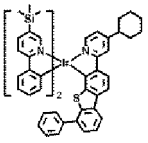

2130

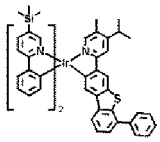

2131

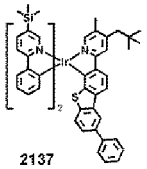

2132

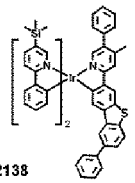

2133

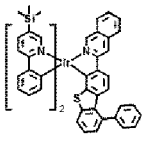

2134

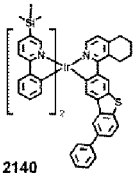

2135

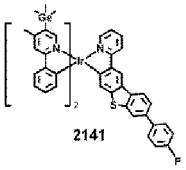

2136

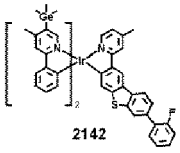

2137

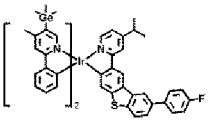

2138

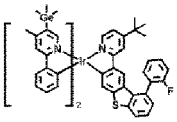

2139

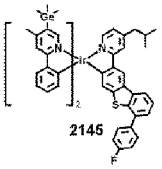

2140

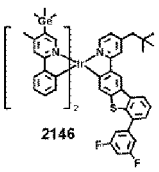

2141

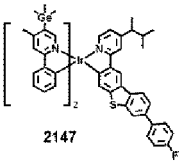

2142

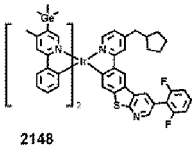

2143

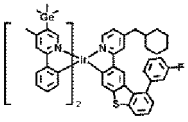

2144

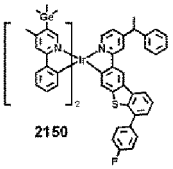

2145

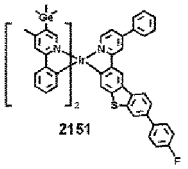

2146

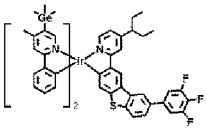

2147

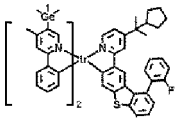

2148

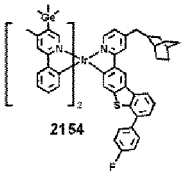

2149

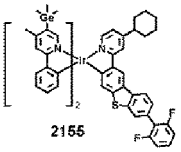

2150

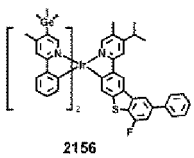

2151

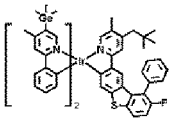

2152

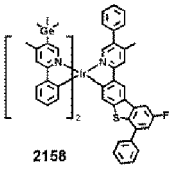

2153

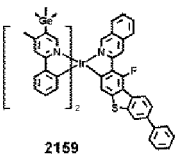

2154

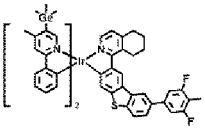

2155

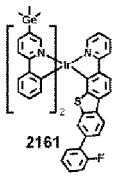

2156

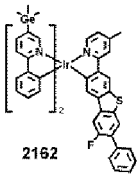

2157

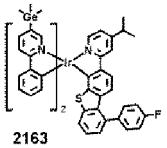

2158

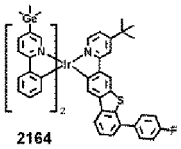

2159

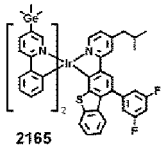

2160

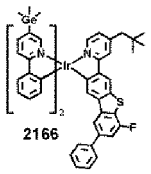

2161

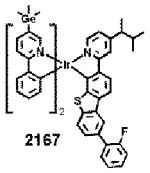

2162

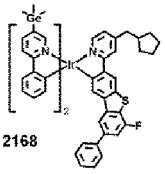

2163

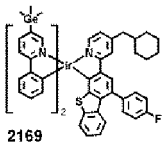

2164

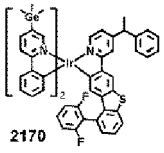

2165

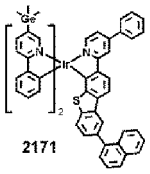

2166

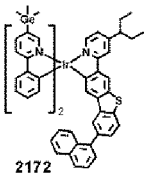

2167

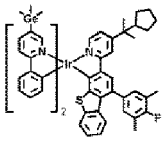

2168

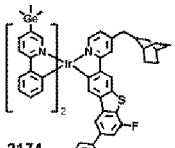

2169

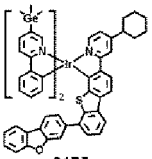

2170

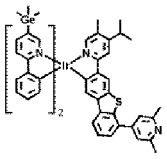

2171

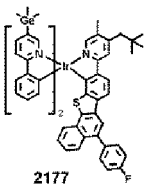

2172

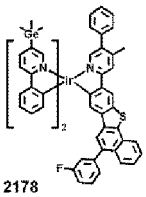

2173

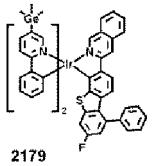

2174

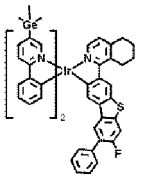

2175

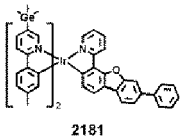

2176

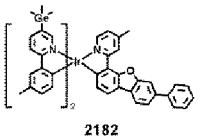

2177

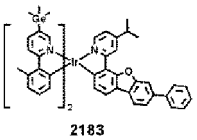

2178

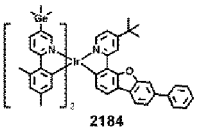

2179

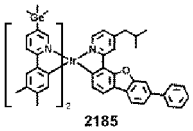

2180

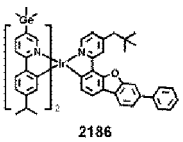

2181

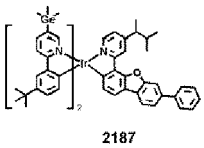

2182

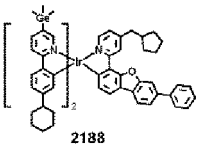

2183

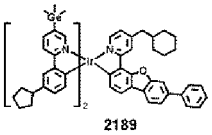

2184

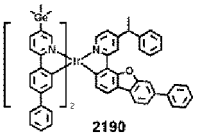

2185

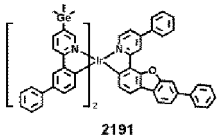

2186

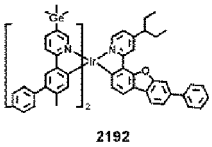

2187

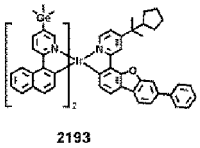

2188

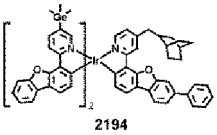

2189

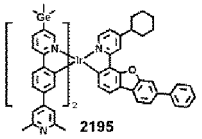

2190

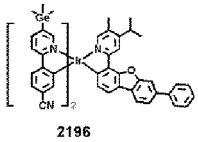

2191

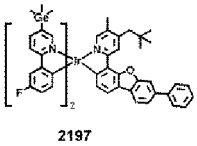

2192

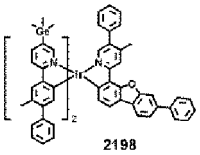

2193

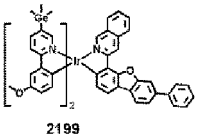

2194

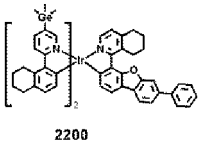

2195

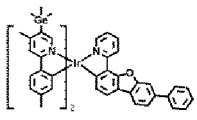

2196

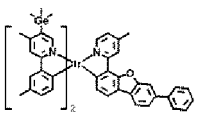

2197

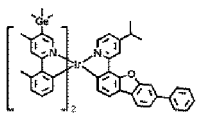

2198

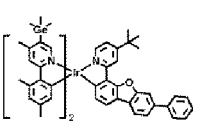

2199

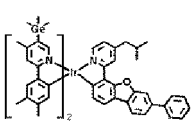

2200

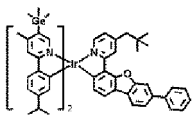

2201

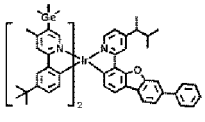

2202

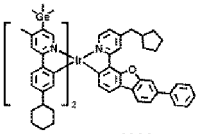

2203

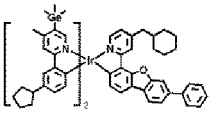

2204

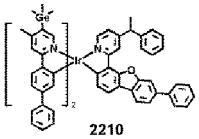

2205

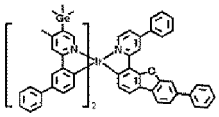

2206

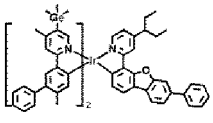

2207

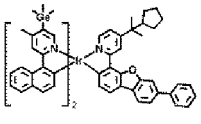

2208

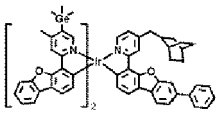

2209

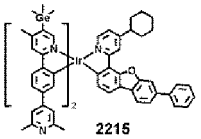

2210

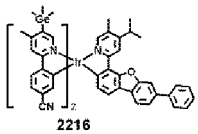

2211

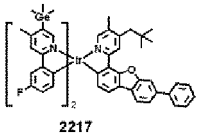

2212

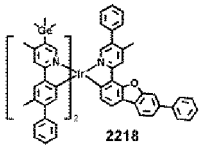

2213

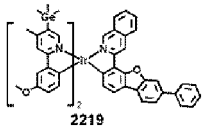

2214

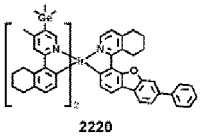

2215

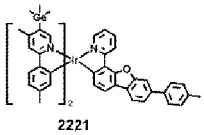

2216

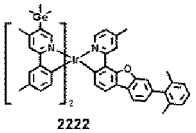

2217

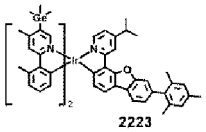

2218

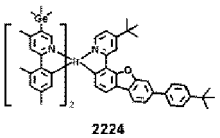

2219

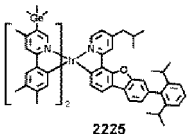

2220

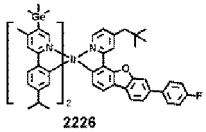

2221

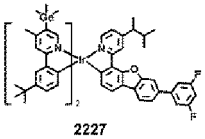

2222

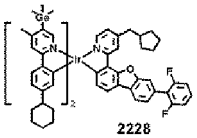

2223

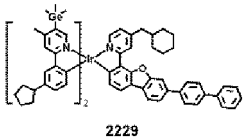

2224

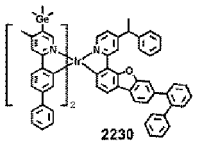

2225

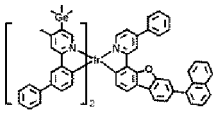

2226

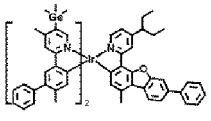

2227

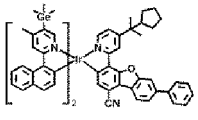

2228

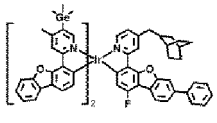

2229

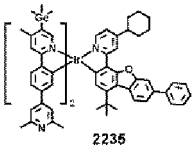

2230

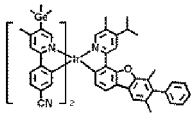

2231

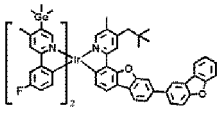

2232

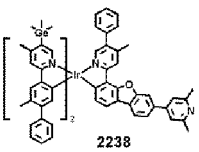

2233

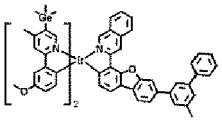

2234

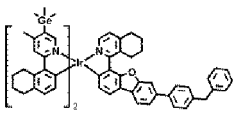

2235

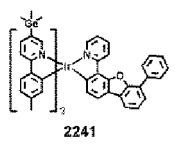

2236

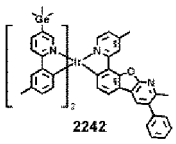

2237

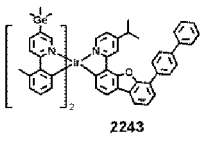

2238

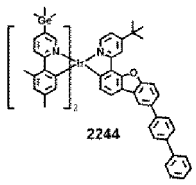

2239

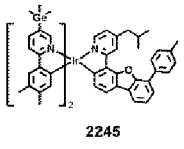

2240

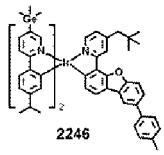

2241

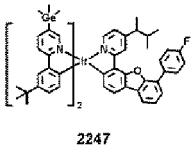

2242

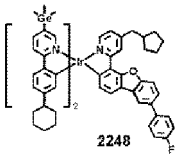

2243

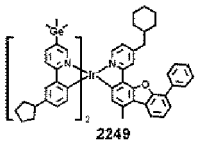

2244

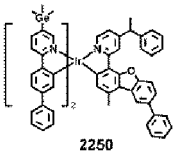

2245

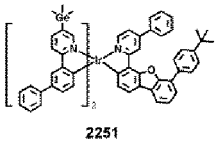

2246

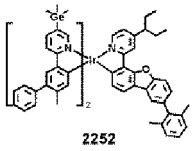

2247

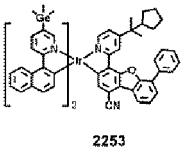

2248

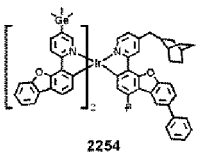

2249

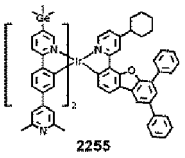

2250

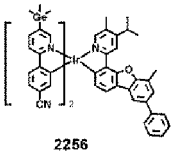

2251

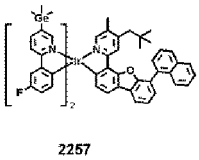

2252

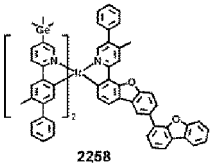

2253

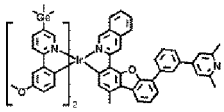

2254

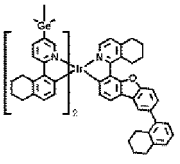

2255

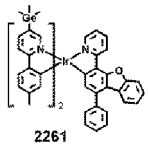

2256

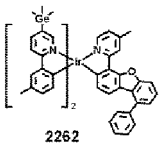

2257

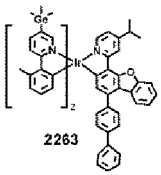

2258

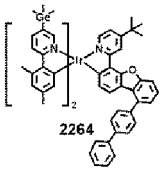

2259

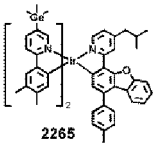

2260

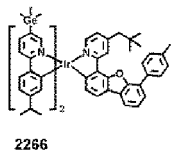

2261

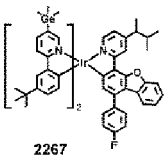

2262

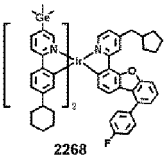

2263

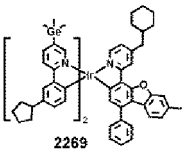

2264

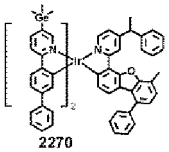

2265

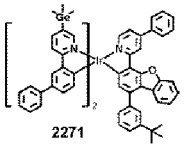

2266

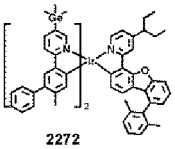

2267

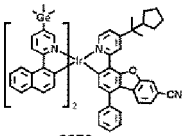

2268

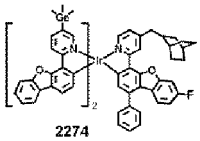

2269

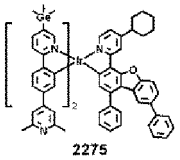

2270

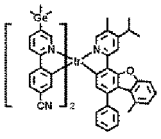

2271

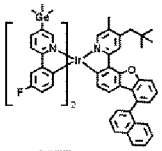

2272

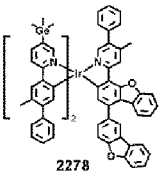

2273

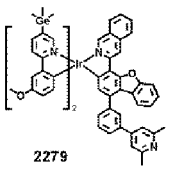

2274

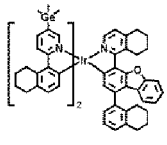

2275

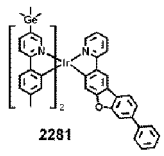

2276

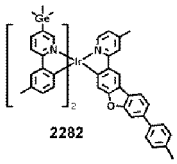

2277

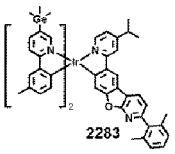

2278

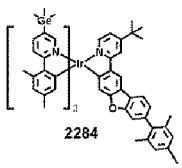

2279

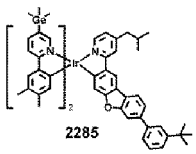

2280

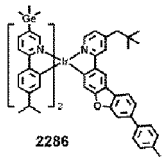

2281

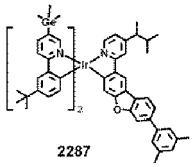

2282

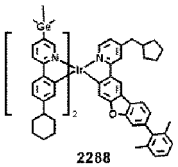

2283

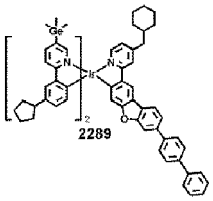

2284

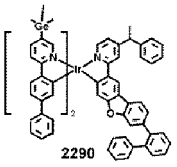

2285

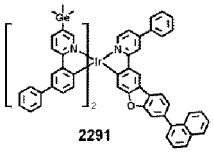

2286

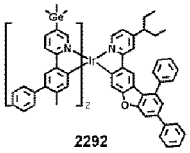

2287

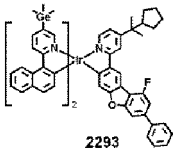

2288

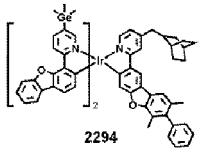

2289

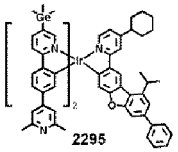

2290

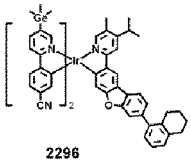

2291

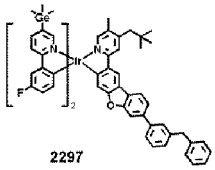

2292

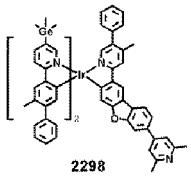

2293

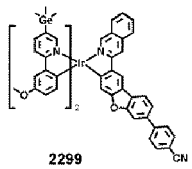

2294

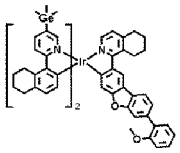

2295

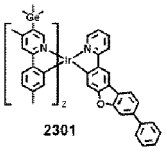

2296

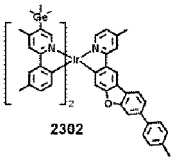

2297

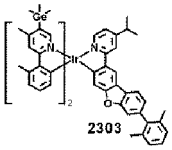

2298

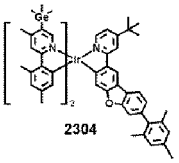

2299

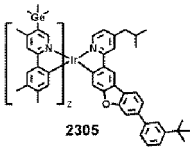

2300

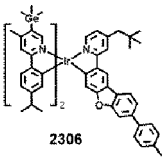

2301

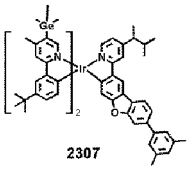

2302

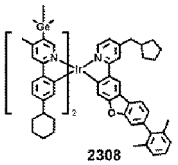

2303

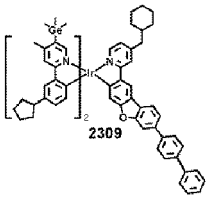

2304

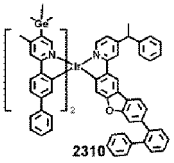

2305

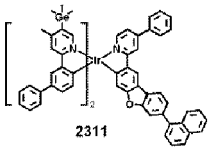

2306

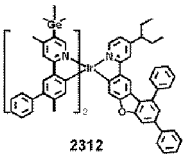

2307

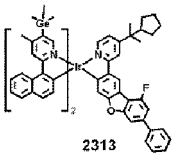

2308

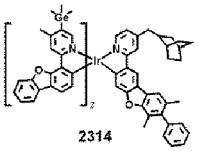

2309

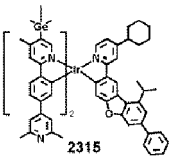

2310

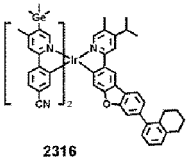

2311

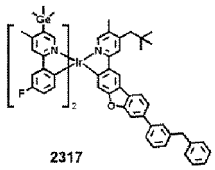

2312

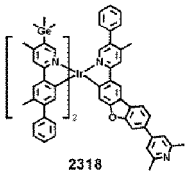

2313

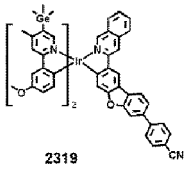

2314

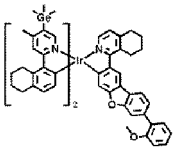

2315

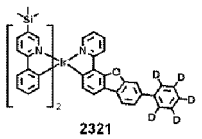

2316

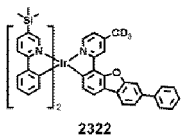

2317

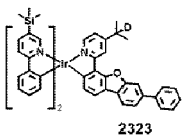

2318

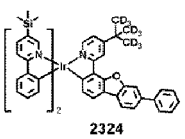

2319

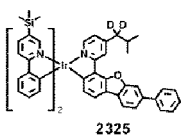

2320

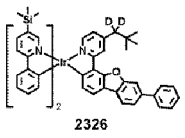

2321

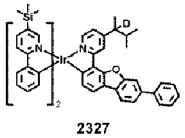

2322

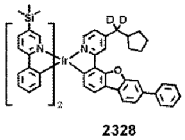

2323

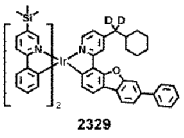

2324

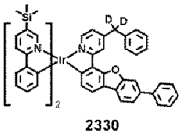

2325

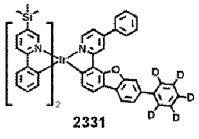

2326

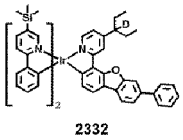

2327

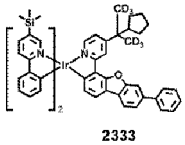

2328

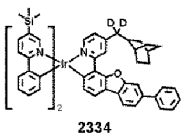

2329

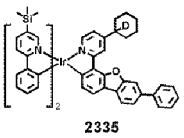

2330

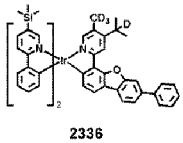

2331

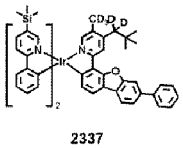

2332

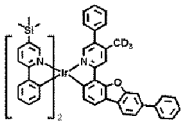

2333

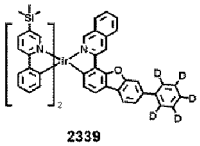

2334

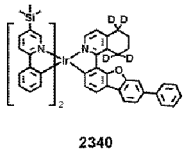

2335

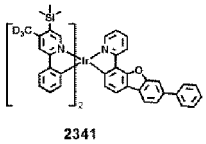

2336

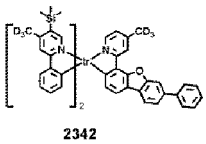

2337

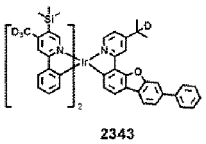

2338

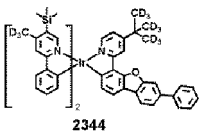

2339

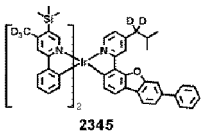

2340

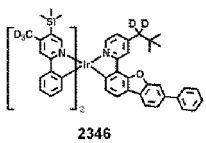

2341

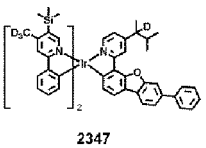

2342

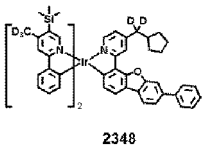

2343

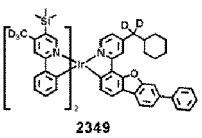

2344

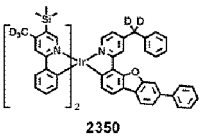

2345

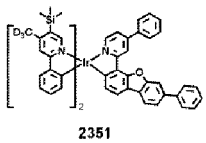

2346

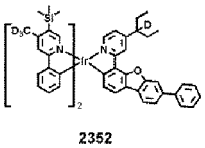

2347

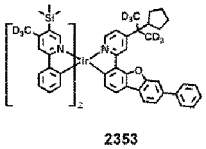

2348

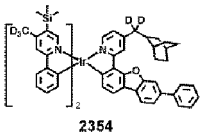

2349

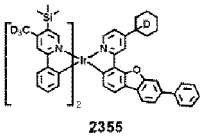

2350

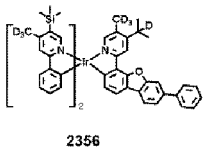

2351

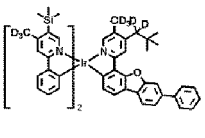

2352

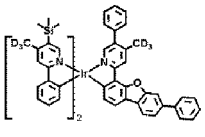

2353

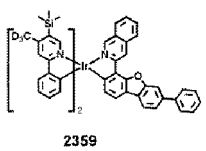

2354

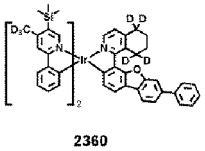

2355

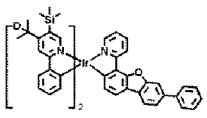

2356

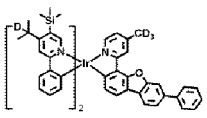

2357

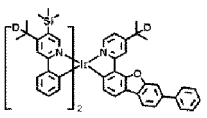

2358

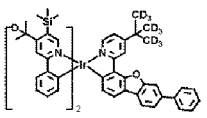

2359

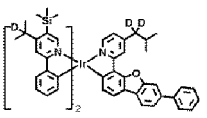

2360

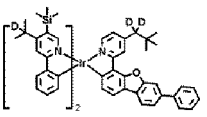

2361

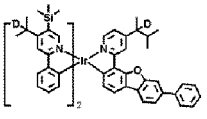

2362

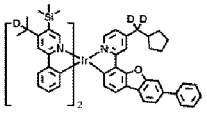

2363

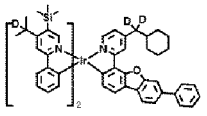

2364

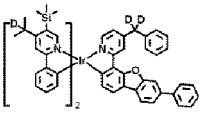

2365

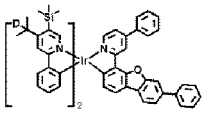

2366

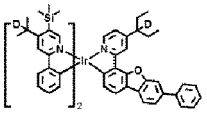

2367

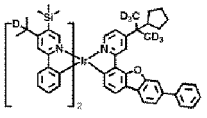

2368

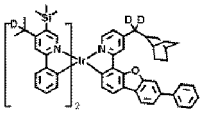

2369

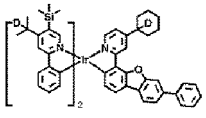

2370

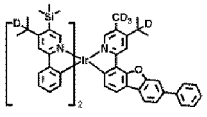

2371

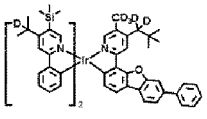

2372

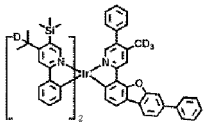

2373

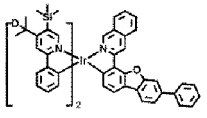

2374

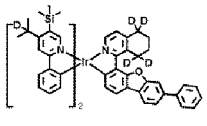

2375

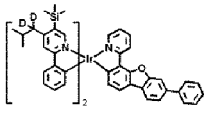

2376

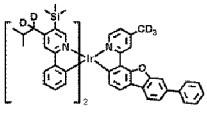

2377

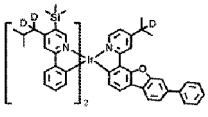

2378

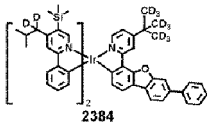

2379

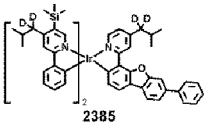

2380

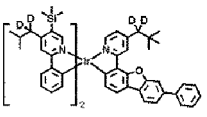

2381

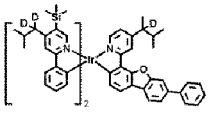

2382

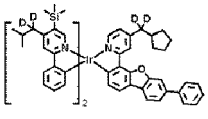

2383

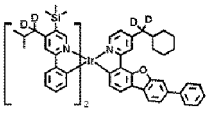

2384

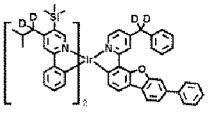

2385

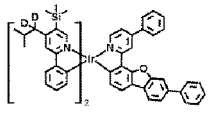

2386

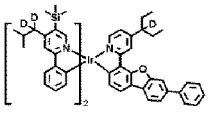

2387

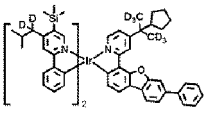

2388

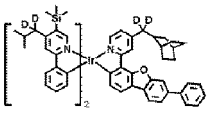

2389

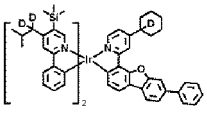

2390

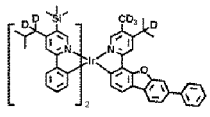

2391

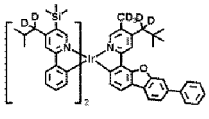

2392

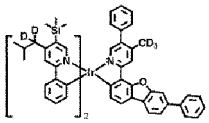

2393

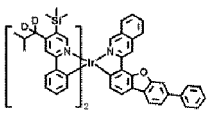

2394

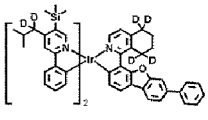

2395

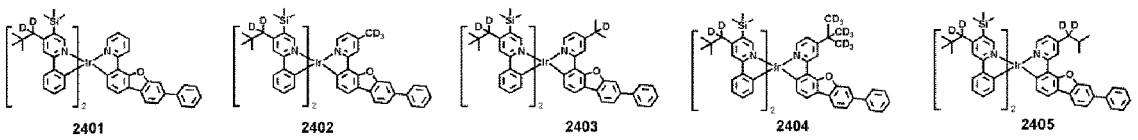

2396

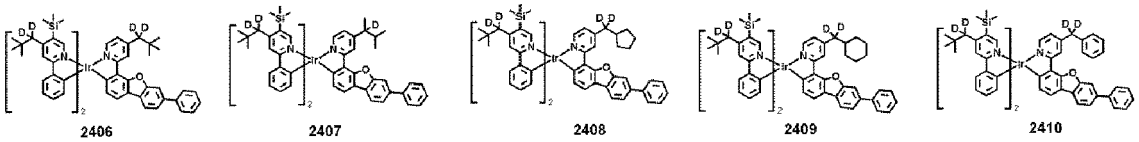

2397

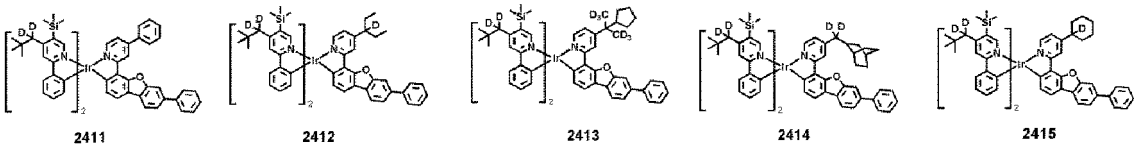

2398

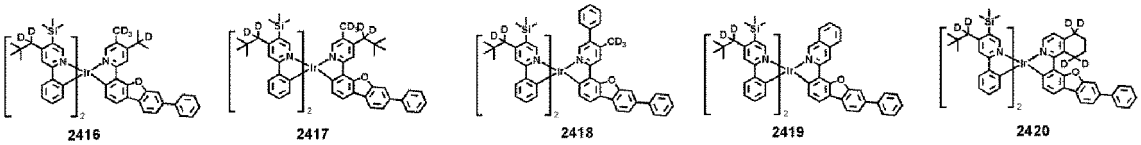

2399

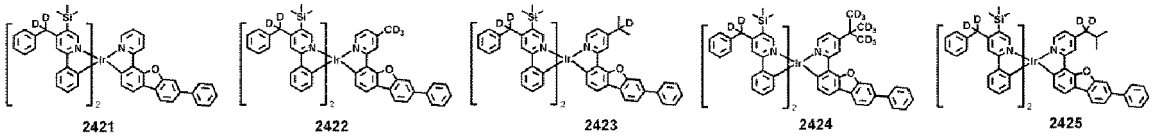

2400

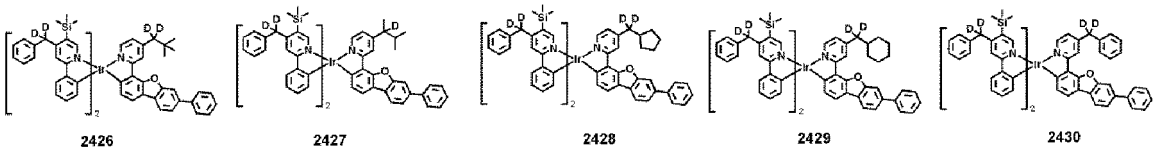

2401 2402 2403 2404 2405

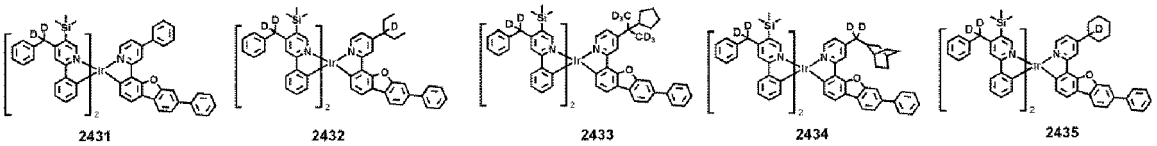

2406 2407 2408 2409 2410

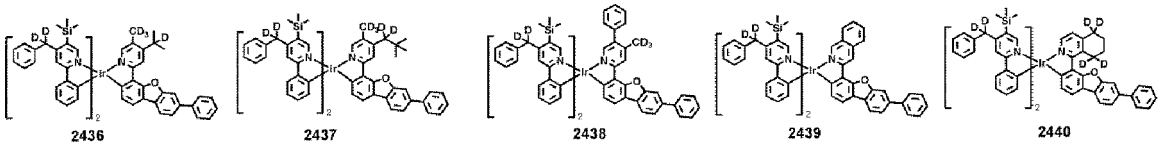

2411 2412 2413 2414 2415

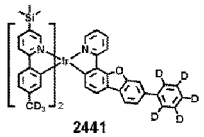

2416 2417 2418 2419 2420

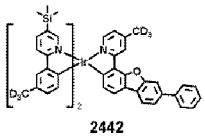

2421 2422 2423 2424 2425

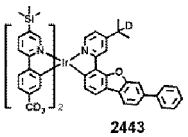

2426 2427 2428 2429 2430

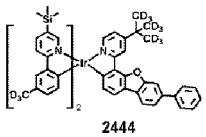

2431 2432 2433 2434 2435

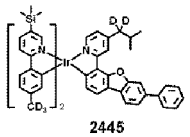

2436 2437 2438 2439 2440

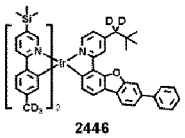

2441

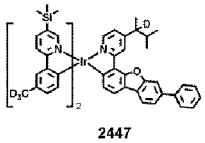

2442

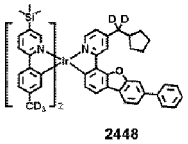

2443

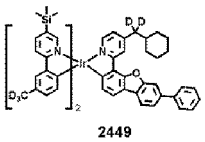

2444

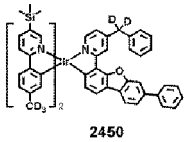

2445

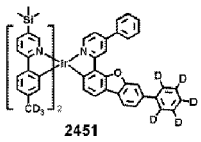

2446

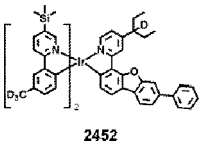

2447

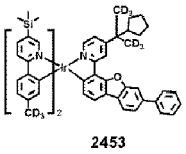

2448

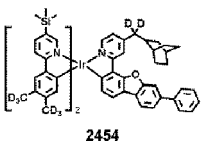

2449

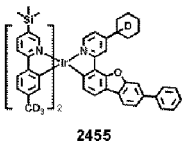

2450

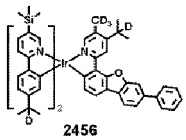

2451

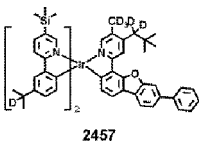

2452

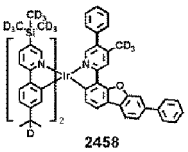

2453

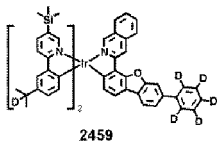

2454

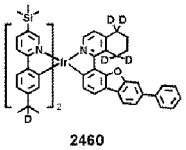

2455

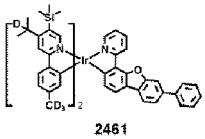

2456

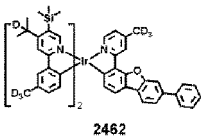

2457

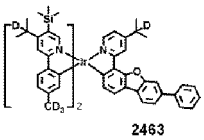

2458

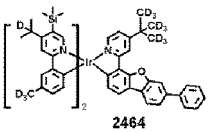

2459

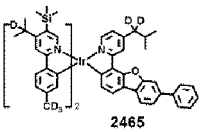

2460

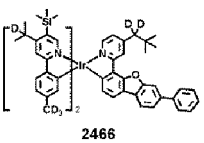

2461

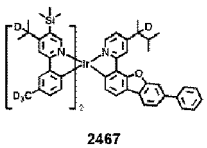

2462

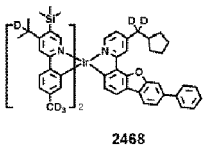

2463

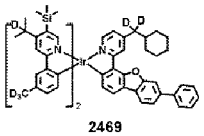

2464

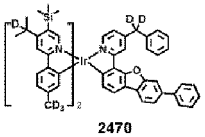

2465

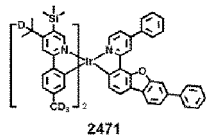

2466

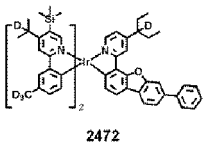

2467

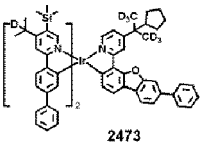

2468

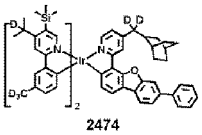

2469

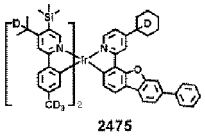

2470

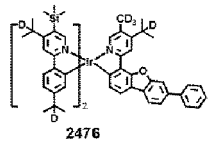

2471

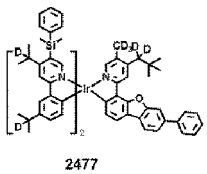

2472

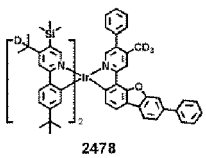

2473

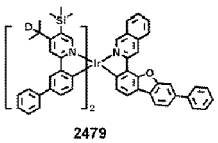

2474

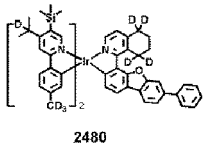

2475

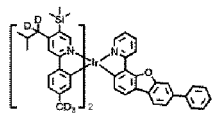

2476

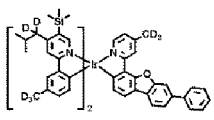

2477

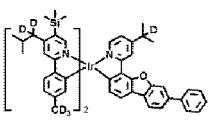

2478

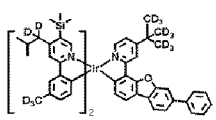

2479

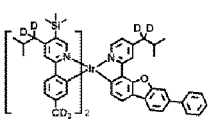

2480

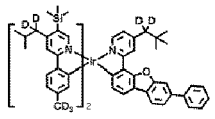

2481

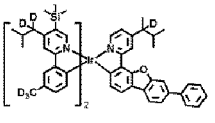

2482

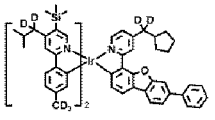

2483

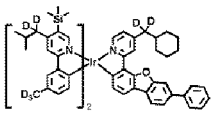

2484

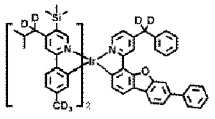

2485

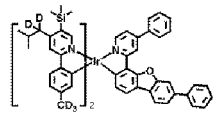

2486

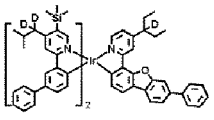

2487

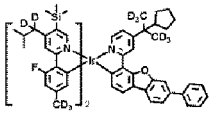

2488

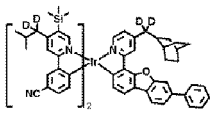

2489

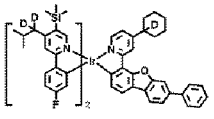

2490

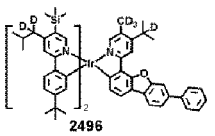

2491

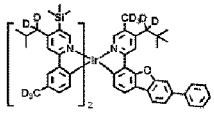

2492

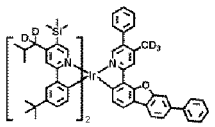

2493

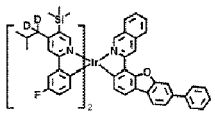

2494

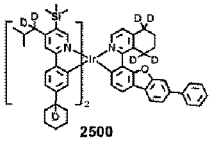

2495

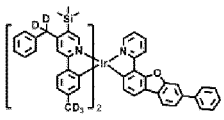

2496

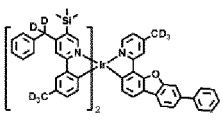

2497

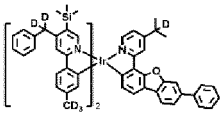

2498

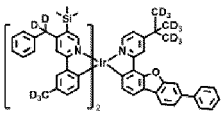

2499

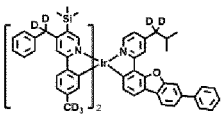

2500

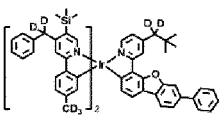

2501

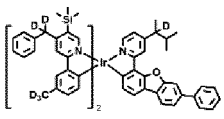

2502

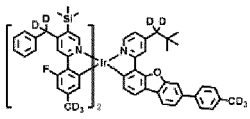

2503

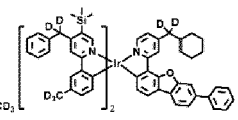

2504

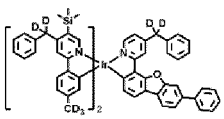

2505

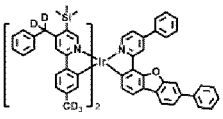

2506

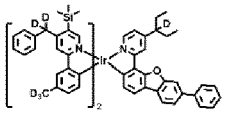

2507

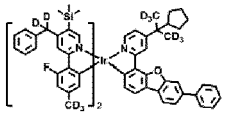

2508

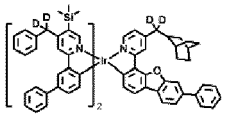

2509

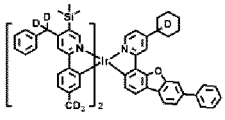

2510

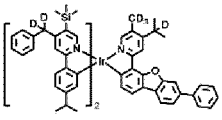

2511

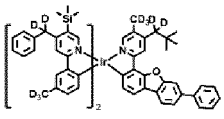

2512

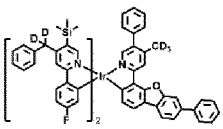

2513

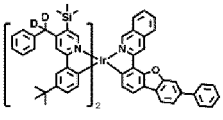

2514

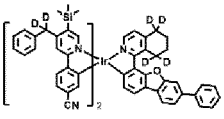

2515

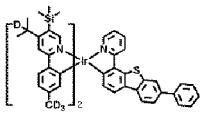

2516

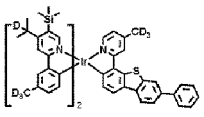

2517

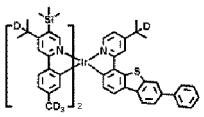

2518

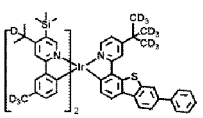

2519

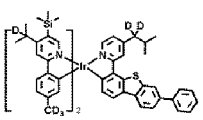

2520

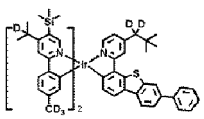

2521

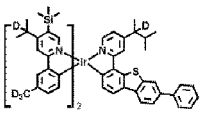

2522

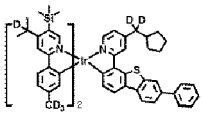

2523

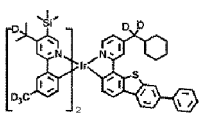

2524

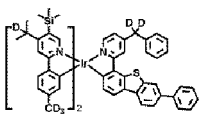

2525

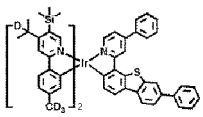

2526

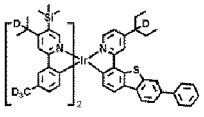

2527

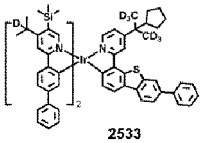

2528

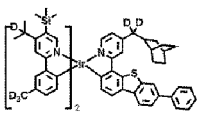

2529

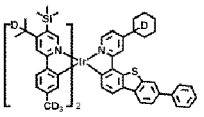

2530

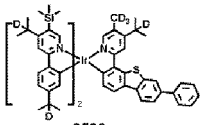

2531

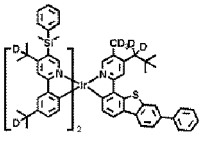

2532

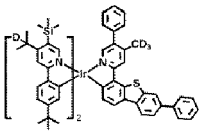

2533

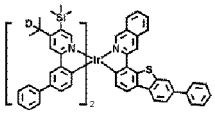

2534

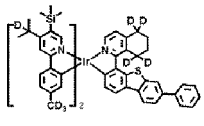

2535

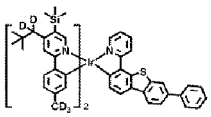

2536

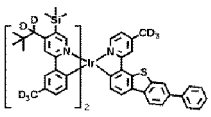

2537

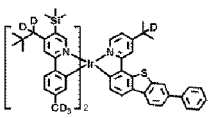

2538

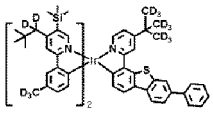

2539

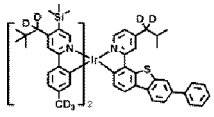

2540

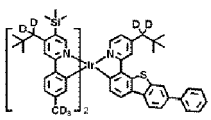

2541

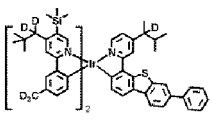

2542

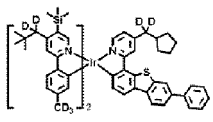

2543

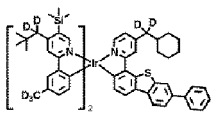

2544

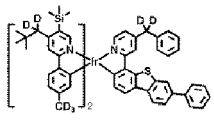

2545

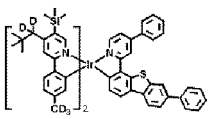

2546

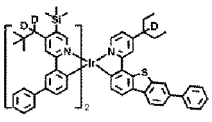

2547

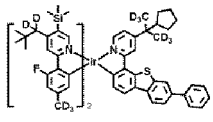

2548

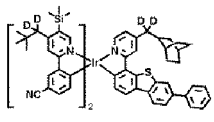

2549

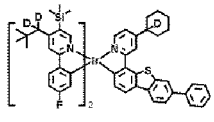

2550

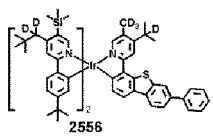

2551

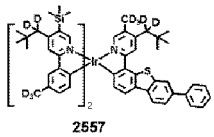

2552

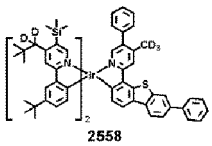

2553

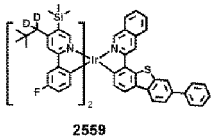

2554

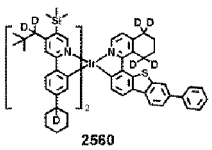

2555

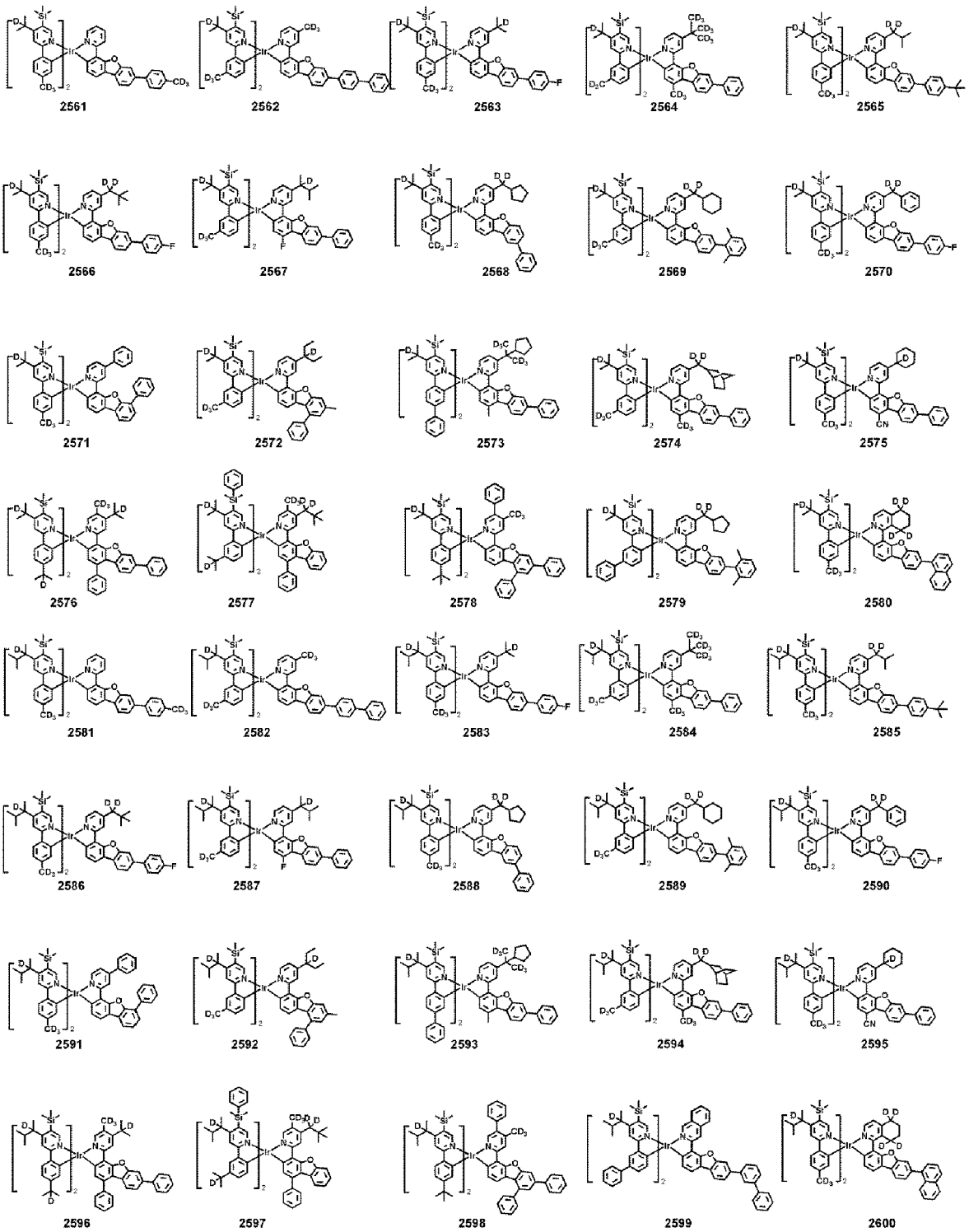

2556

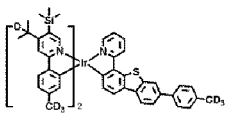

2557

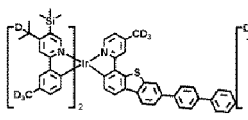

2558

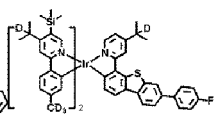

2559

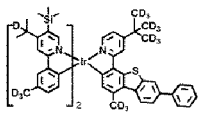

2560

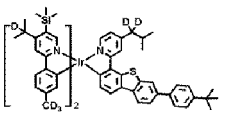

2561
2562
2563
2564
2565
2566
2567
2568
2569
2570
2571
2572
2573
2574
2575
2576
2577
2578
2579
2580
2581
2582
2583
2584
2585
2586
2587
2588
2589
2590
2591
2592
2593
2594
2595
2596
2597
2598
2599
2600

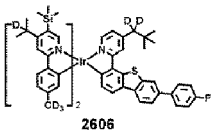

2601

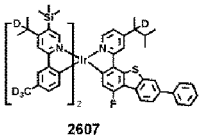

2602

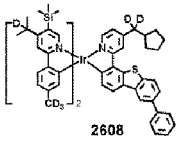

2603

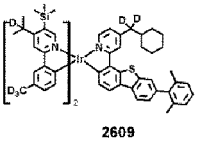

2604

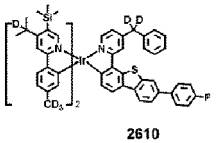

2605

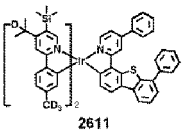

2606

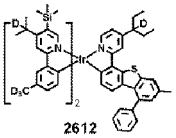

2607

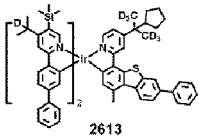

2608

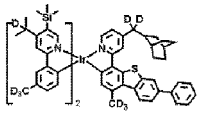

2609

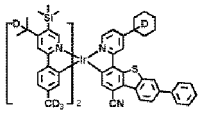

2610

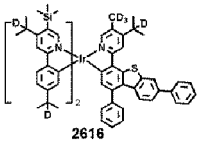

2611

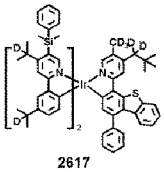

2612

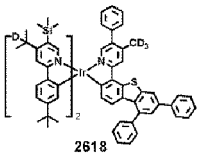

2613

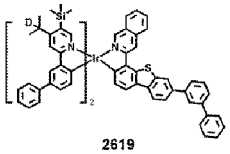

2614

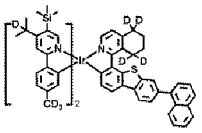

2615

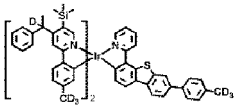

2616

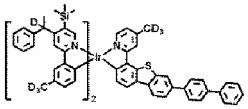

2617

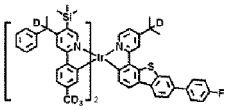

2618

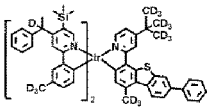

2619

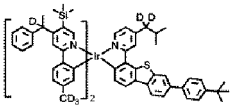

2620

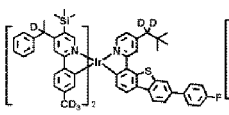

2621

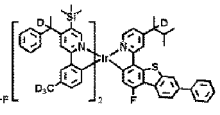

2622

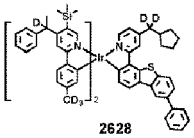

2623

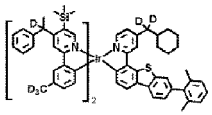

2624

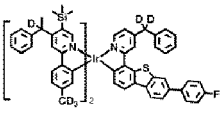

2625

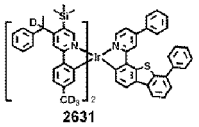

2626

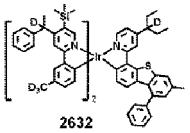

2627

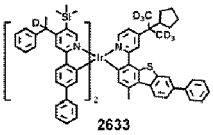

2628

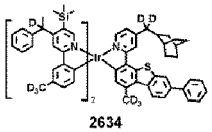

2629

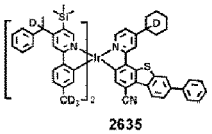

2630

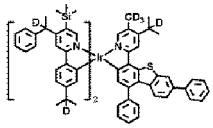

2631

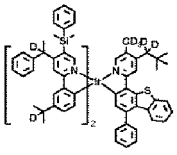

2632

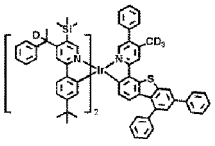

2633

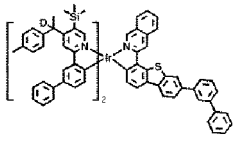

2634

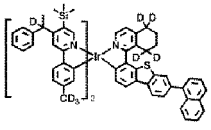

2635

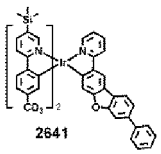

2636

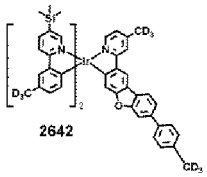

2637

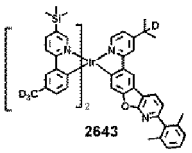

2638

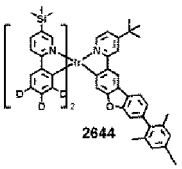

2639

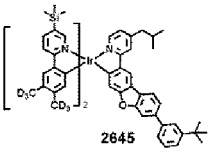

2640

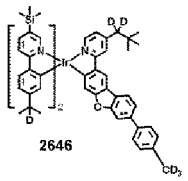

2641

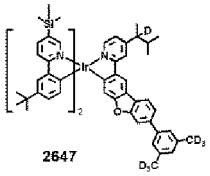

2642

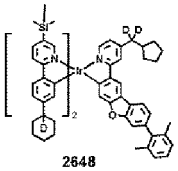

2643

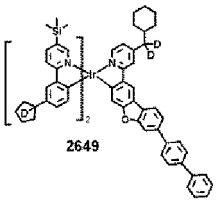

2644

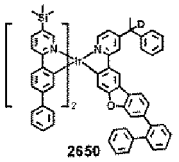

2645

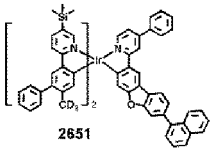

2646

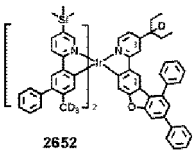

2647

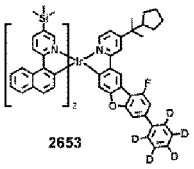

2648

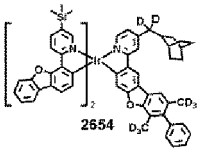

2649

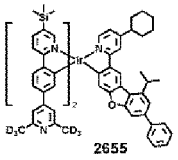

2650

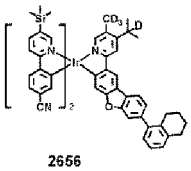

2651

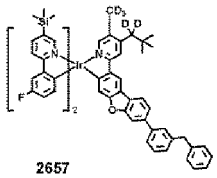

2652

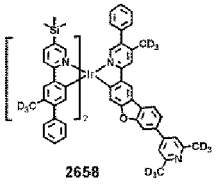

2653

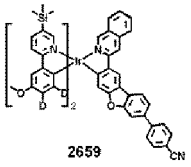

2654

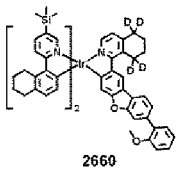

2655

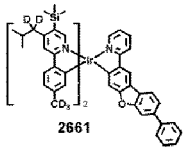

2656

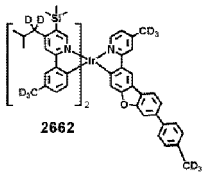

2657

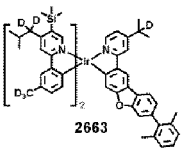

2658

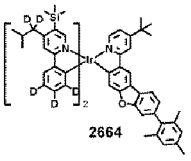

2659

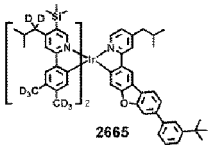

2660

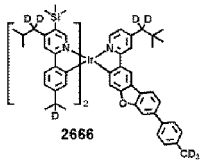

2661

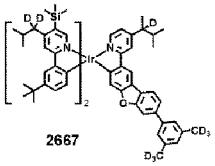

2662

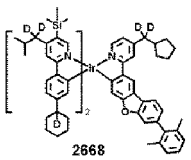

2663

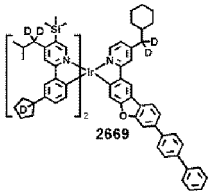

2664

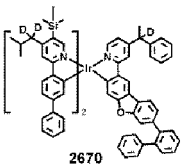

2665

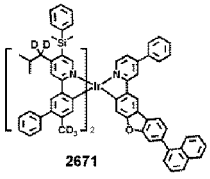

2666

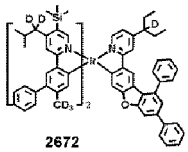

2667

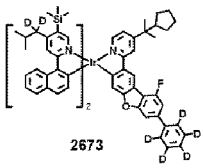

2668

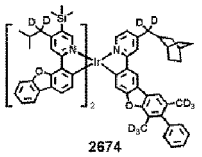

2669

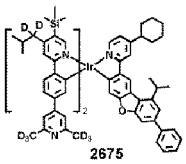

2670

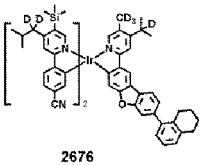

2671

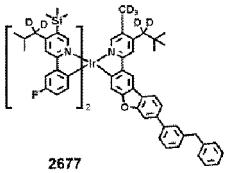

2672

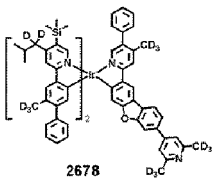

2673

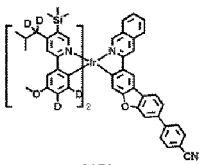

2674

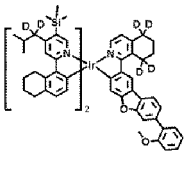

2675

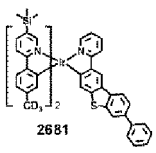

2676

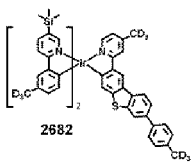

2677

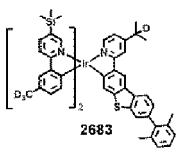

2678

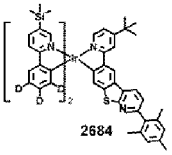

2679

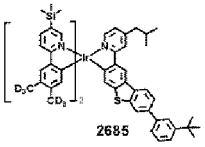

2680

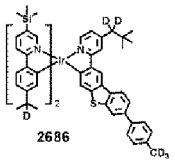

2681

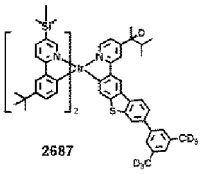

2682

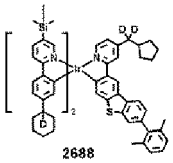

2683

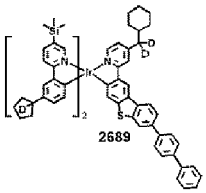

2684

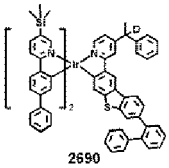

2685

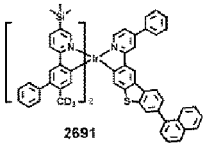

2686

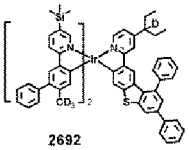

2687

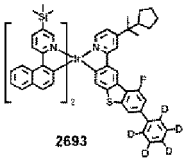

2688

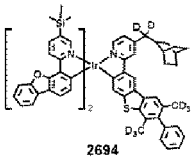

2689

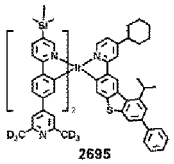

2690

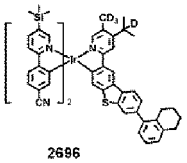

2691

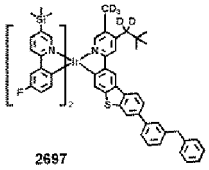

2692

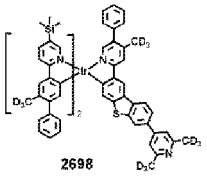

2693

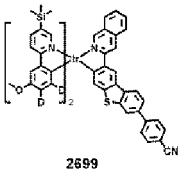

2694

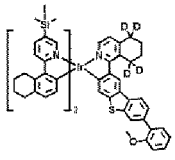

2695

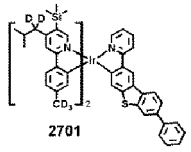

2696

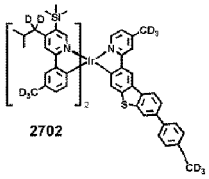

2697

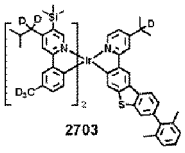

2698

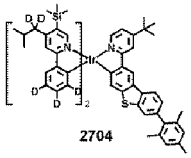

2699

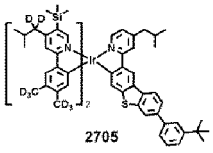

2700

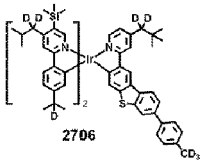

2701

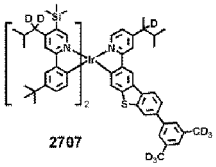

2702

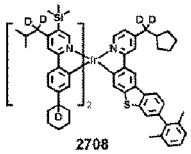

2703

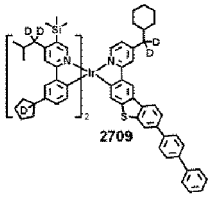

2704

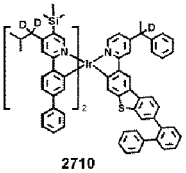

2705

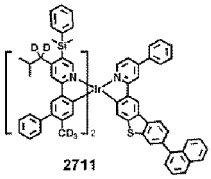

2706

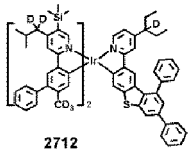

2707

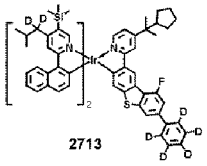

2708

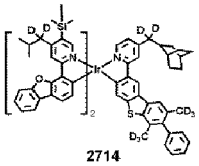

2709

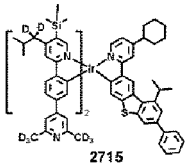

2710

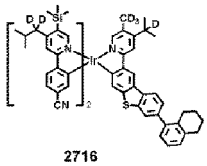

2711

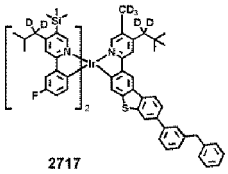

2712

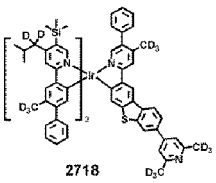

2713

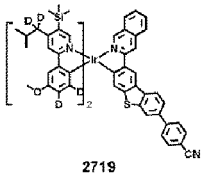

2714

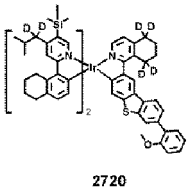

2715

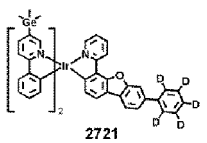

2716

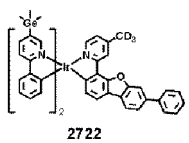

2717

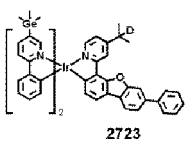

2718

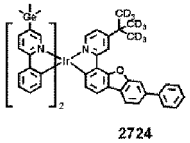

2719

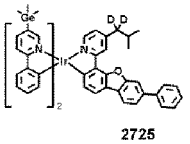

2720

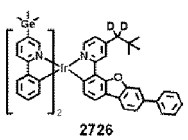

2721

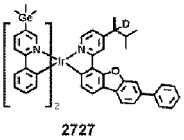

2722

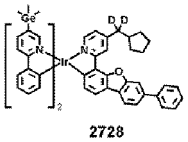

2723

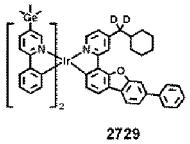

2724

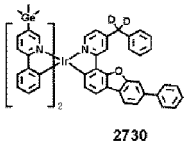

2725

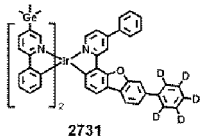

2726

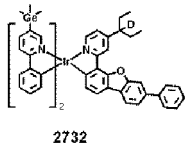

2727

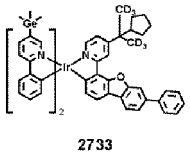

2728

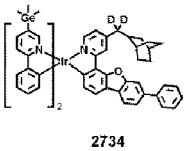

2729

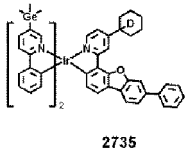

2730

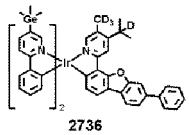

2731

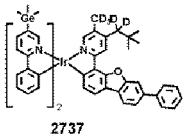

2732

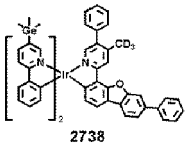

2733

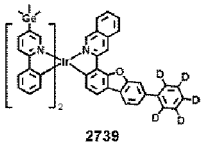

2734

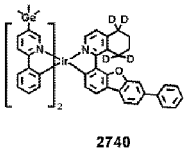

2735

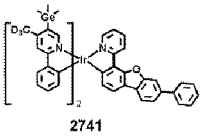

2736

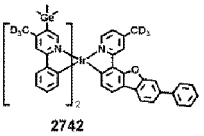

2737

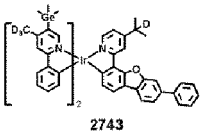

2738

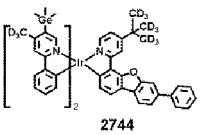

2739

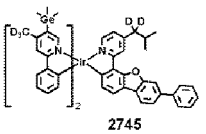

2740

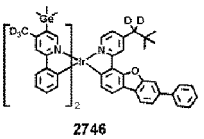

2741

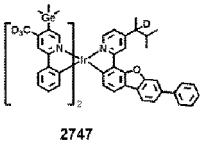

2742

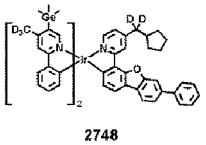

2743

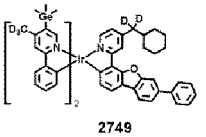

2744

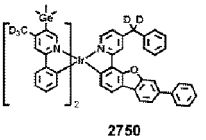

2745

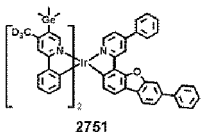

2746

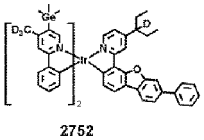

2747

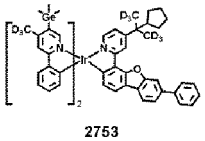

2748

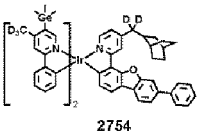

2749

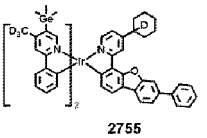

2750

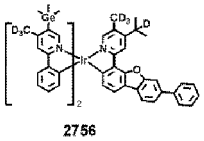

2751

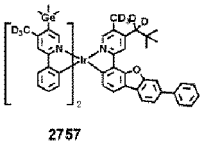

2752

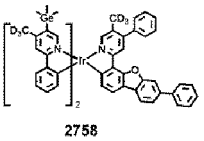

2753

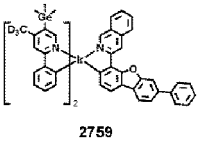

2754

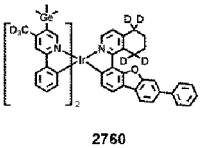

2755

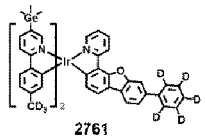

2756

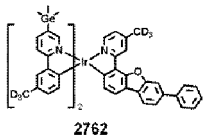

2757

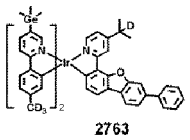

2758

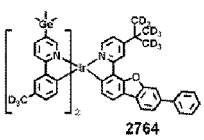

2759

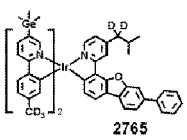

2760

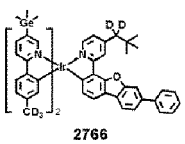

2761

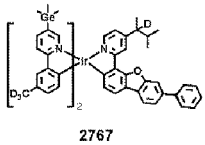

2762

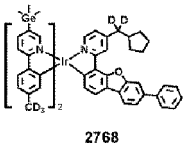

2763

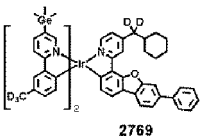

2764

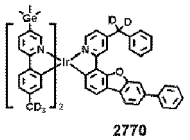

2765

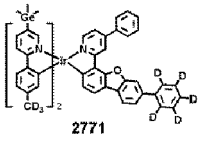

2766

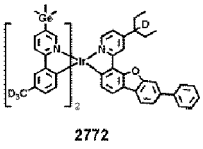

2767

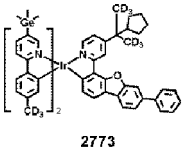

2768

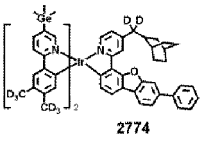

2769

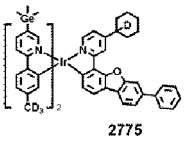

2770

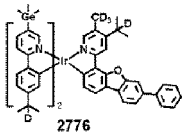

2771

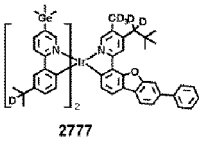

2772

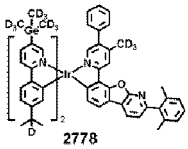

2773

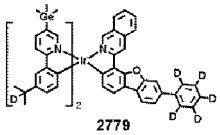

2774

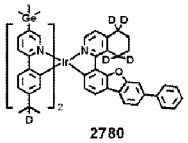

2775

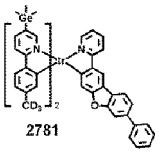

2776

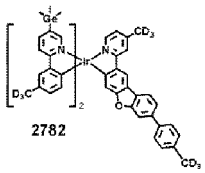

2777

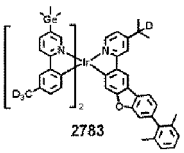

2778

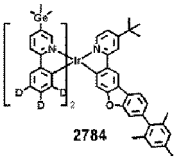

2779

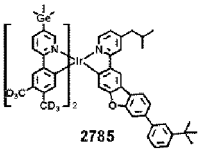

2780

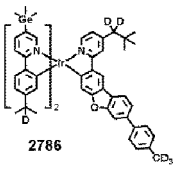

2781

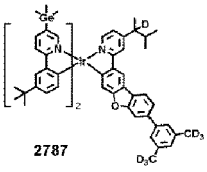

2782

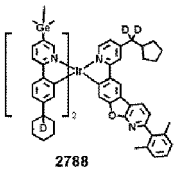

2783

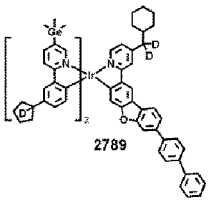

2784

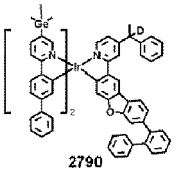

2785

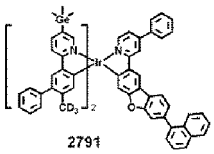

2786

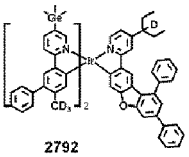

2787

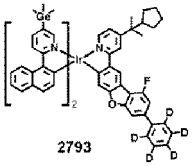

2788

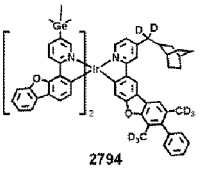

2789

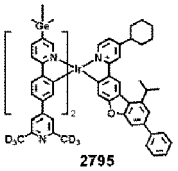

2790

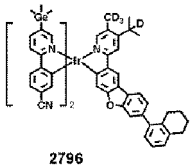

2791

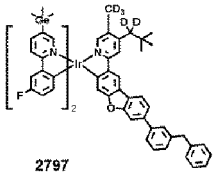

2792

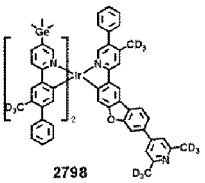

2793

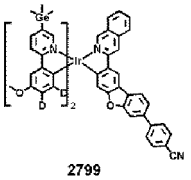

2794

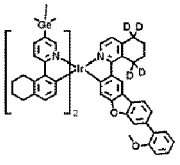

2795

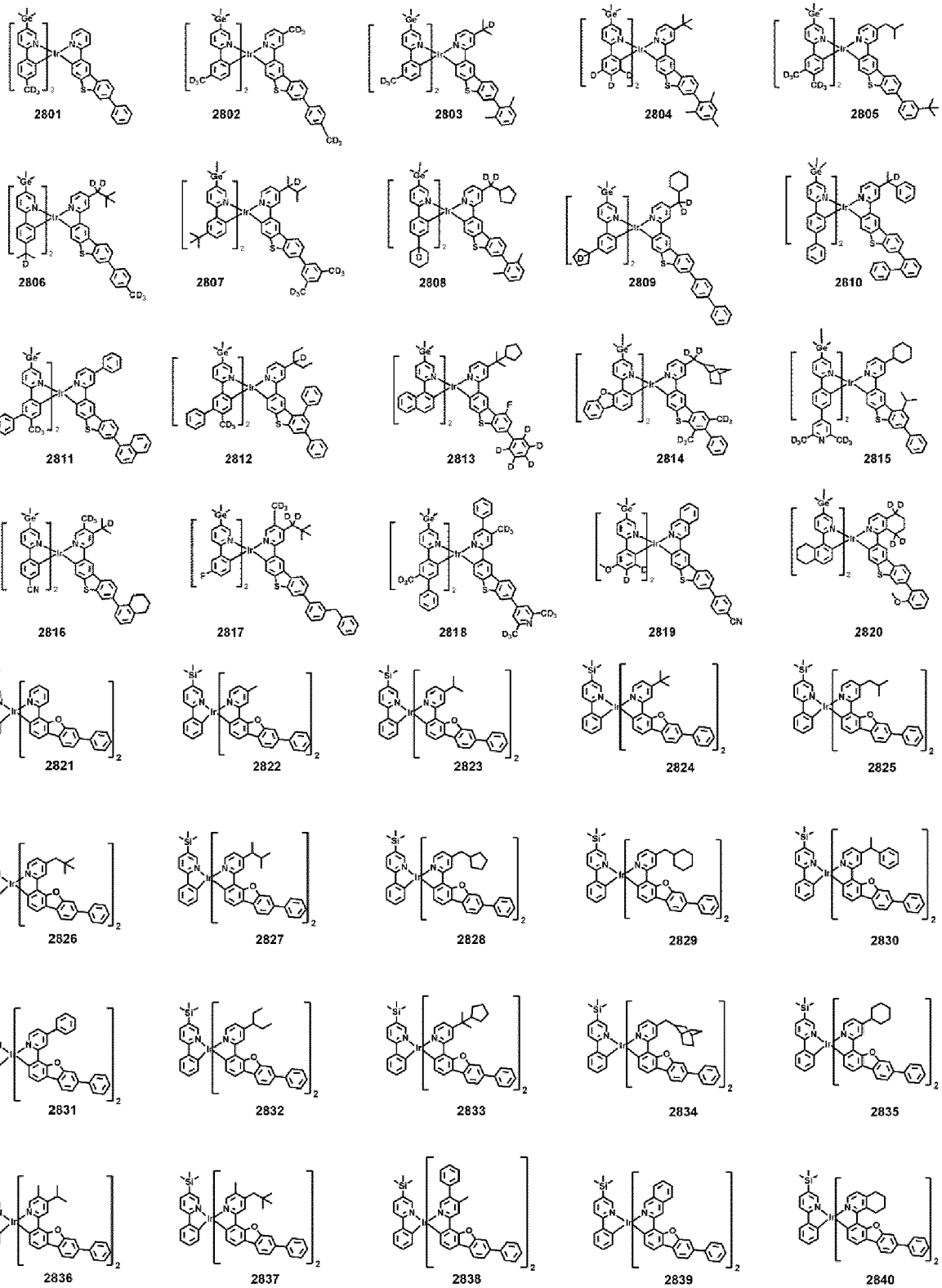

2796

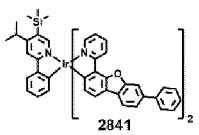

2797

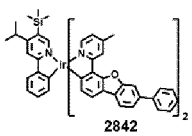

2798

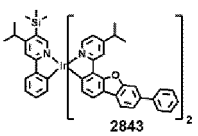

2799

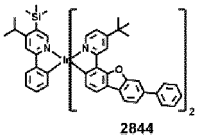

2800

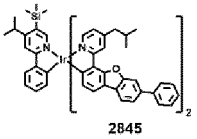

2801
2802
2803
2804
2805
2806
2807
2808
2809
2810
2811
2812
2813
2814
2815
2816
2817
2818
2819
2820
2821
2822
2823
2824
2825
2826
2827
2828
2829
2830
2831
2832
2833
2834
2835
2836
2837
2838
2839
2840

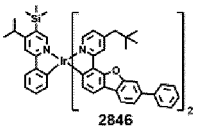

2841

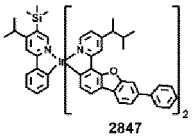

2842

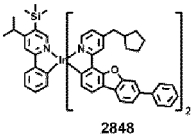

2843

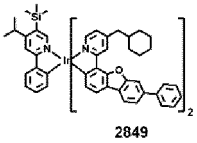

2844

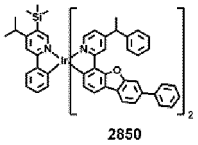

2845

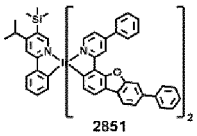

2846

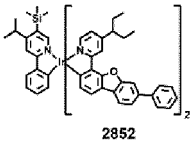

2847

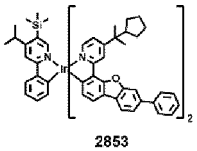

2848

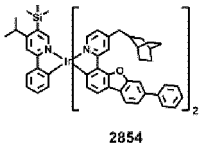

2849

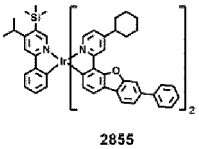

2850

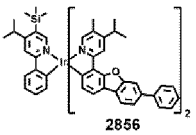

2851

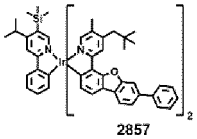

2852

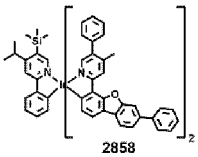

2853

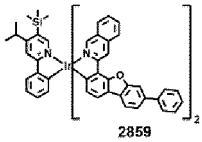

2854

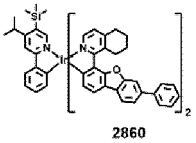

2855

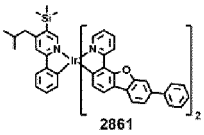

2856

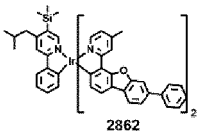

2857

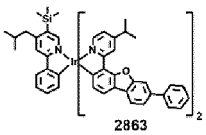

2858

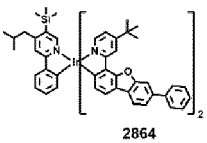

2859

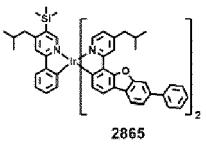

2860

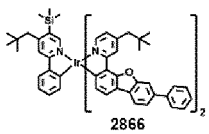

2861

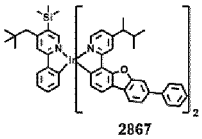

2862

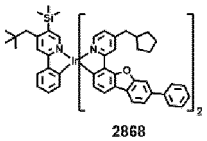

2863

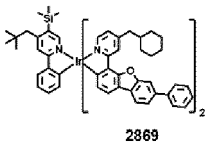

2864

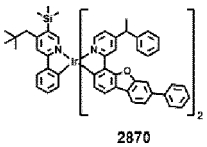

2865

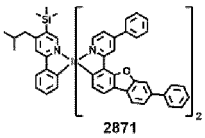

2866

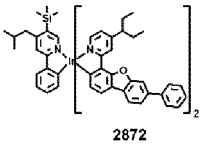

2867

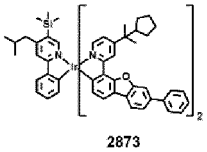

2868

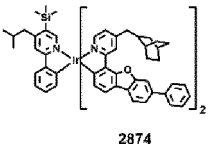

2869

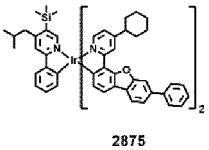

2870

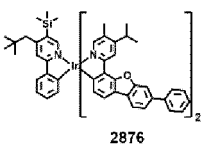

2871

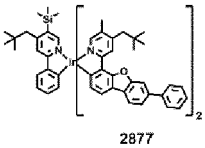

2872

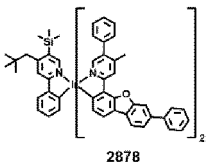

2873

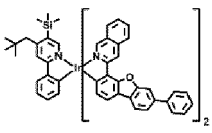

2874

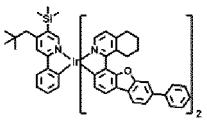

2875

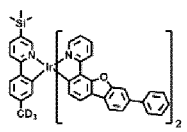

2876

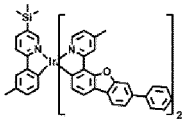

2877

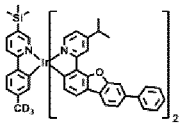

2878

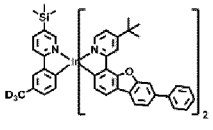

2879

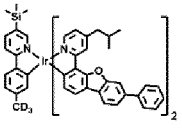

2880

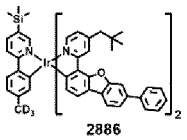

2881

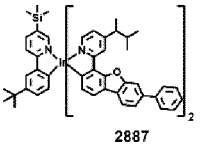

2882

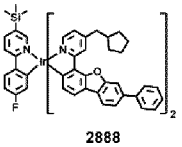

2883

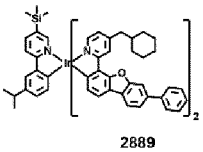

2884

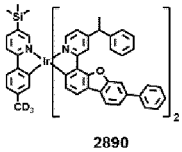

2885

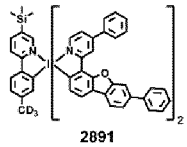

2886

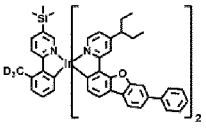

2887

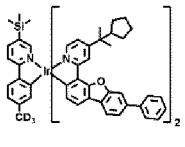

2888

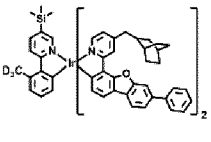

2889

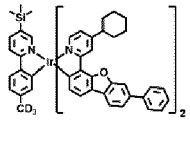

2890

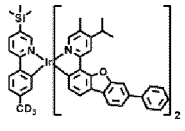

2891

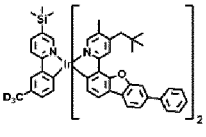

2892

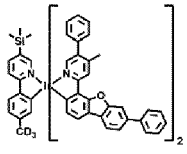

2893

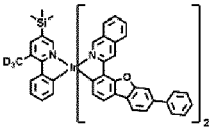

2894

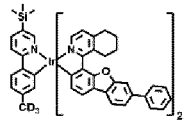

2895

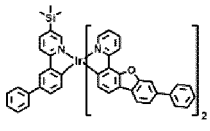

2896

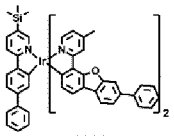

2897

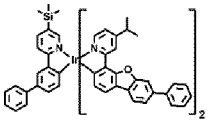

2898

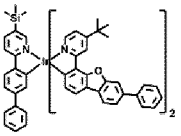

2899

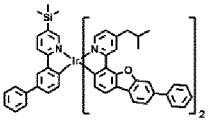

2900

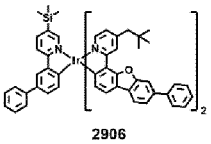

2901

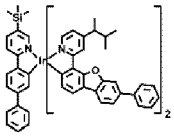

2902

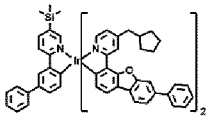

2903

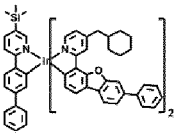

2904

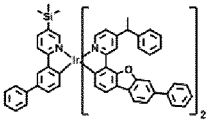

2905

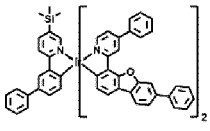

2906

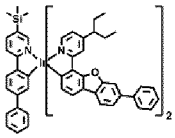

2907

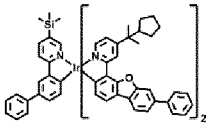

2908

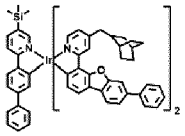

2909

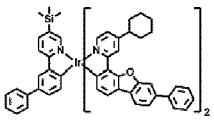

2910

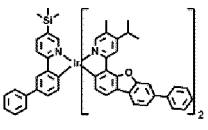

2911

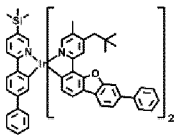

2912

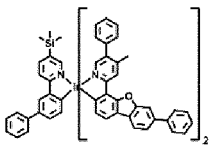

2913

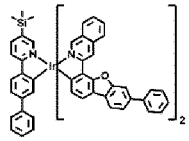

2914

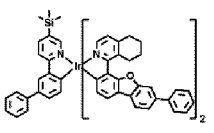

2915

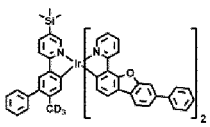

2916

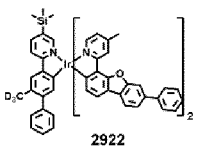

2917

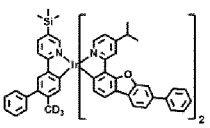

2918

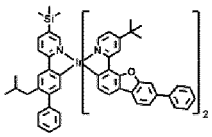

2919

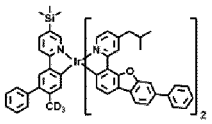

2920

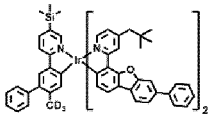

2921

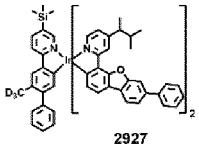

2922

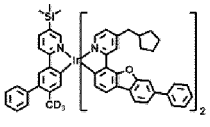

2923

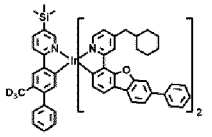

2924

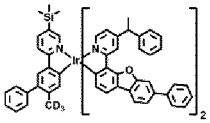

2925

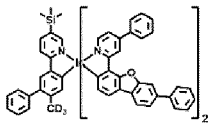

2926

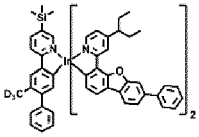

2927

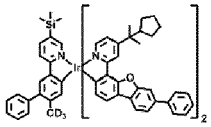

2928

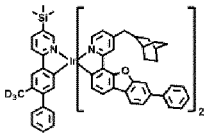

2929

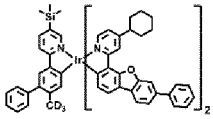

2930

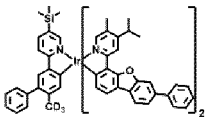

2931

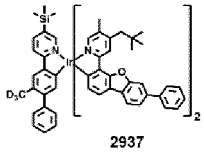

2932

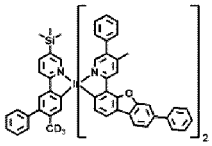

2933

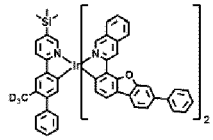

2934

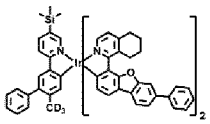

2935

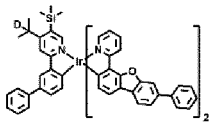

2936

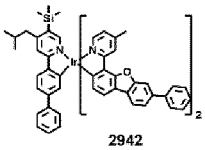

2937

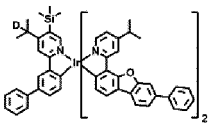

2938

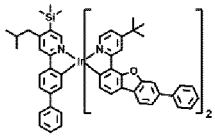

2939

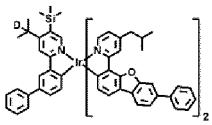

2940

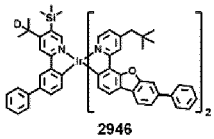

2941

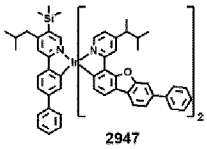

2942

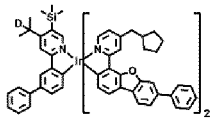

2943

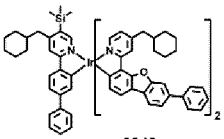

2944

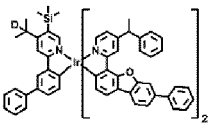

2945

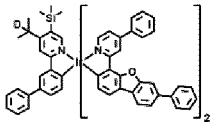

2946

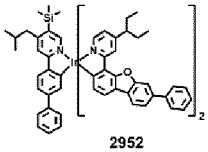

2947

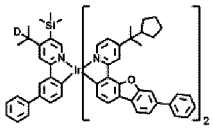

2948

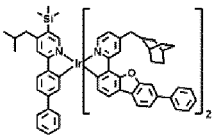

2949

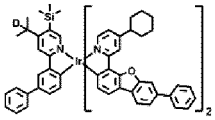

2950

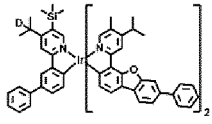

2951

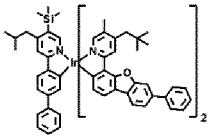

2952

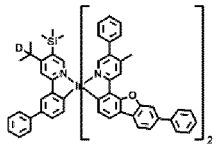

2953

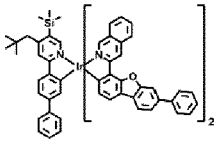

2954

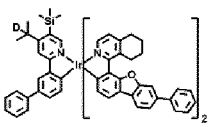

2955

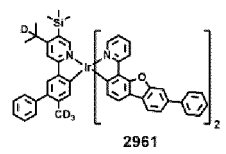

2956

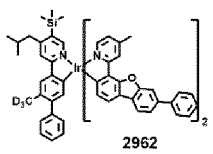

2957

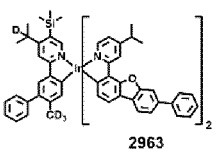

2958

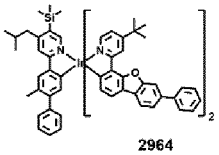

2959

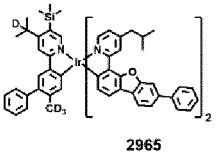

2960

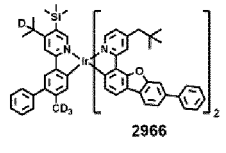

2961

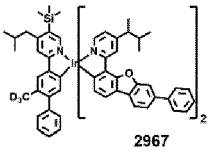

2962

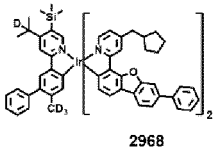

2963

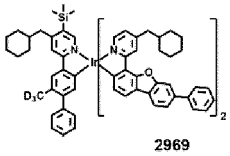

2964

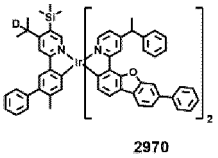

2965

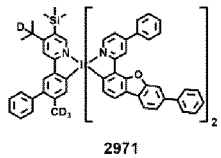

2966

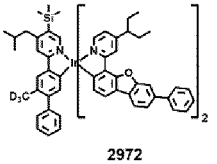

2967

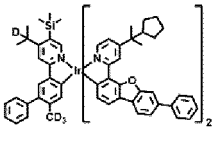

2968

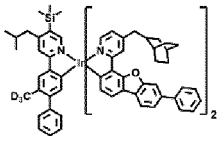

2969

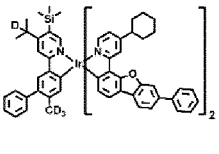

2970

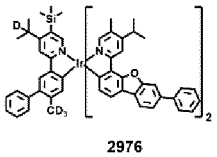

2971

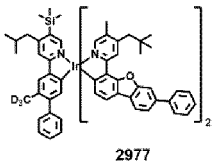

2972

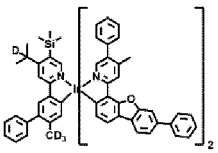

2973

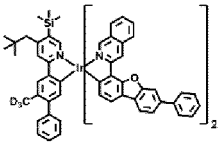

2974

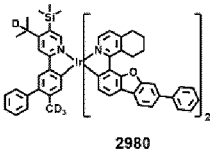

2975

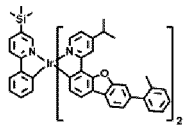

2976

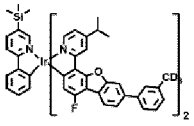

2977

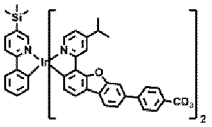

2978

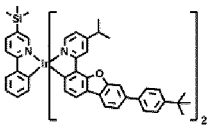

2979

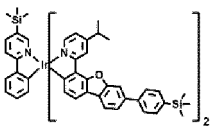

2980

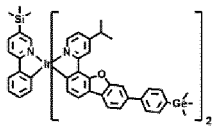

2981

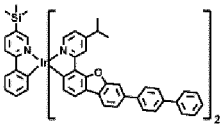

2982

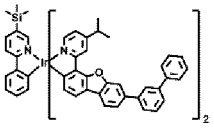

2983

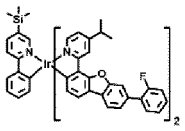

2984

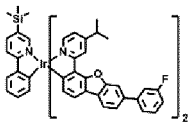

2985

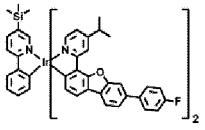

2986

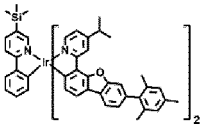

2987

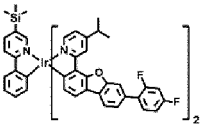

2988

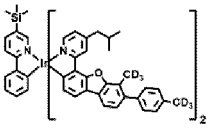

2989

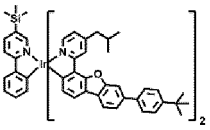

2990

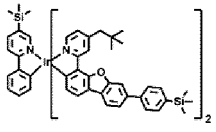

2991

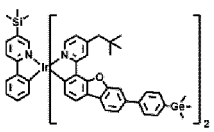

2992

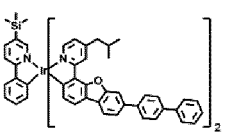

2993

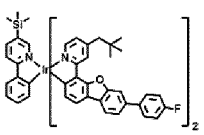

2994

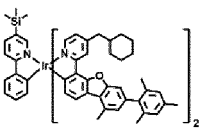

2995

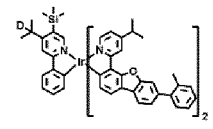

2996


2997

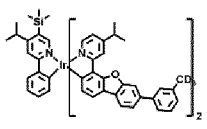

2998


2999

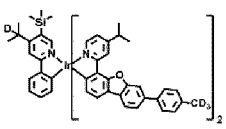

3000



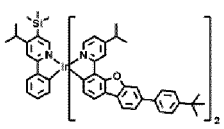
3001



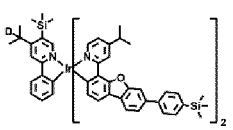
3002



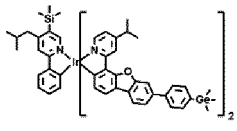
3003



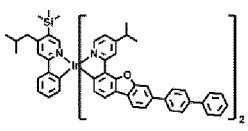
3004



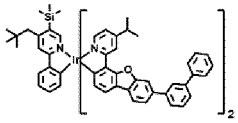
3005



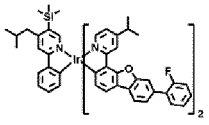
3006



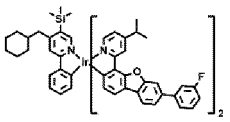
3007



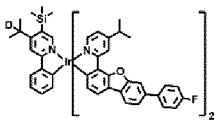
3008



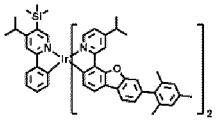
3009



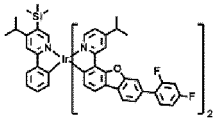
3010



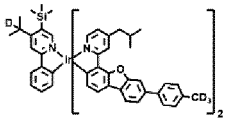
3011



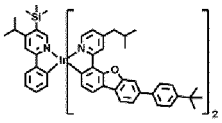
3012



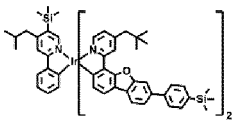
3013



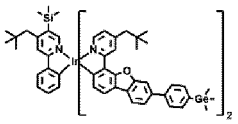
3014



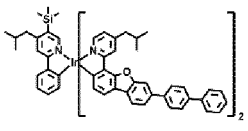
3015



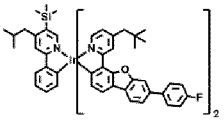
3016



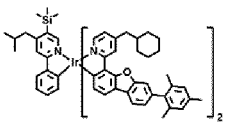
3017



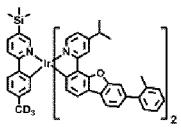
3018



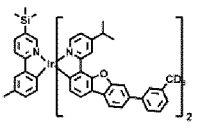
3019



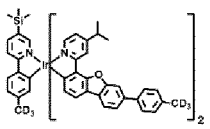
3020



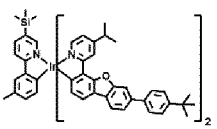
3021



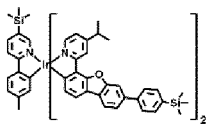
3022



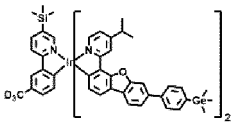
3023



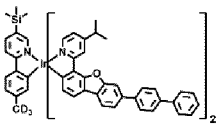
3024



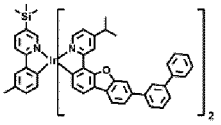
3025



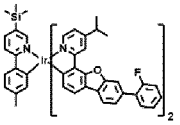
3026



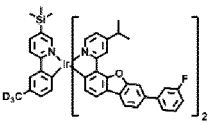
3027



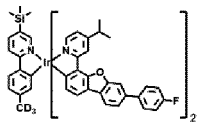
3028



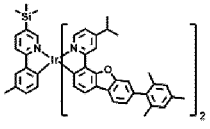
3029



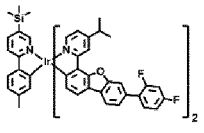
3030



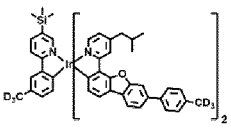
3031



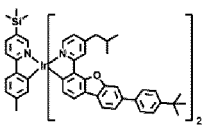
3032



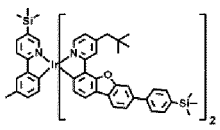
3033



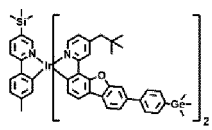
3034



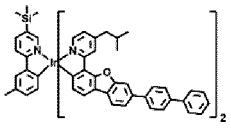
3035



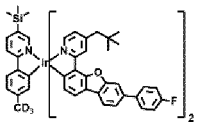
3036



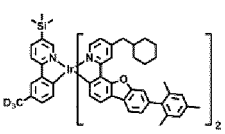
3037



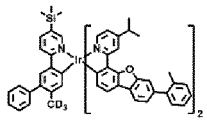
3038



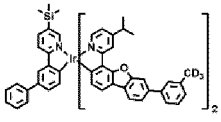
3039



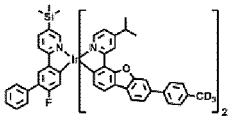
3040



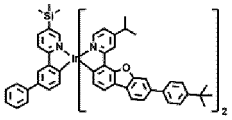
3041



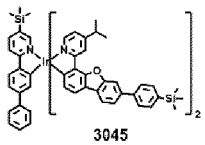
3042



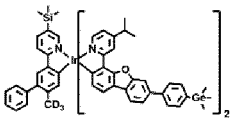
3043



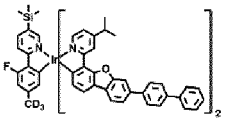
3044



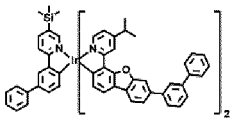
3045



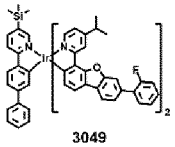
3046



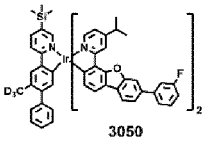
3047



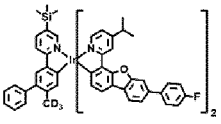
3048



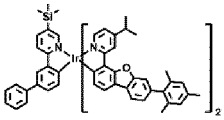
3049



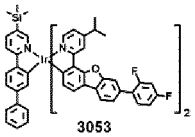
3050



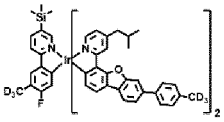
3051



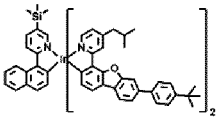
352



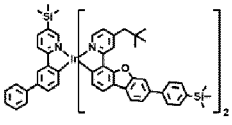
3053



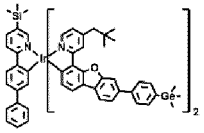
3054



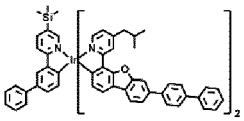
3055



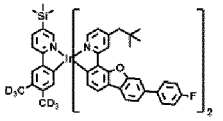
3056



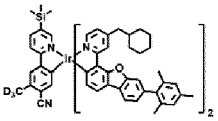
3057



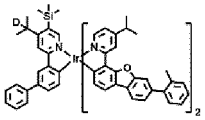
3058



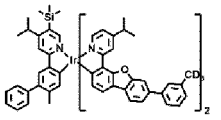
3059



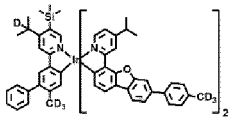
3060



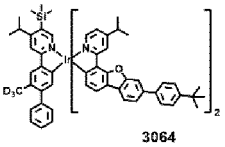
3061



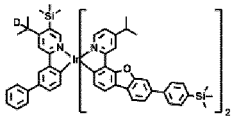
3062



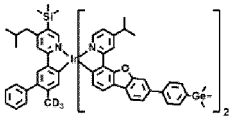
3063



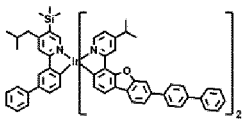
3064



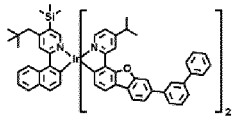
3065



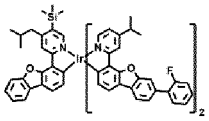
3066



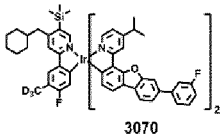
3067



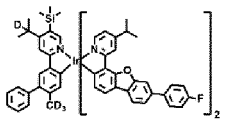
3068



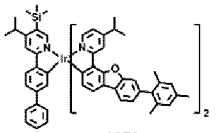
3069



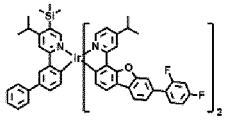
3070



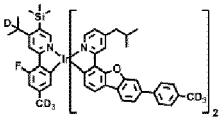
3071



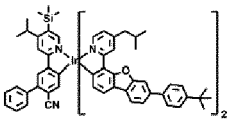
3072



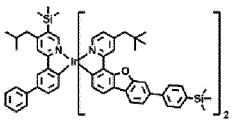
3073



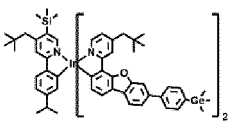
3074



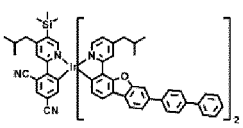
3075



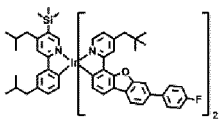
3076



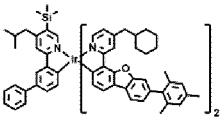
3077



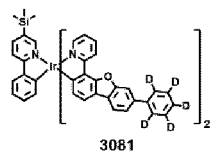
3078

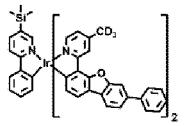


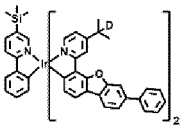
3079

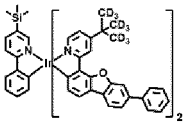


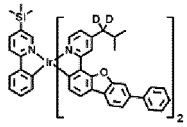
3080

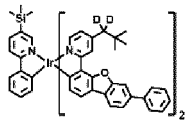

3081

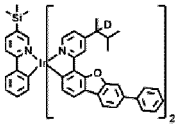

3082

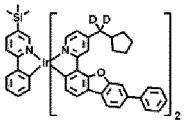

3083

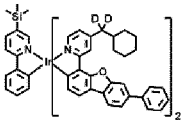

3084

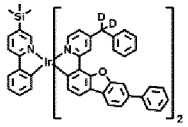

3085

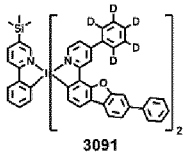

3086

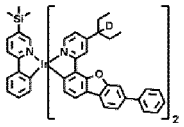

3087

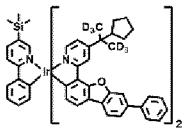

3088

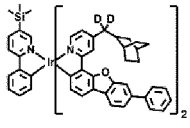

3089

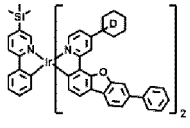

3090

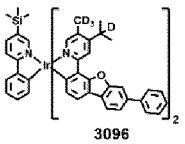

3091

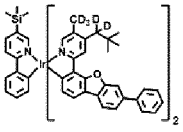

3092

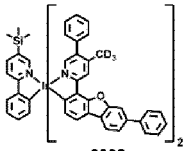

3093

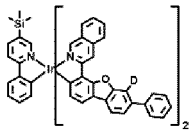

3094

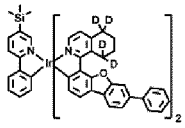

3095

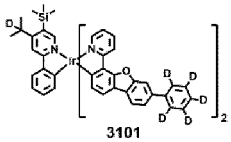

3096

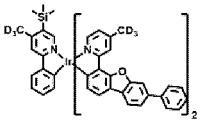

3097

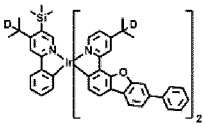

3098

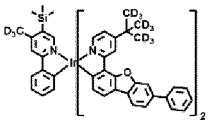

3099

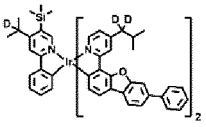

3100

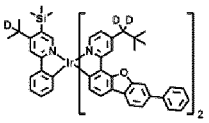

3101

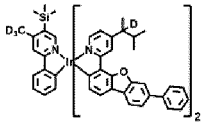

3102

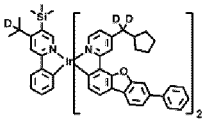

3103

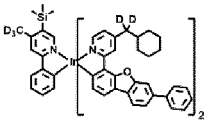

3104

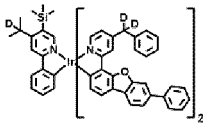

3105

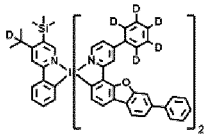

3106

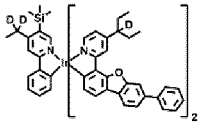

3107

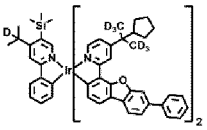

3108

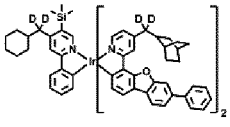

3109

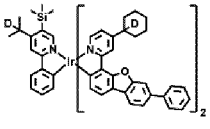

3110

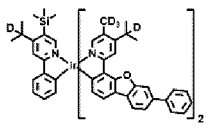

3111

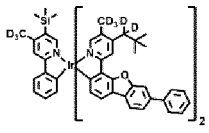

3112

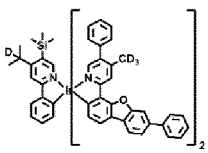

3113

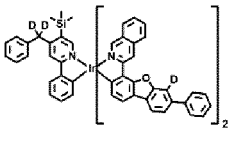

3114

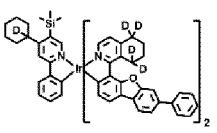

3115

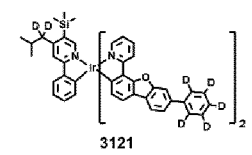

3116

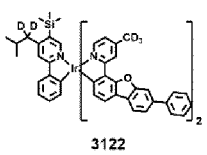

3117

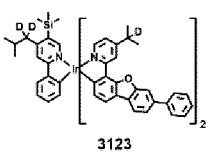

3118

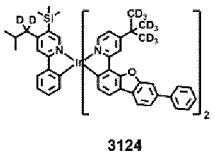

3119

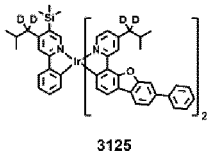

3120

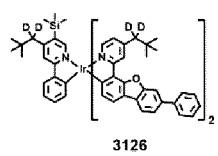

3121

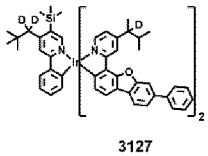

3122

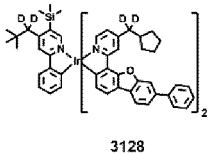

3123

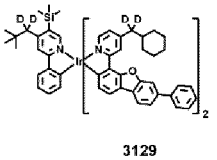

3124

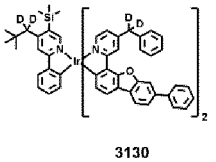

3125

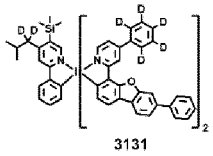

3126

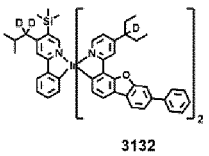

3127

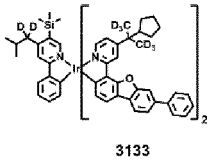

3128

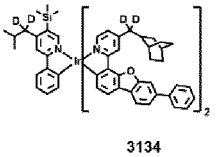

3129

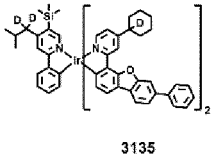

3130

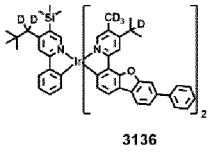

3131

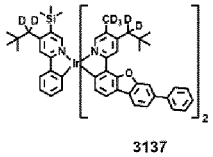

3132

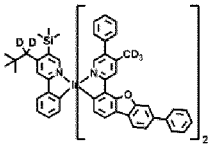

3133

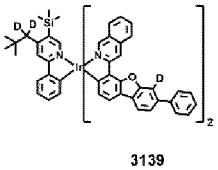

3134

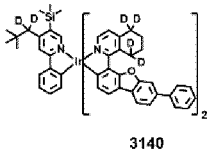

3135

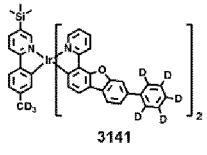

3136

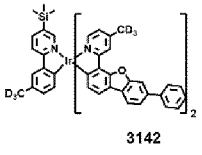

3137

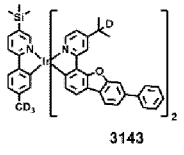

3138

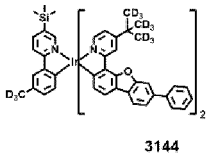

3139

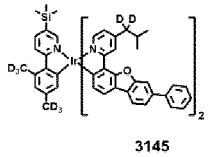

3140

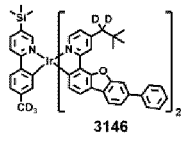

3141

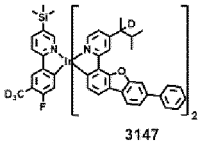

3142

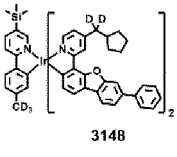

3143

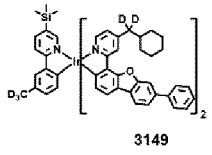

3144

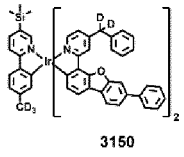

3145

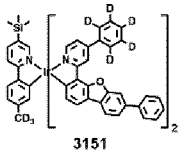

3146

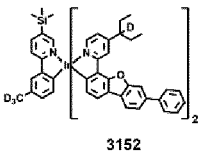

3147

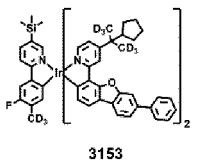

3148

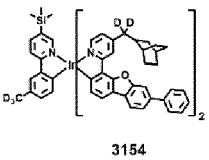

3149

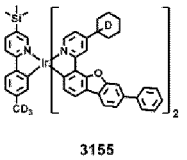

3150

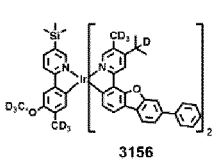

3151

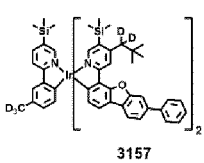

3152

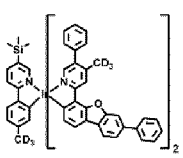

3153

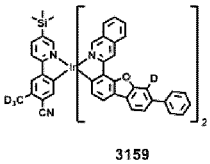

3154

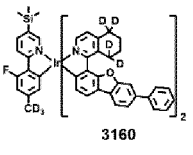

3155

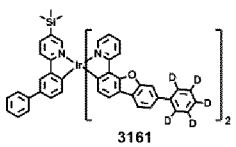

3156

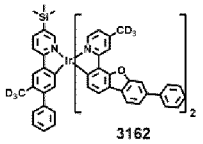

3157

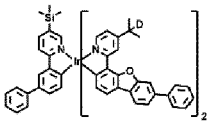

3158

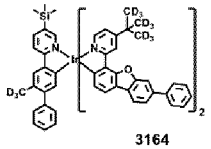

3159

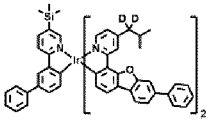

3160

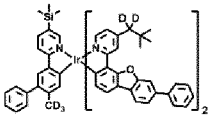

3161

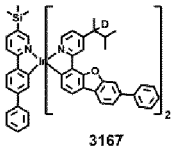

3162

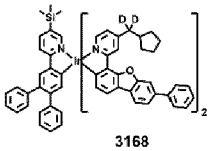

3163

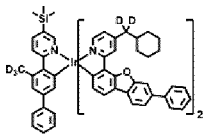

3164

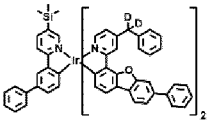

3165

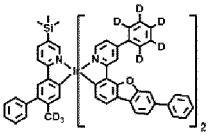

3166

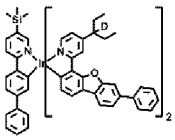

3167

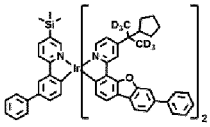

3168

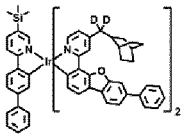

3169

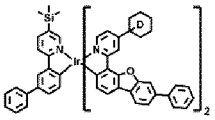

3170

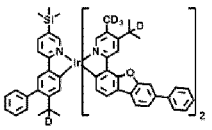

3171

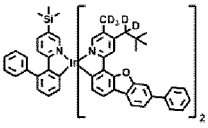

3172

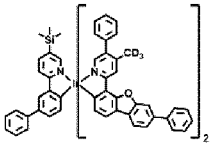

3173

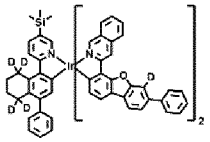

3174

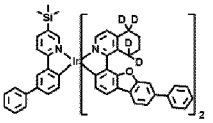

3175

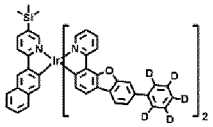

3176

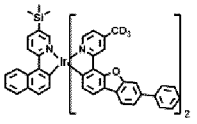

3177

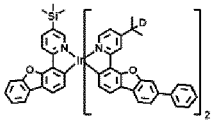

3178

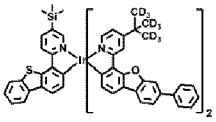

3179

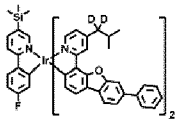

3180

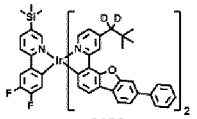

3181

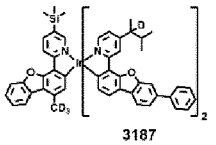

3182

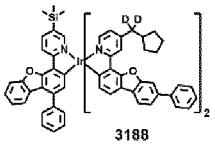

3183

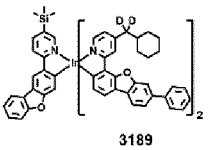

3184

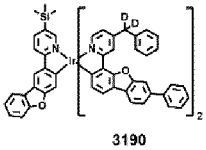

3185

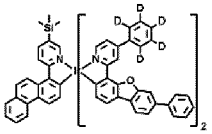

3186

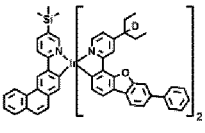

3187

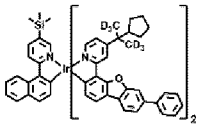

3188

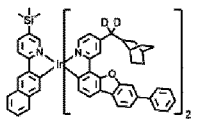

3189

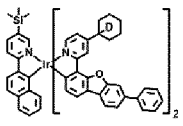

3190

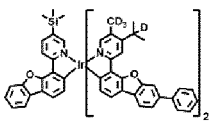

3191

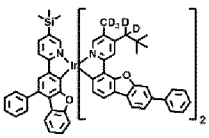

3192

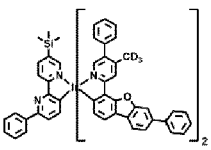

3193

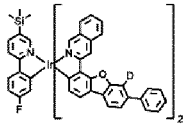

3194

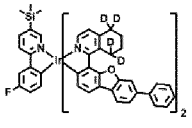

3195

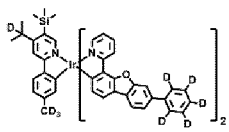

3196

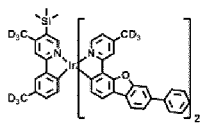

3197

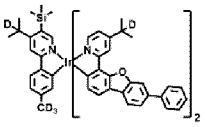

3198

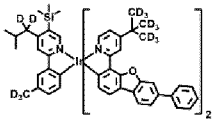

3199

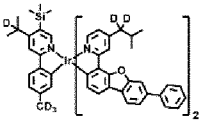

3200

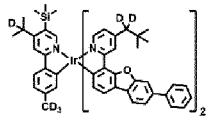

3201

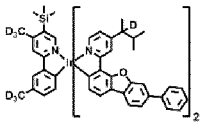

3202

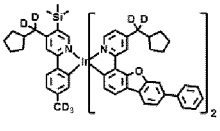

3203

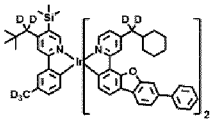

3204

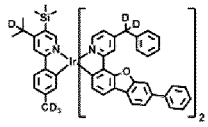

3205

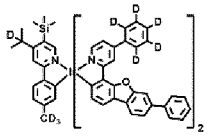

3206

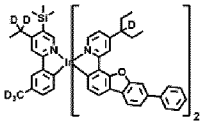

3207

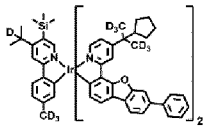

3208

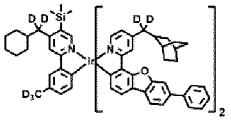

3209

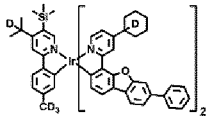

3210

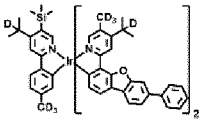

3211

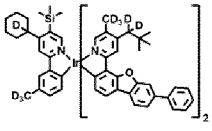

3212

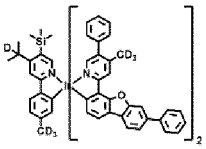

3213

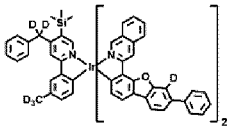

3214

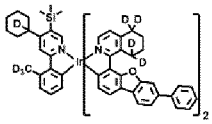

3215

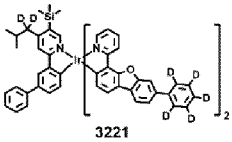

3216

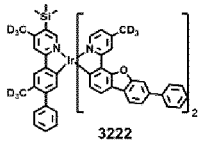

3217

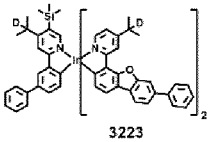

3218

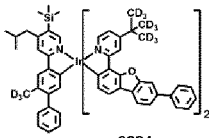

3219

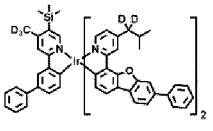

3220

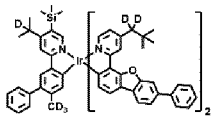

3221

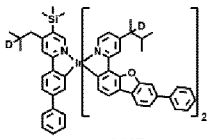

3222

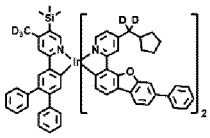

3223

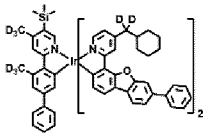

3224

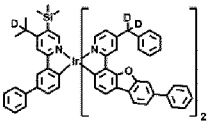

3225

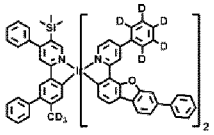

3226

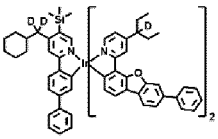

3227

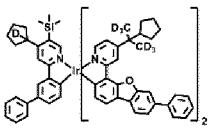

3228

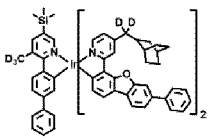

3229

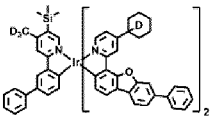

3230

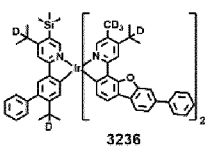

3231

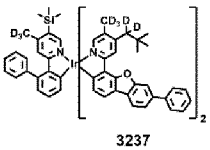

3232

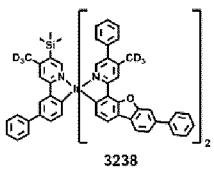

3233

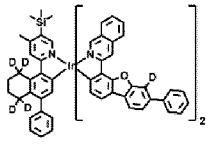

3234

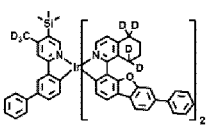

3235

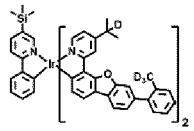

3236


3237

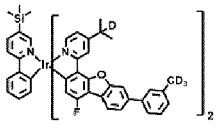

3238


3239

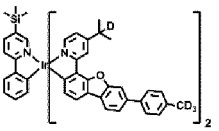

3240



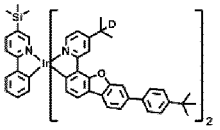
3241



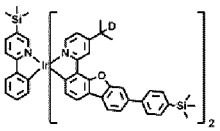
3242



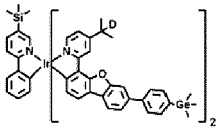
3243



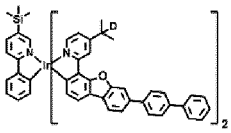
3244



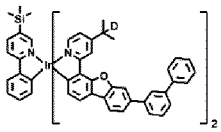
3245



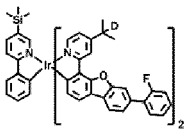
3246



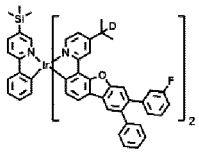
3247



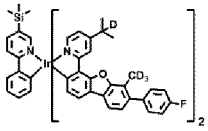
3248



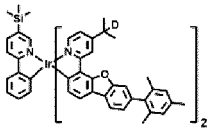
3249



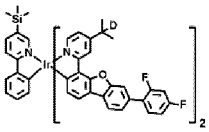
3250



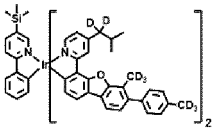
3251



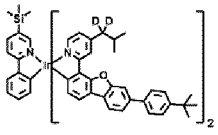
3252



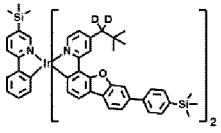
3253



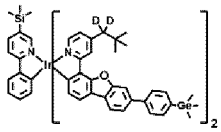
3254



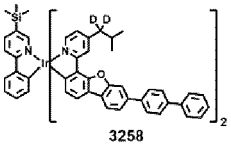
3255



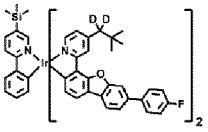
3256



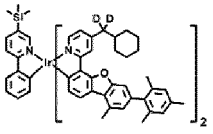
3257



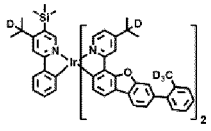
3258



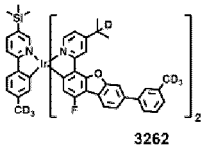
3259



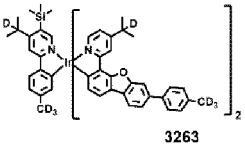
3260



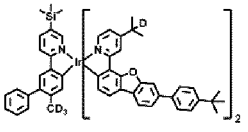
3261



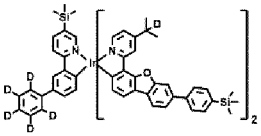
3262



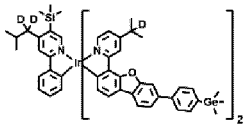
3263



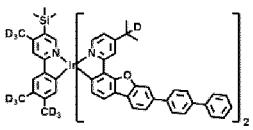
3264



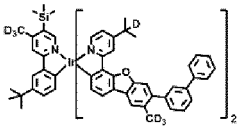
3265



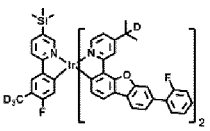
3266



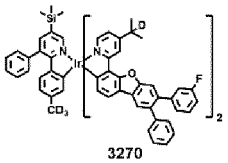
3267



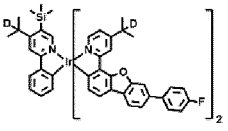
3268



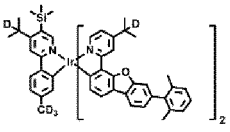
3269



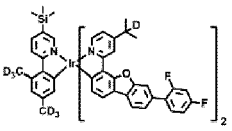
3270



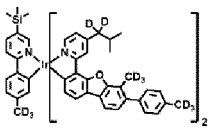
3271



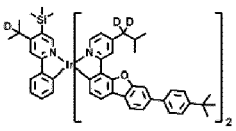
3272



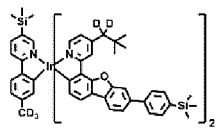
3273



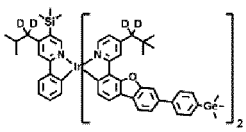
3274



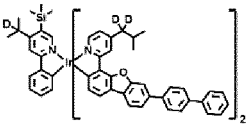
3275



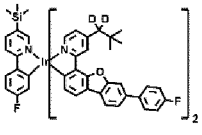
3276



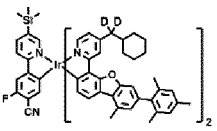
3277



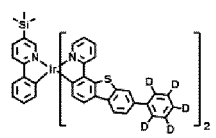
3278

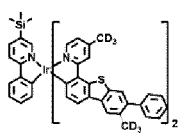


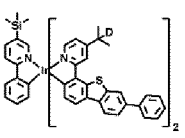
3279

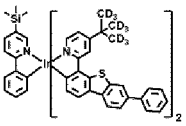


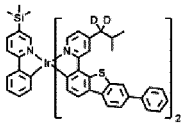
3280

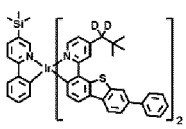

3281

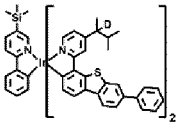

3282

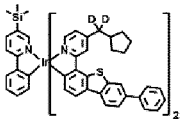

3283

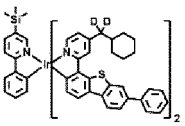

3284

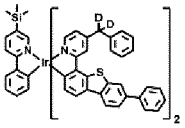

3285

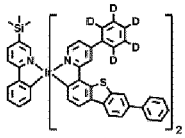

3286

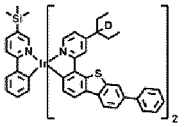

3287

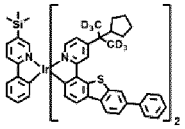

3288

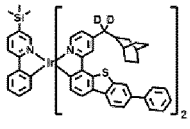

3289

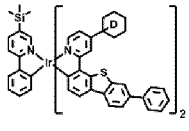

3290

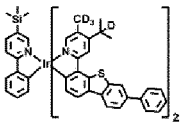

3291

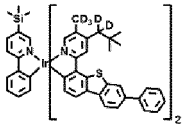

3292

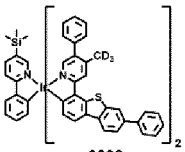

3293

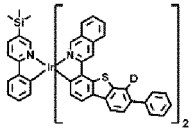

3294

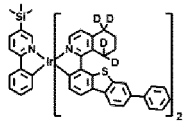

3295

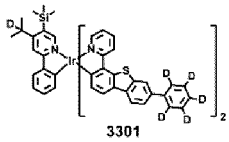

3296

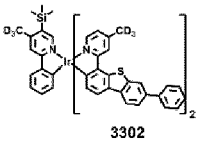

3297

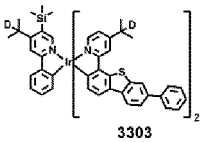

3298

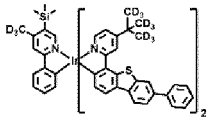

3299

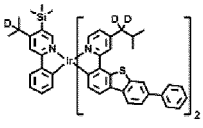

3300

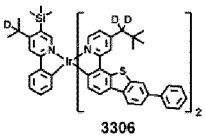

3301

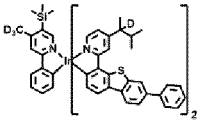

3302

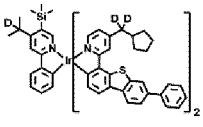

3303

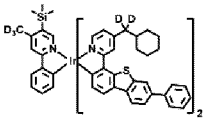

3304

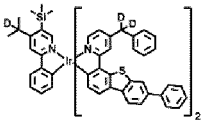

3305

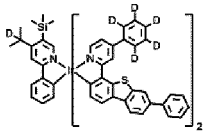

3306

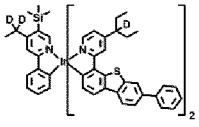

3307

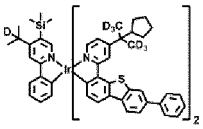

3308

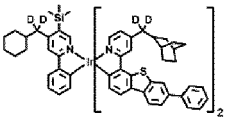

3309

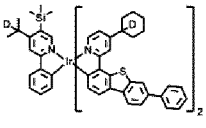

3310

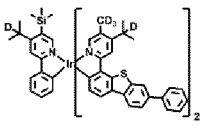

3311

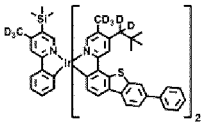

3312

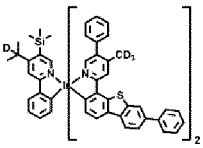

3313

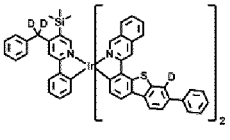

3314

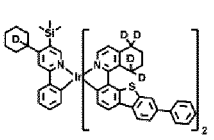

3315

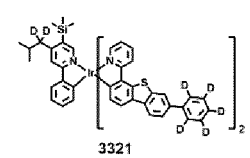

3316

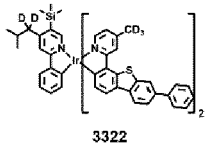

3317

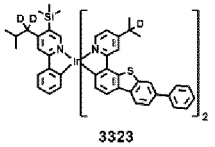

3318

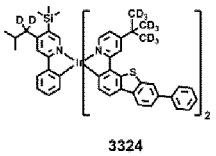

3319

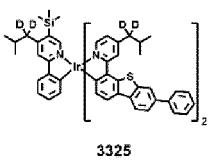

3320

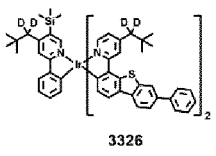

3321

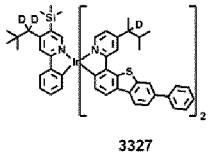

3322

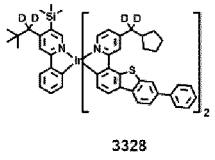

3323

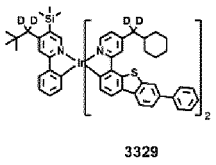

3324

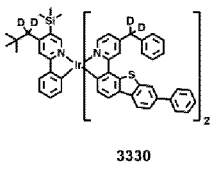

3325

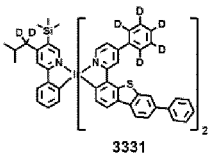

3326

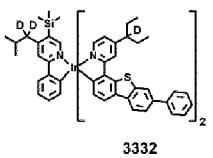

3327

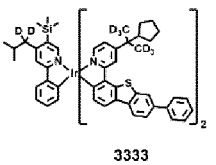

3328

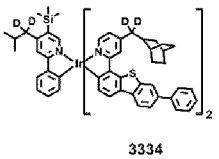

3329

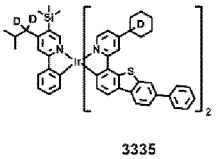

3330

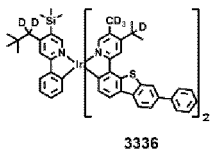

3331

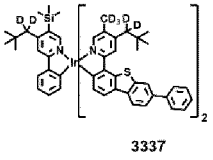

3332

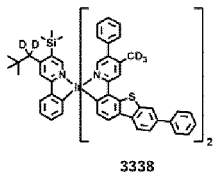

3333

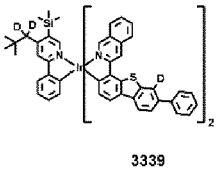

3334

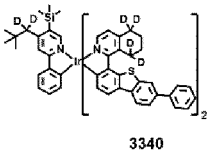

3335

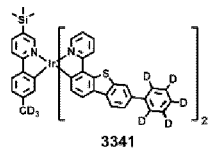

3336

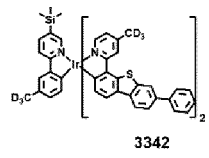

3337

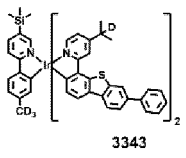

3338

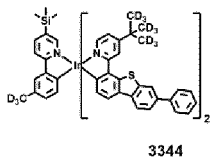

3339

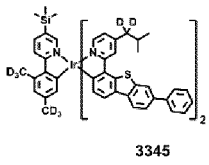

3340

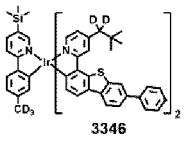

3341

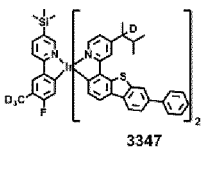

3342

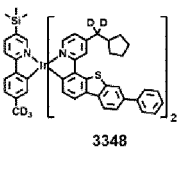

3343

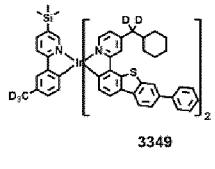

3344

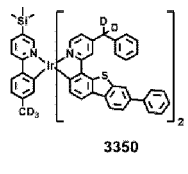

3345

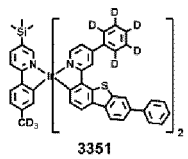

3346

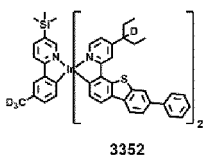

3347

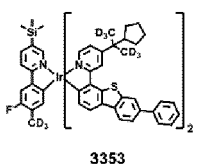

3348

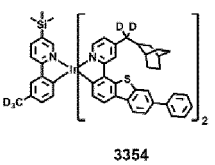

3349

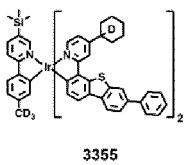

3350

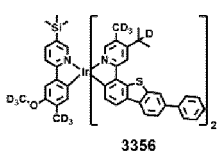

3351

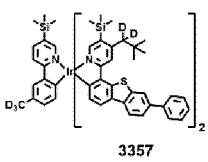

3352

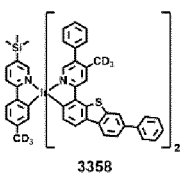

3353

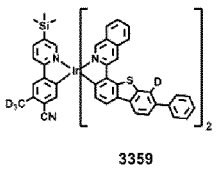

3354

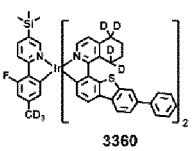

3355

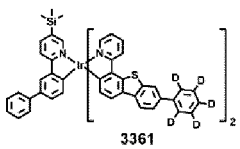

3356

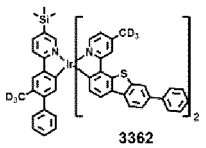

3357

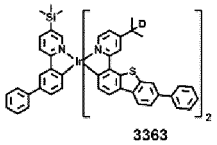

3358

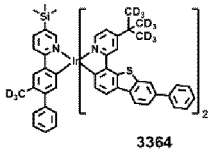

3359

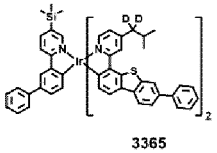

3360

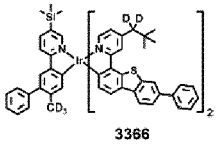

3361

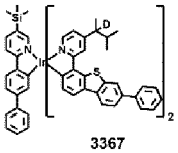

3362

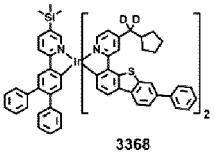

3363

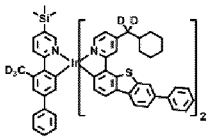

3364

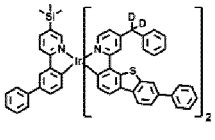

3365

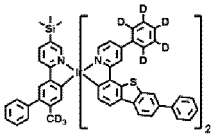

3366

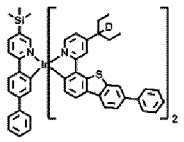

3367

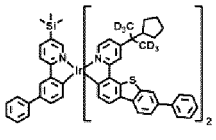

3368

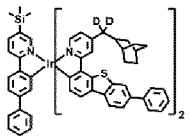

3369

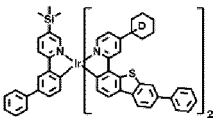

3370

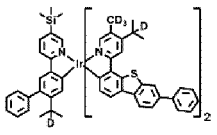

3371

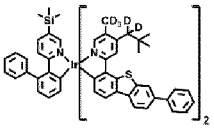

3372

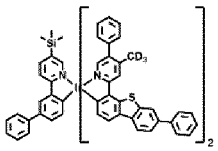

3373

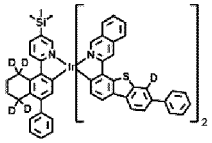

3374

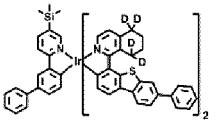

3375

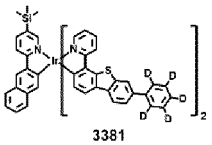

3376

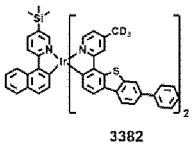

3377

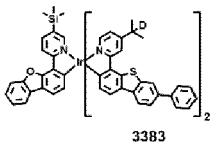

3378

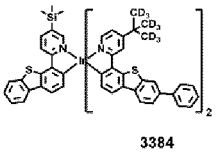

3379

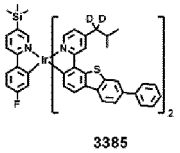

3380

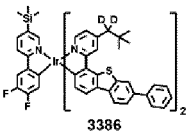

3381

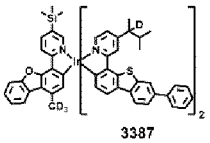

3382

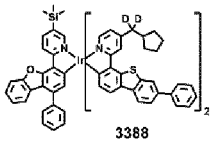

3383

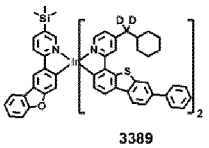

3384

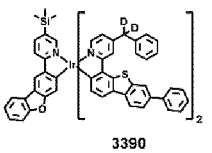

3385

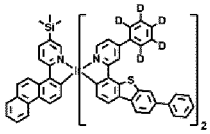

3386

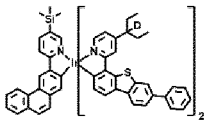

3387

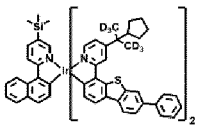

3388

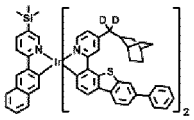

3389

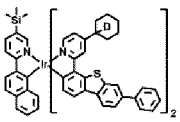

3390

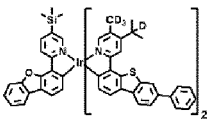

3391

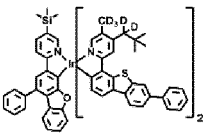

3392

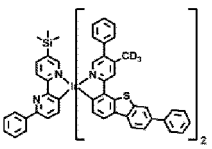

3393

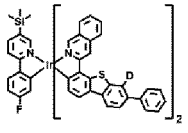

3394

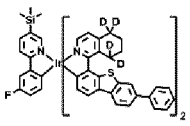

3395

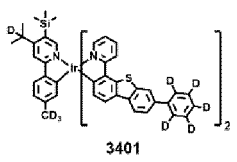

3396

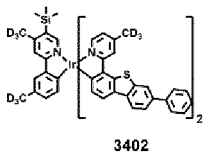

3397

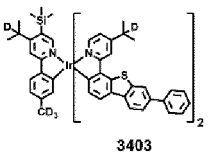

3398

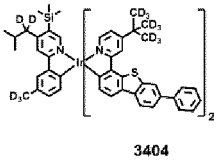

3399

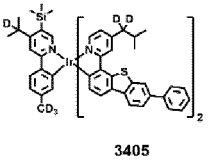

3400

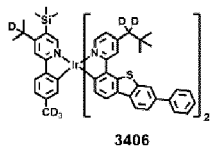

3401

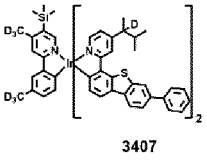

3402

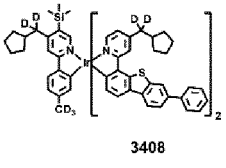

3403

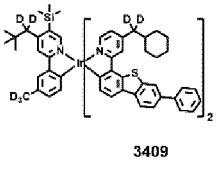

3404

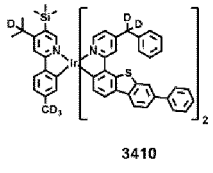

3405

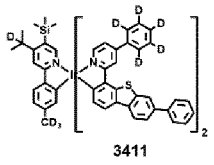

3406

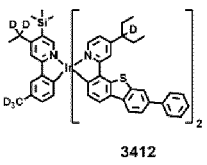

3407

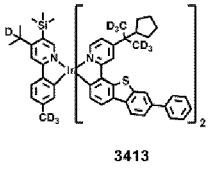

3408

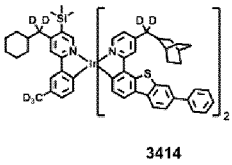

3409

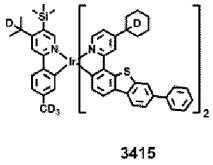

3410

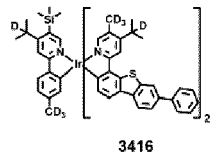

3411

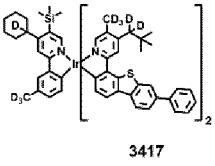

3412

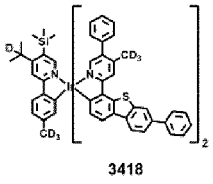

3413

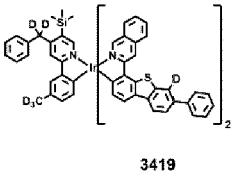

3414

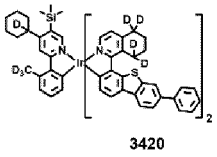

3415

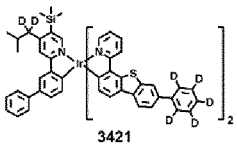

3416

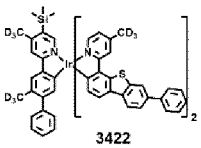

3417

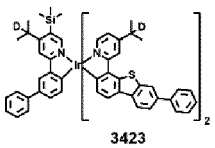

3418

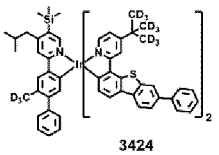

3419

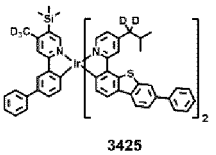

3420

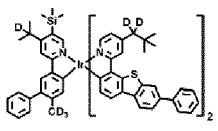

3421

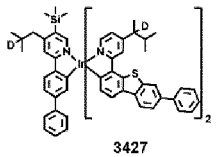

3422

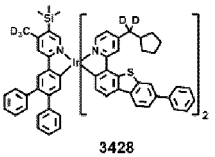

3423

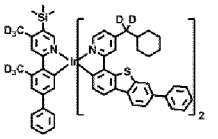

3424

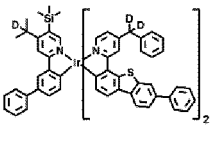

3425

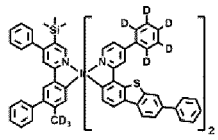

3426

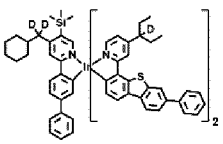

3427

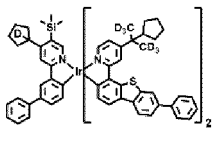

3428

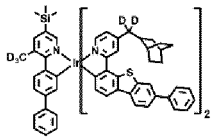

3429

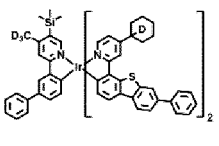

3430

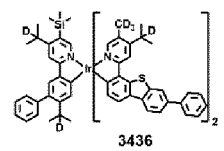

3431

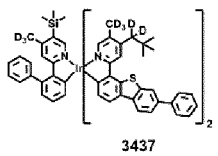

3432

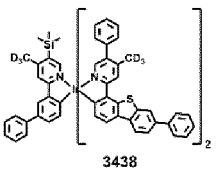

3433

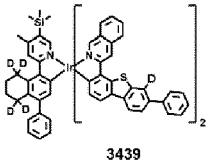

3434

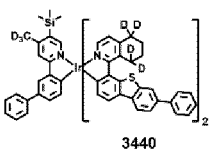

3435

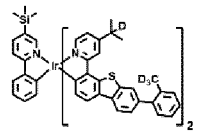

3436

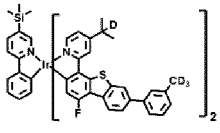

3437

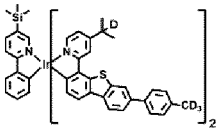

3438

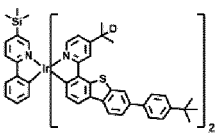

3439

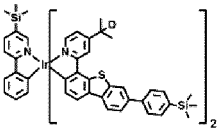

3440

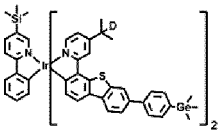

3441

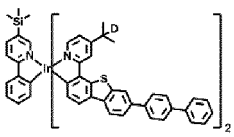

3442

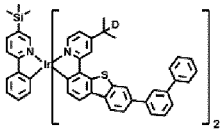

3443

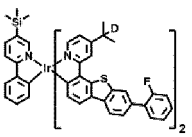

3444

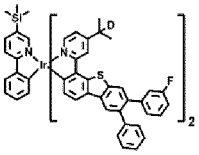

3445

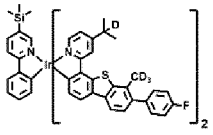

3446

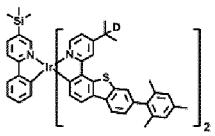

3447

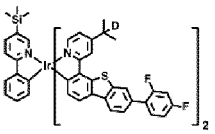

3448

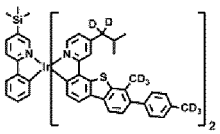

3449

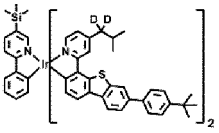

3450

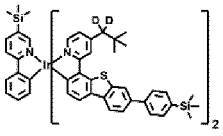

3451

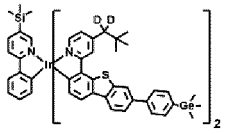

3452

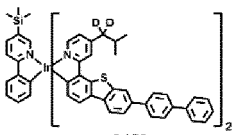

3453

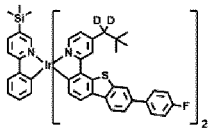

3454

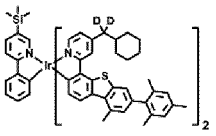

3455

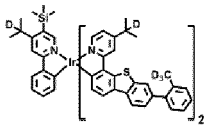

3456

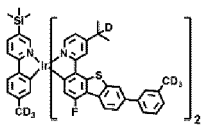

3457

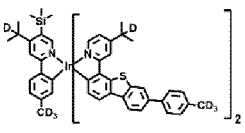

3458

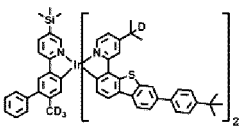

3459

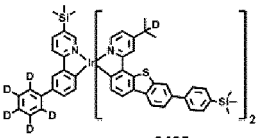

3460

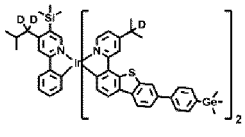

3461

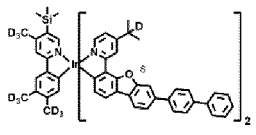

3462

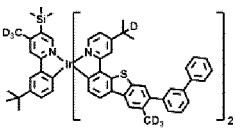

3463

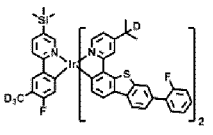

3464

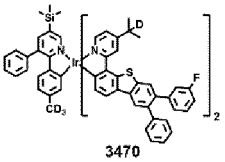

3465

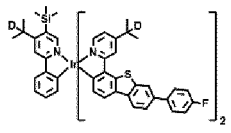

3466

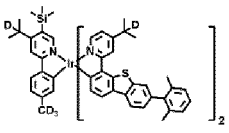

3467

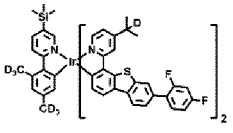

3468

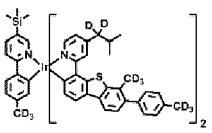

3469

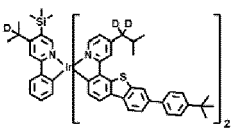

3470

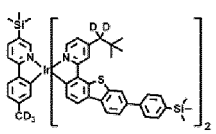

3471

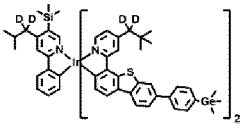

3472

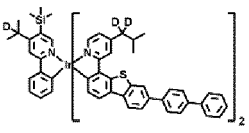

3473

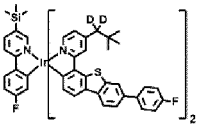

3474

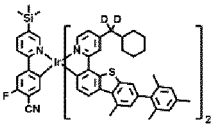

3475

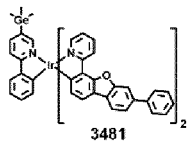

3476

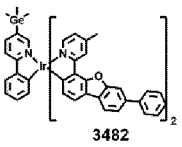

3477

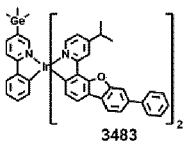

3478

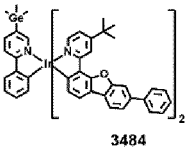

3479

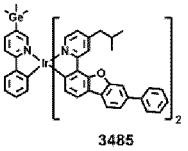

3480

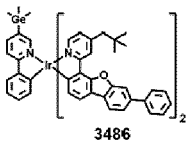

3481

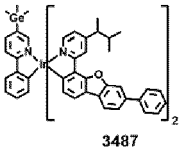

3482

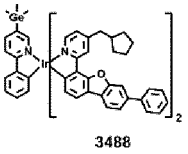

3483

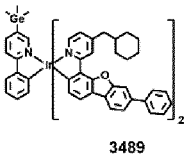

3484

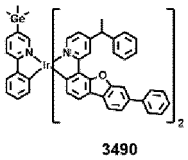

3485

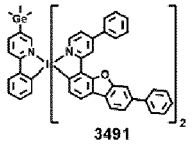

3486

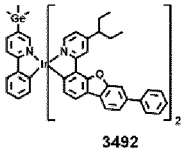

3487

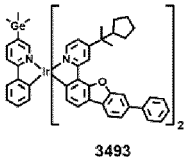

3488

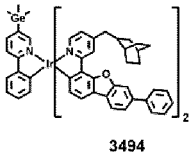

3489

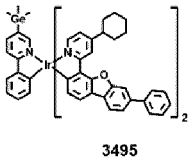

3490

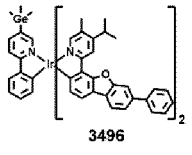

3491

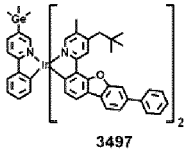

3492

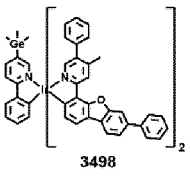

3493

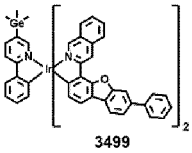

3494

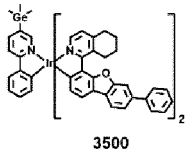

3495

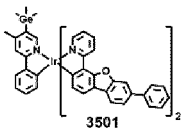

3496

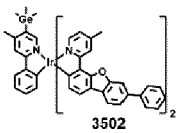

3497

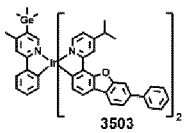

3498

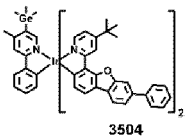

3499

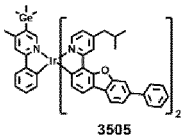

3500

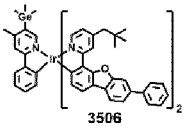

3501

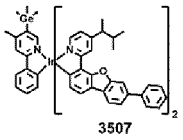

3502

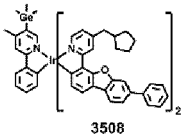

3503

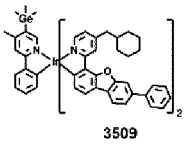

3504

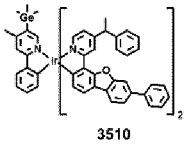

3505

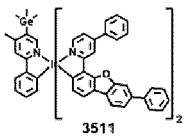

3506

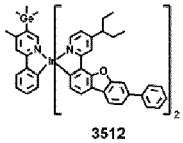

3507

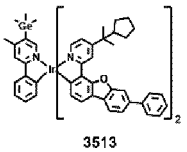

3508

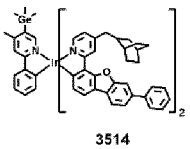

3509

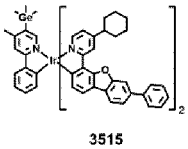

3510

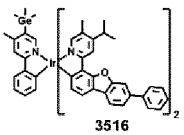

3511

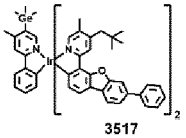

3512

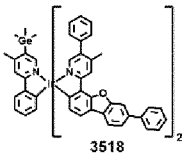

3513

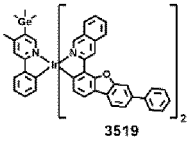

3514

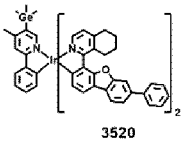

3515

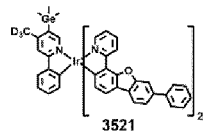

3516

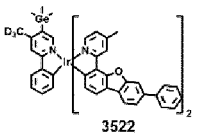

3517

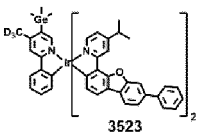

3518

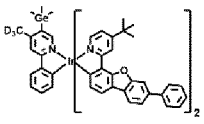

3519

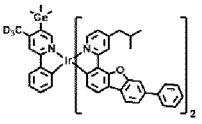

3520

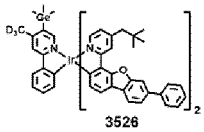

3521

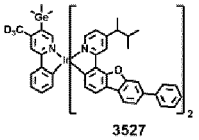

3522

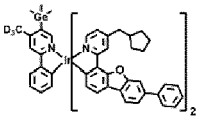

3523

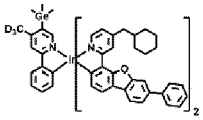

3524

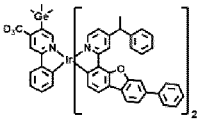

3525

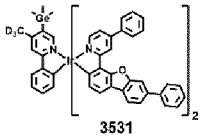

3526

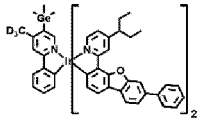

3527

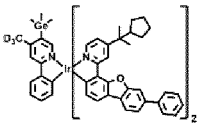

3528

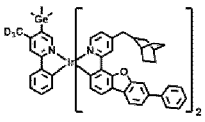

3529

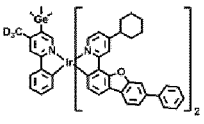

3530

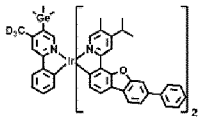

3531

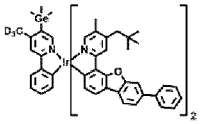

3532

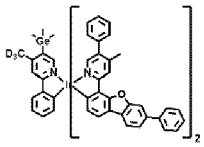

3533

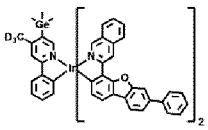

3534

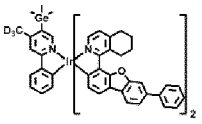

3535

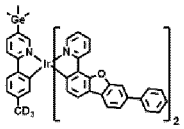

3536

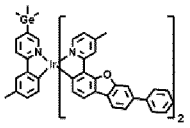

3537

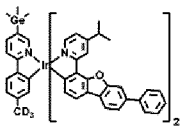

3538

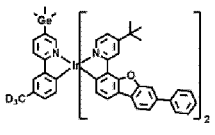

3539

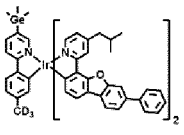

3540

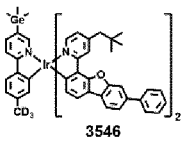

3541

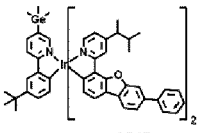

3542

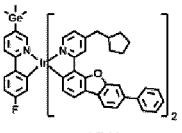

3543

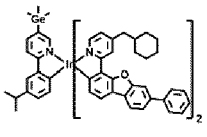

3544

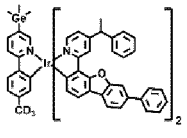

3545

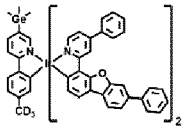

3546

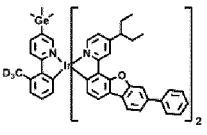

3547

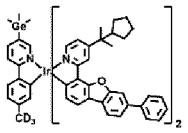

3548

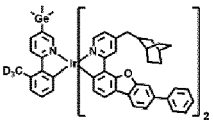

3549

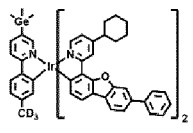

3550

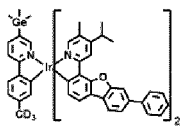

3551

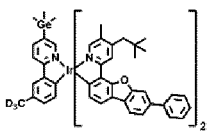

3552

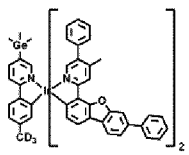

3553

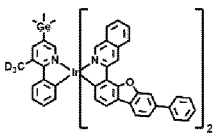

3554

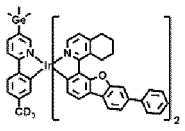

3555

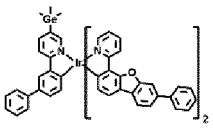

3556

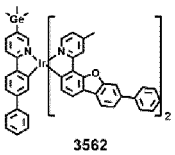

3557

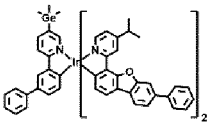

3558

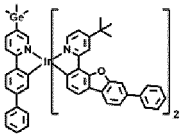

3559

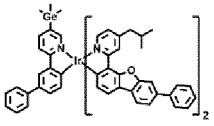

3560

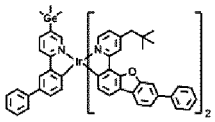

3561

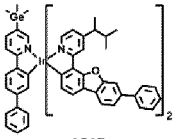

3562

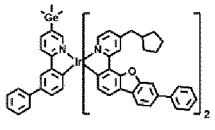

3563

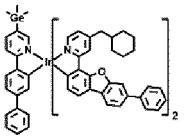

3564

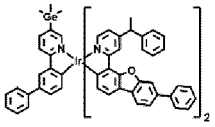

3565

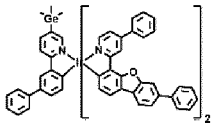

3566

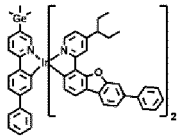

3567

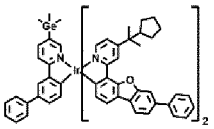

3568

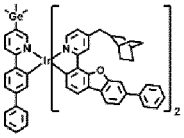

3569

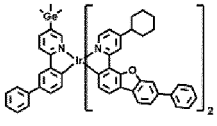

3570

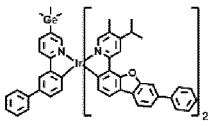

3571

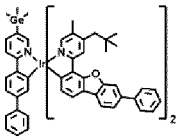

3572

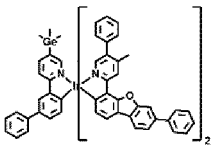

3573

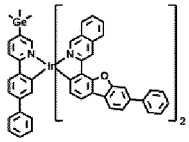

3574

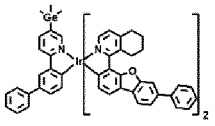

3575

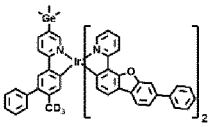

3576

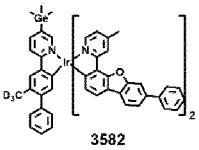

3577

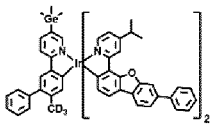

3578

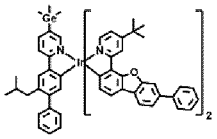

3579

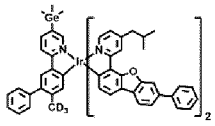

3580

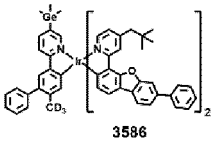

3581

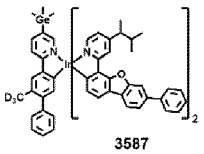

3582

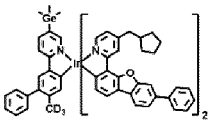

3583

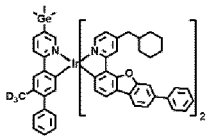

3584

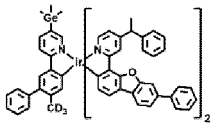

3585

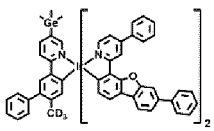

3586

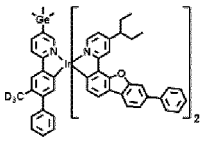

3587

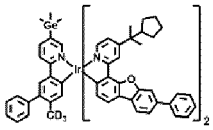

3588

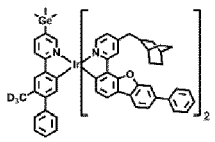

3589

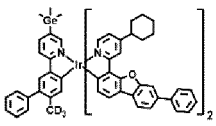

3590

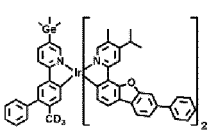

3591

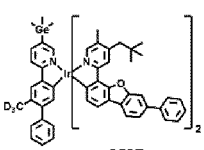

3592

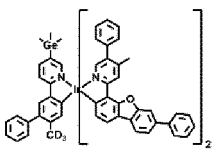

3593

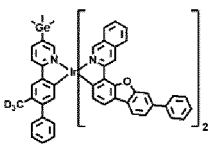

3594

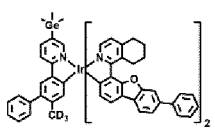

3595

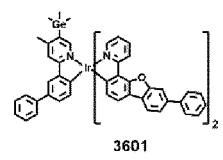

3596

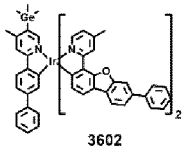

3597

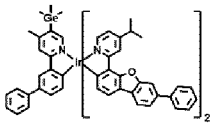

3598

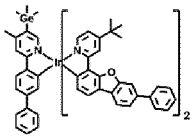

3599

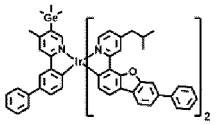

3600

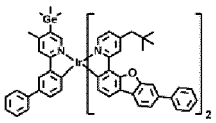

3601

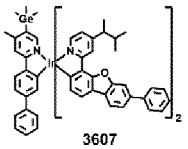

3602

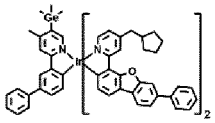

3603

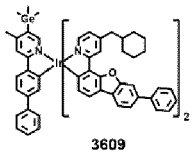

3604

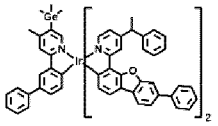

3605

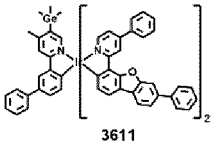

3606

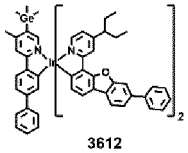

3607

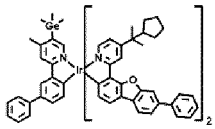

3608

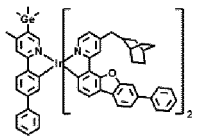

3609

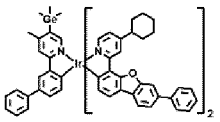

3610

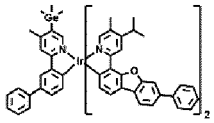

3611

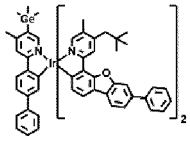

3612

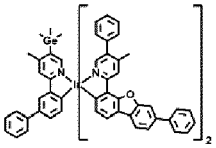

3613

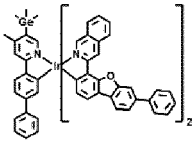

3614

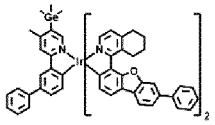

3615

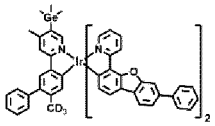

3616

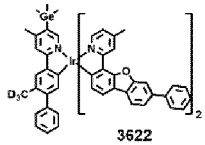

3617

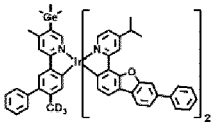

3618

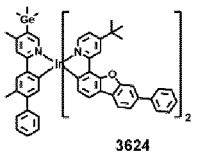

3619

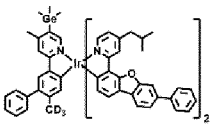

3620

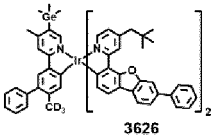

3621

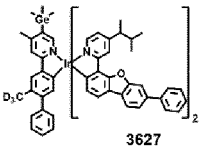

3622

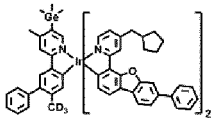

3623

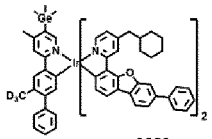

3624

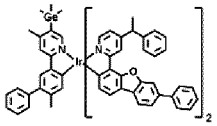

3625

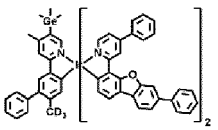

3626

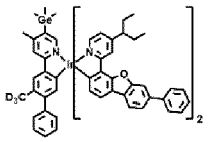

3627

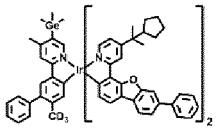

3628

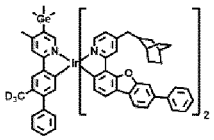

3629

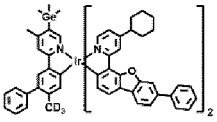

3630

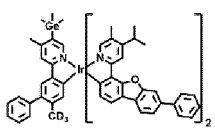

3631

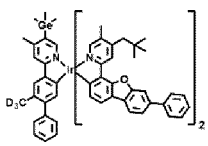

3632

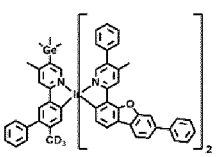

3633

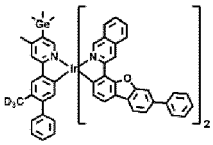

3634

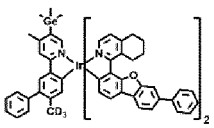

3635

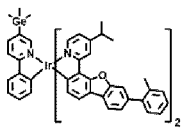

3636

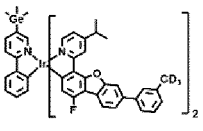

3637

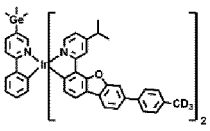

3638

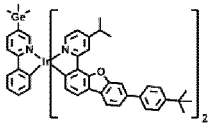

3639

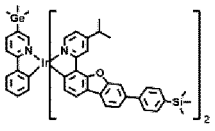

3640

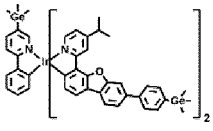

3641

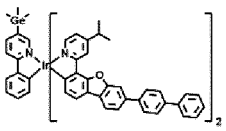

3642

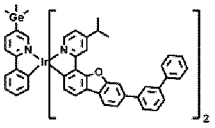

3643

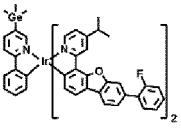

3644

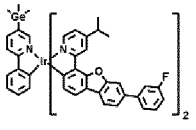

3645

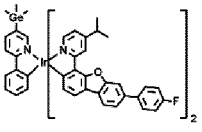

3646

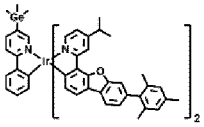

3647

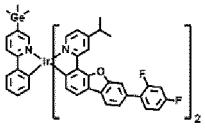

3648

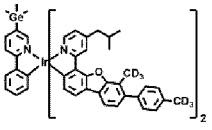

3649

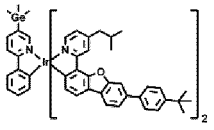

3650

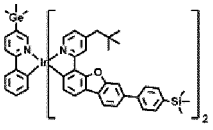

3651

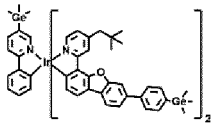

3652

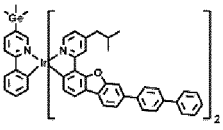

3653

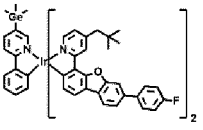

3654

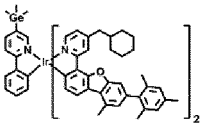

3655

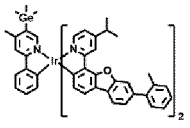

3656

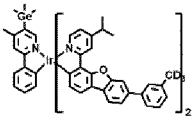

3657

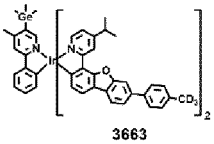

3658

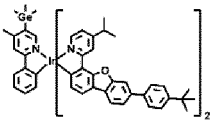

3659

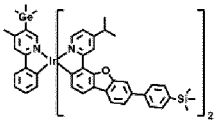

3660

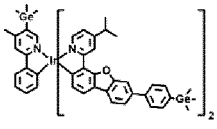

3661

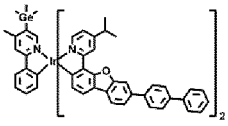

3662

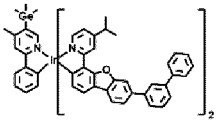

3663

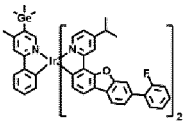

3664

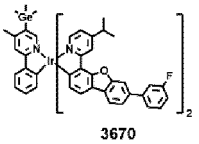

3665

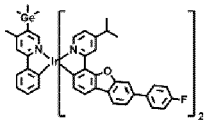

3666

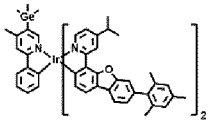

3667

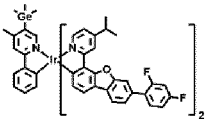

3668

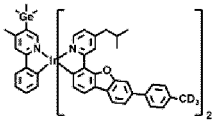

3669

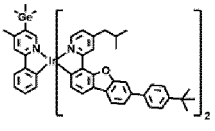

3670

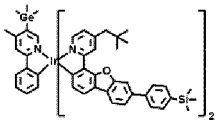

3671

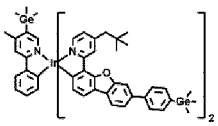

3672

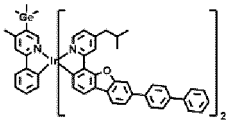

3673

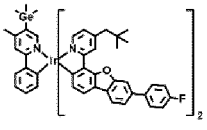

3674

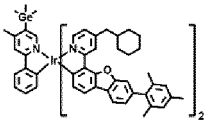

3675

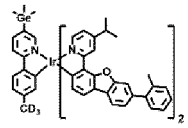

3676

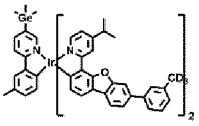

3677

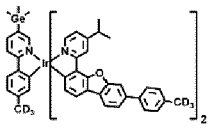

3678

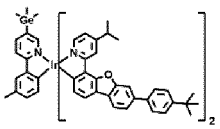

3679

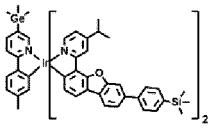

3680

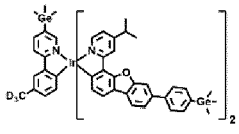

3681

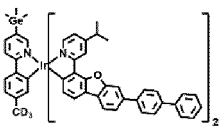

3682

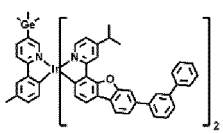

3683

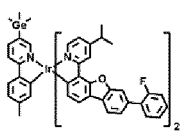

3684

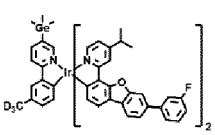

3685

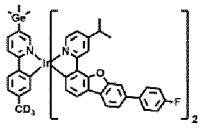

3686

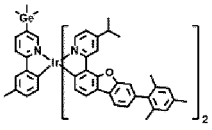

3687

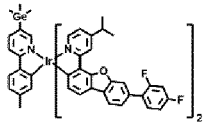

3688

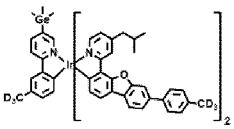

3689

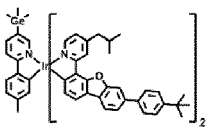

3690

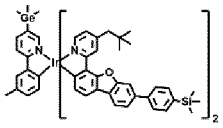

3691

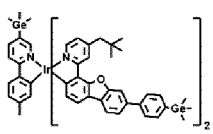

3692

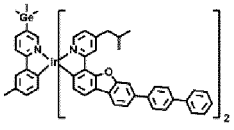

3693

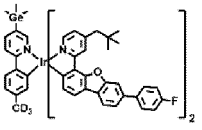

3694

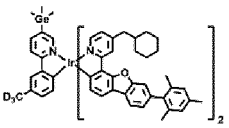

3695

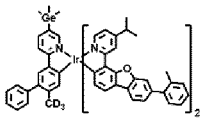

3696

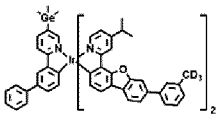

3697

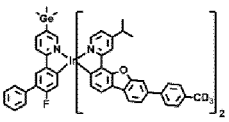

3698

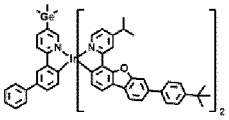

3699

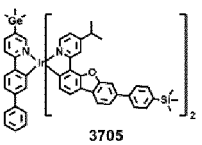

3700

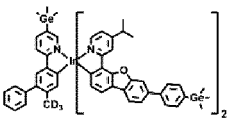

3701

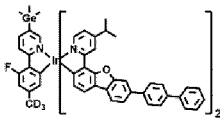

3702

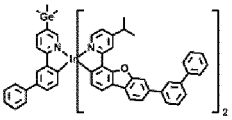

3703

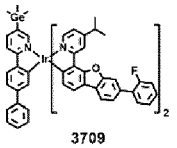

3704

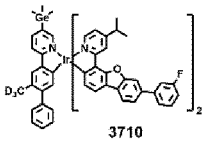

3705

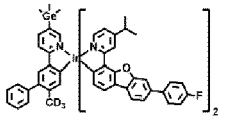

3706

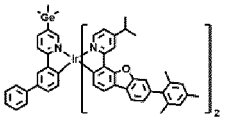

3707

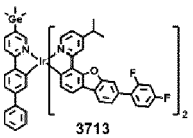

3708

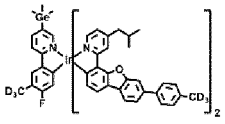

3709

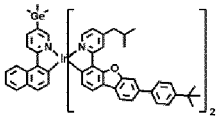

3710

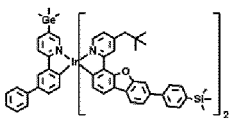

3711

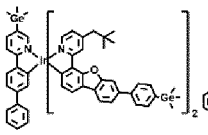

3712

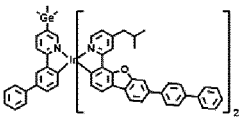

3713

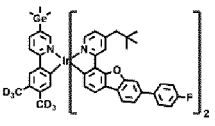

3714

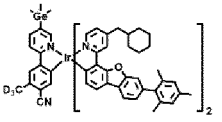

3715

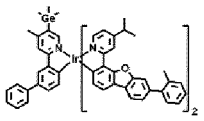

3716


3717

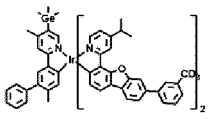

3718


3719

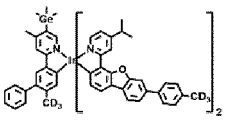

3720



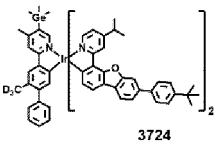
3721



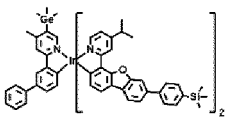
3722



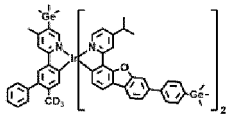
3723



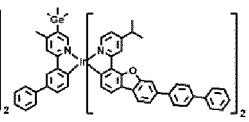
3724



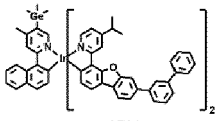
3725



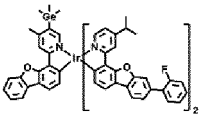
3726



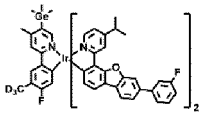
3727



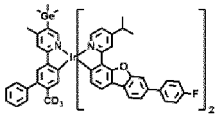
3728



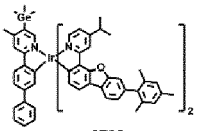
3729



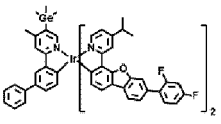
3730



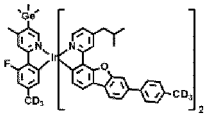
3731



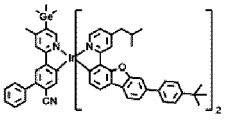
3732



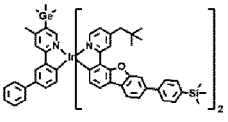
3733



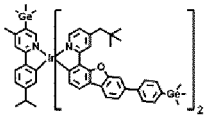
3734



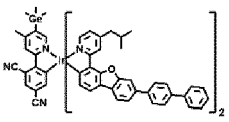
3735



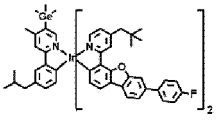
3736



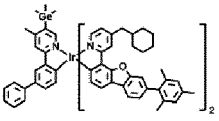
3737



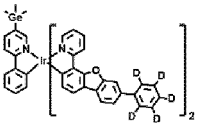
3738



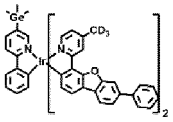
3739



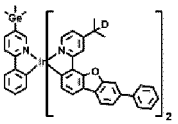
3740



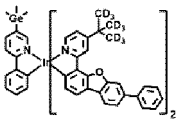
3741



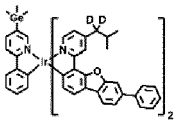
3742



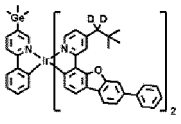
3743



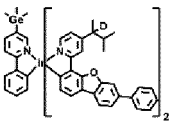
3744



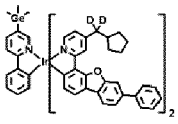
3745



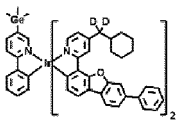
3746



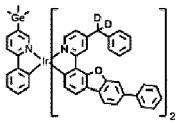
3747



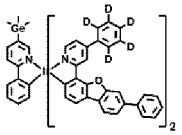
3748



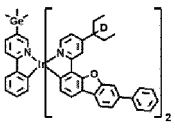
3749



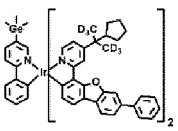
3750



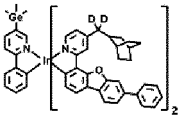
3751



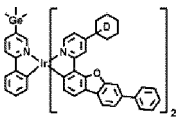
3752



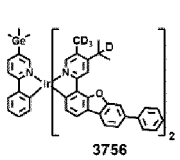
3753



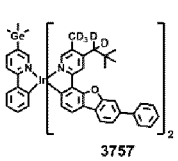
3754



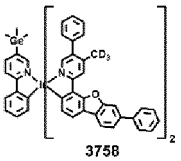
3755



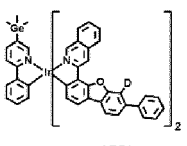
3756



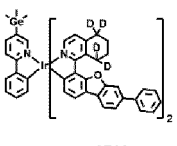
3757



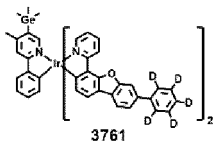
3758

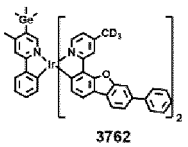


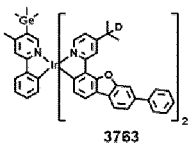
3759

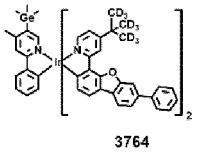


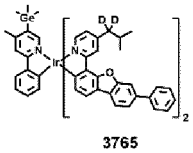
3760

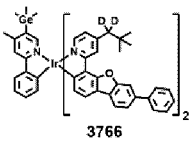

3761

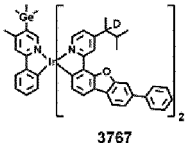

3762

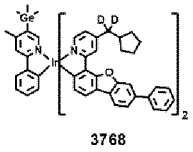

3763

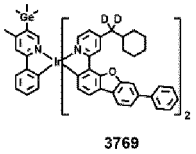

3764

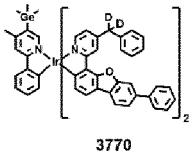

3765

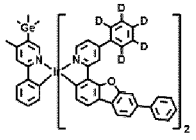

3766

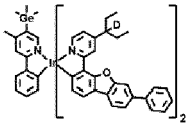

3767

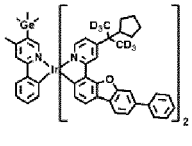

3768

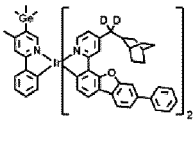

3769

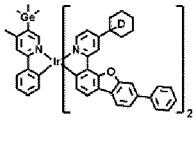

3770

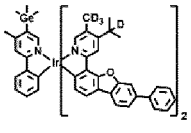

3771

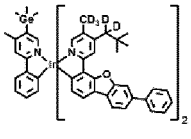

3772

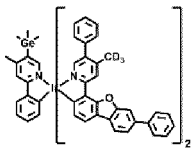

3773

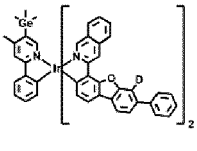

3774

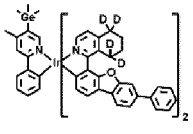

3775

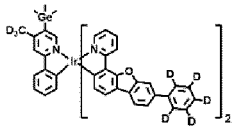

3776

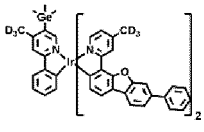

3777

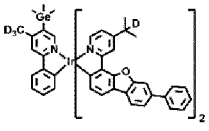

3778

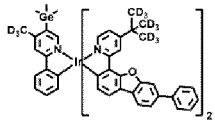

3779

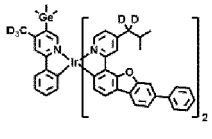

3780

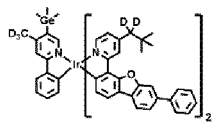

3781

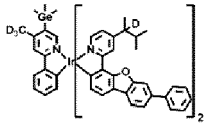

3782

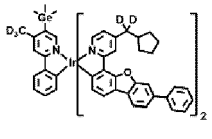

3783

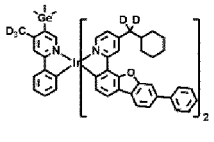

3784

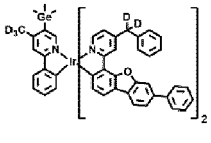

3785

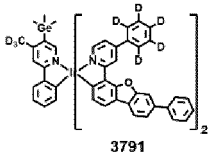

3786

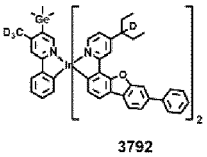

3787

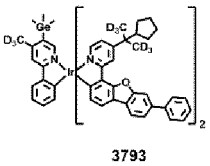

3788

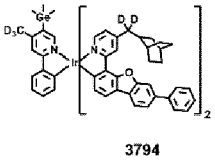

3789

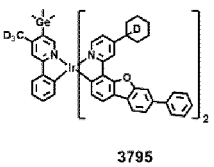

3790

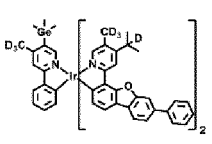

3791

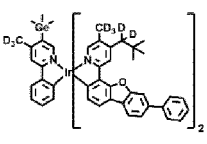

3792

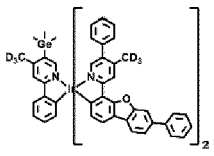

3793

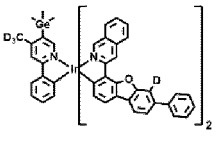

3794

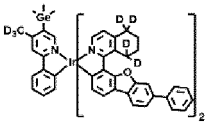

3795

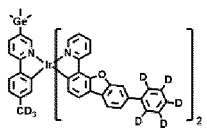

3796

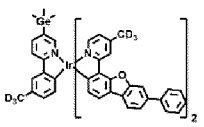

3797

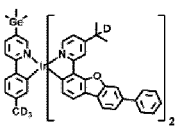

3798

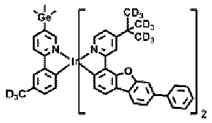

3799

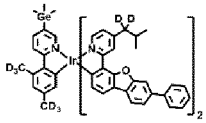

3800

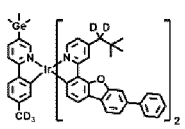

3801

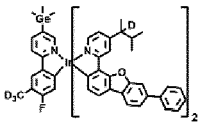

3802

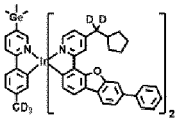

3803

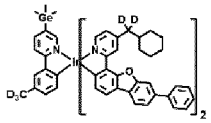

3804

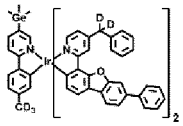

3805

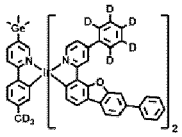

3806

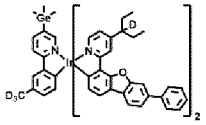

3807

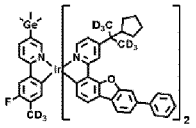

3808

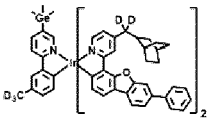

3809

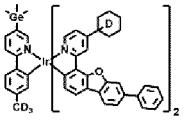

3810

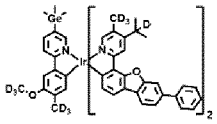

3811

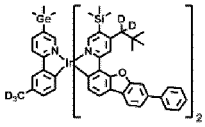

3812

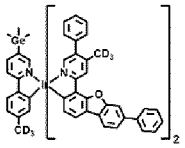

3813

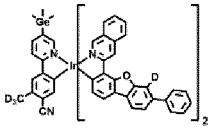

3814

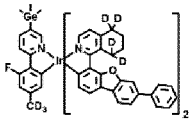

3815

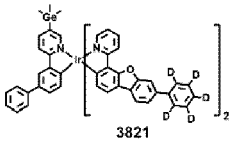

3816

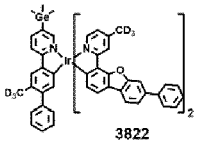

3817

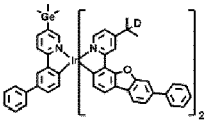

3818

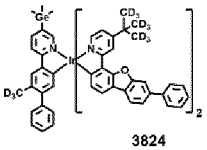

3819

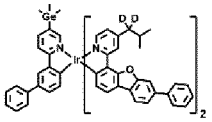

3820

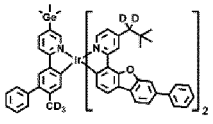

3821

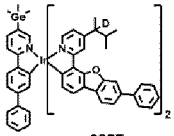

3822

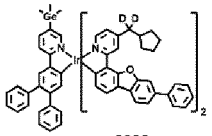

3823

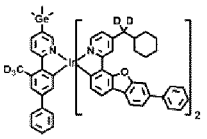

3824

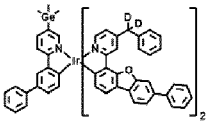

3825

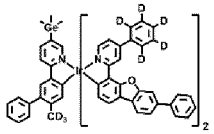

3826

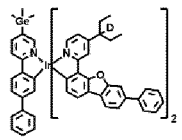

3827

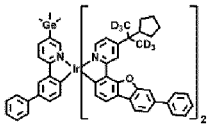

3828

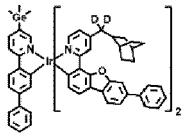

3829

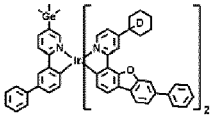

3830

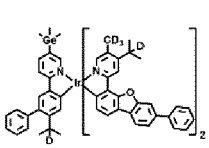

3831

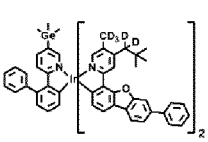

3832

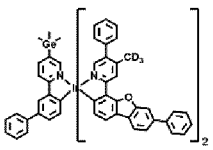

3833

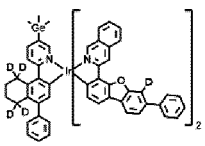

3834

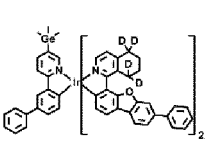

3835

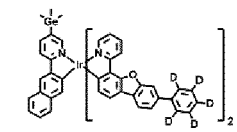

3836

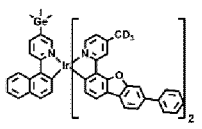

3837

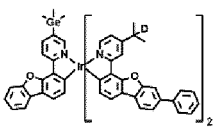

3838

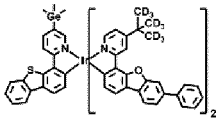

3839

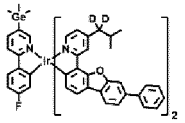

3840

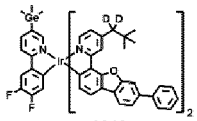

3841

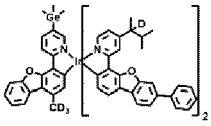

3842

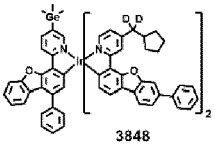

3843

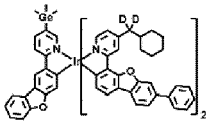

3844

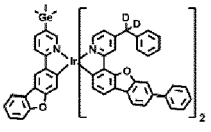

3845

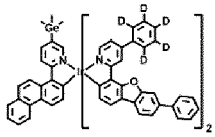

3846

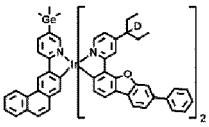

3847

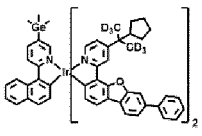

3848

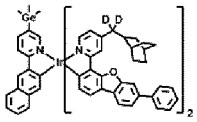

3849

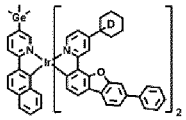

3850

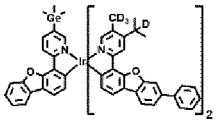

3851

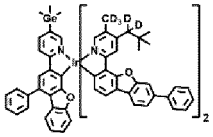

3852

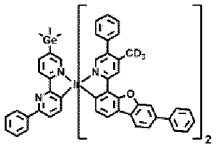

3853

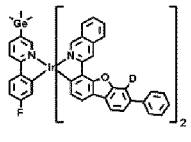

3854

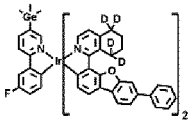

3855

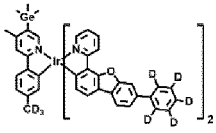

3856

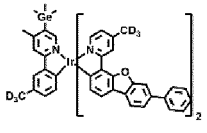

3857

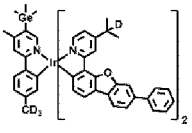

3858

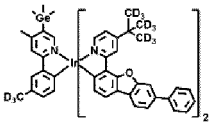

3859

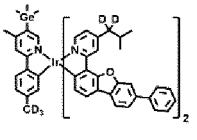

3860

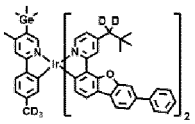

3861

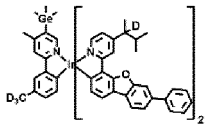

3862

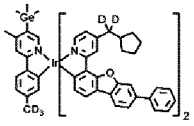

3863

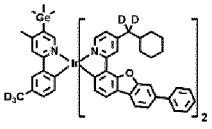

3864

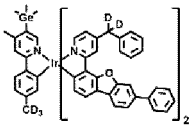

3865

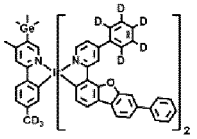

3866

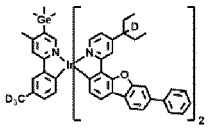

3867

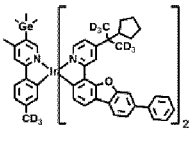

3868

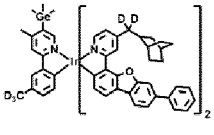

3869

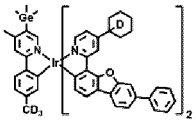

3870

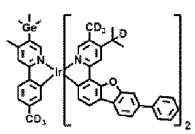

3871

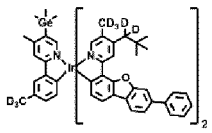

3872

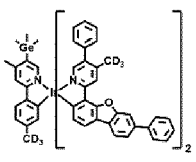

3873

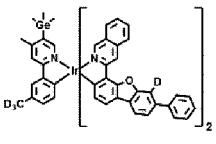

3874

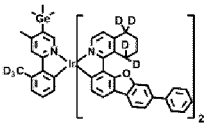

3875

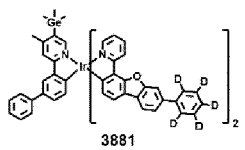

3876

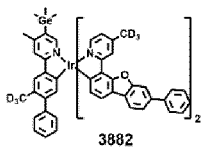

3877

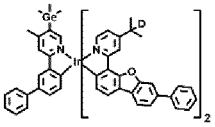

3878

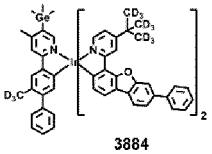

3879

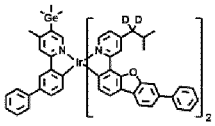

3880

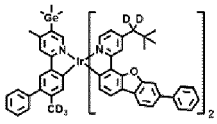

3881

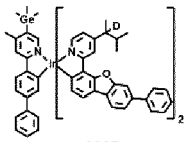

3882

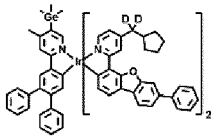

3883

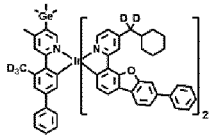

3884

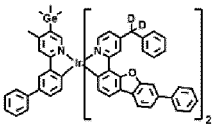

3885

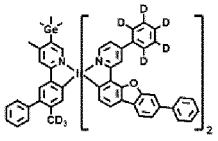

3886

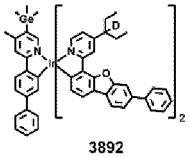

3887

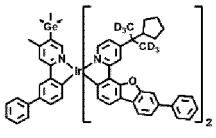

3888

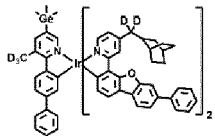

3889

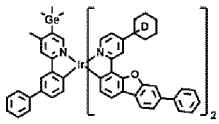

3890

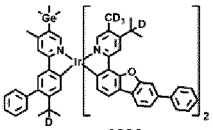

3891

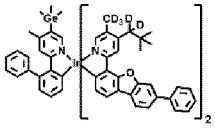

3892

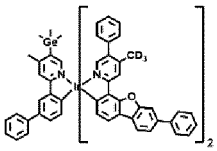

3893

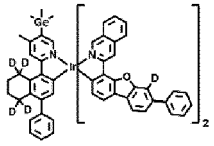

3894

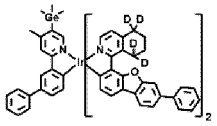

3895

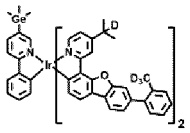

3896

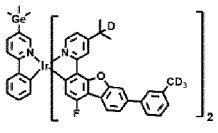

3897

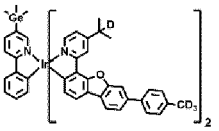

3898

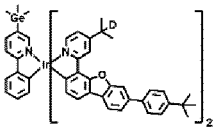

3899

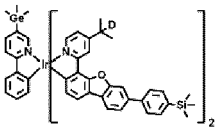

3900

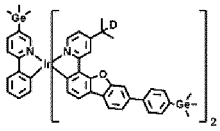

3901

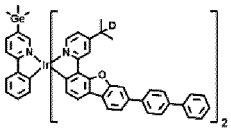

3902

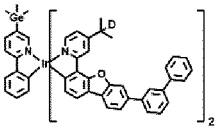

3903

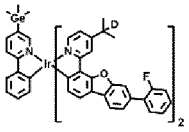

3904

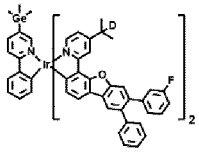

3905

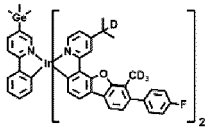

3906

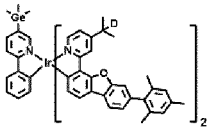

3907

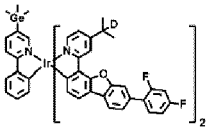

3908

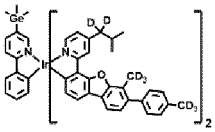

3909

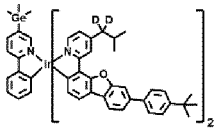

3910

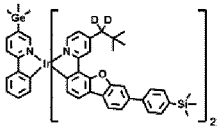

3911

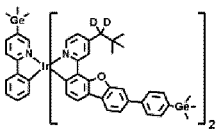

3912

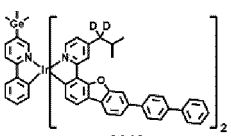

3913

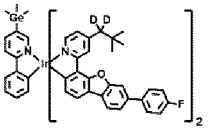

3914

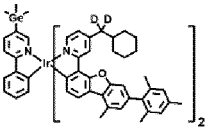

3915

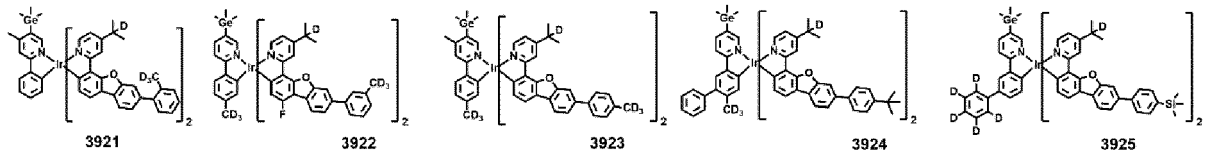

3916


3917

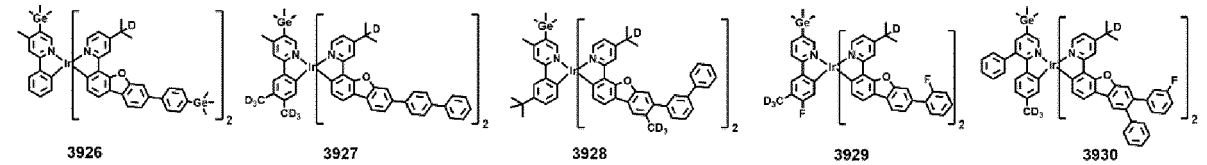

3918


3919

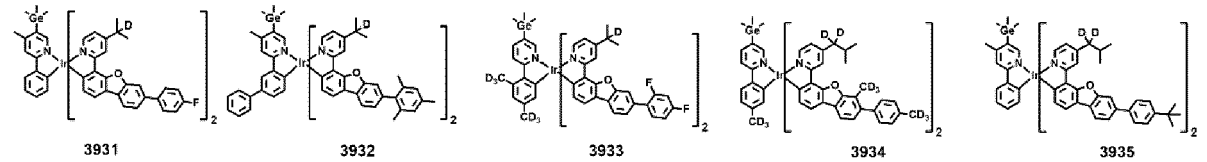

3920



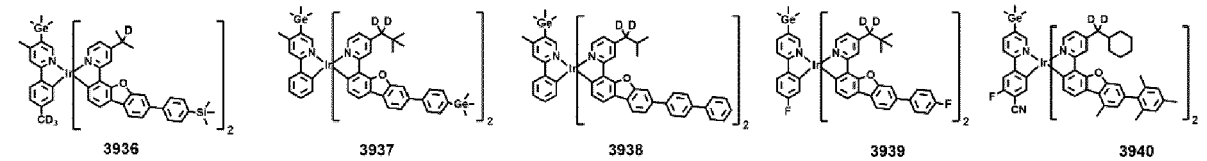
3921 3922 3923 3924 3925



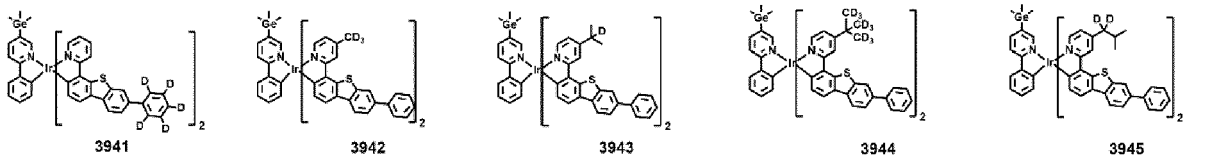
3926 3927 3928 3929 3930



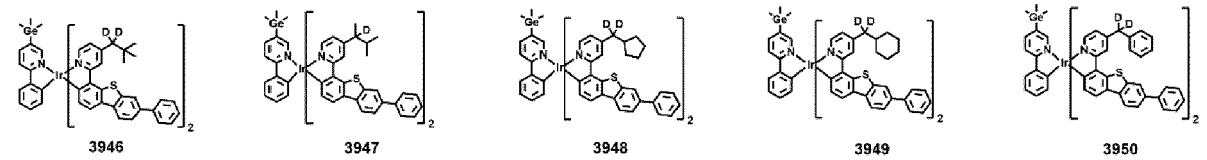
3931 3932 3933 3934 3935



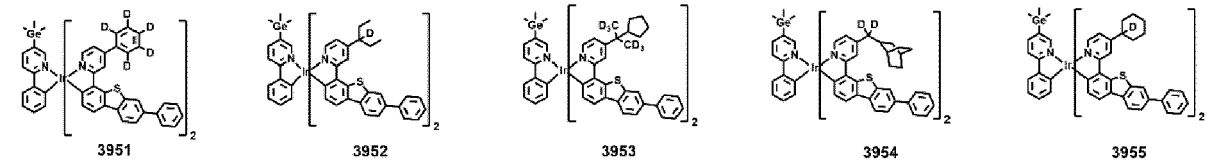
3936 3937 3938 3939 3940



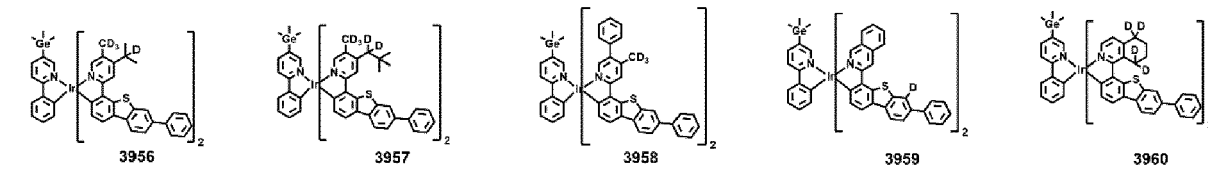
3941 3942 3943 3944 3945



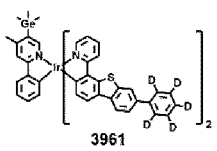
3946 3947 3948 3949 3950

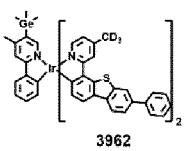


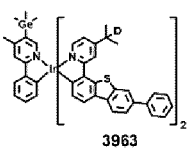
3951 3952 3953 3954 3955

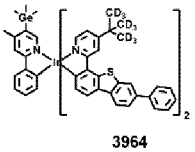


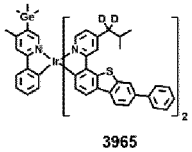
3956 3957 3958 3959 3960

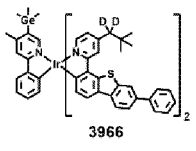

3961

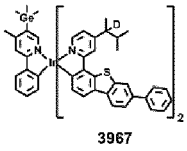

3962

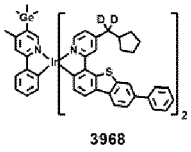

3963

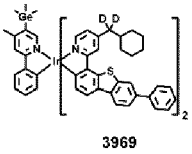

3964

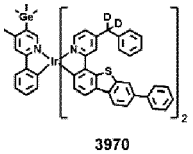

3965

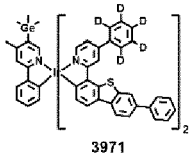

3966

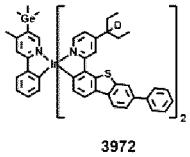

3967

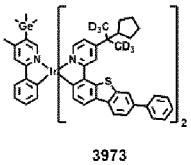

3968

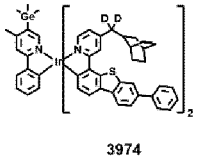

3969

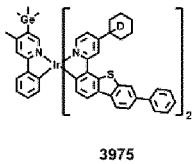

3970

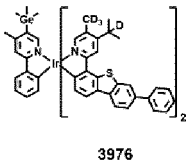

3971

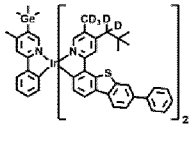

3972

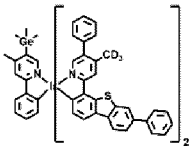

3973

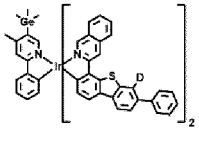

3974

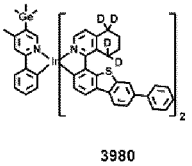

3975

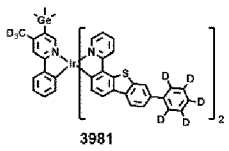

3976

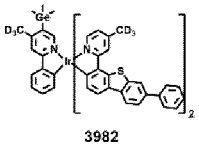

3977

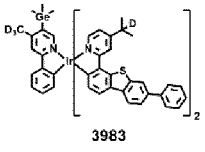

3978

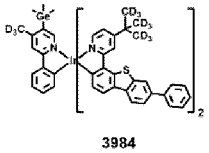

3979

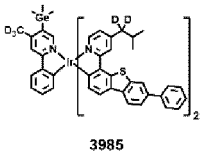

3980

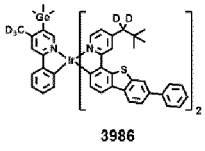

3981

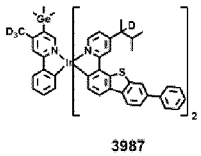

3982

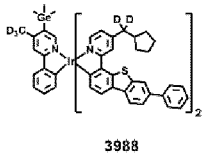

3983

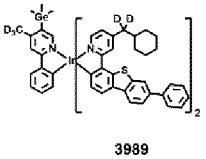

3984

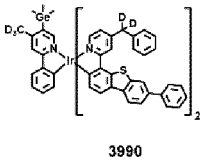

3985

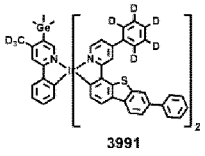

3986

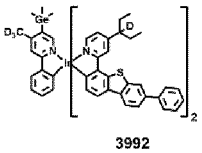

3987

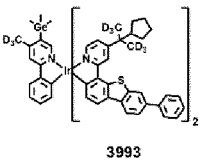

3988

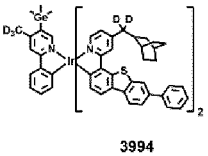

3989

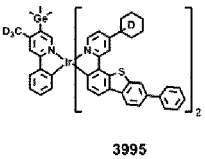

3990

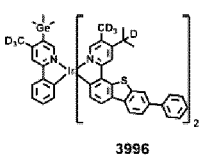

3991

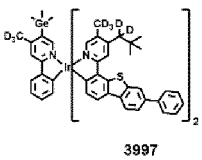

3992

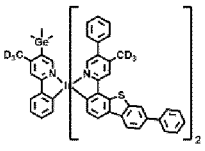

3993

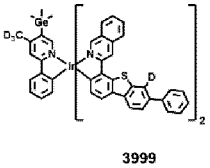

3994

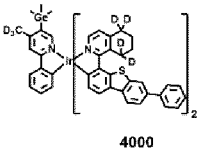

3995

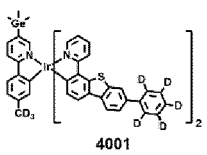

3996

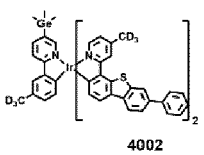

3997

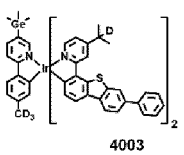

3998

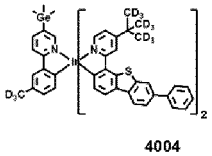

3999

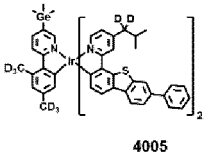

4000

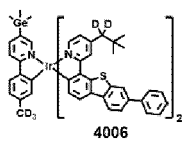

4001

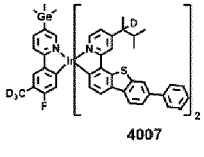

4002

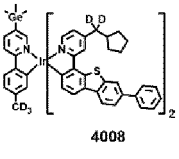

4003

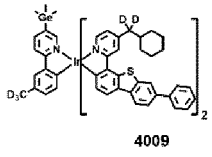

4004

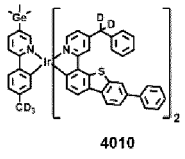

4005

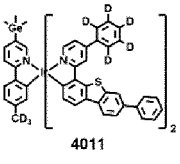

4006

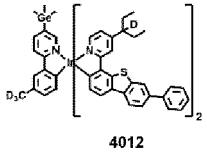

4007

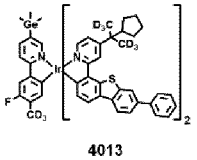

4008

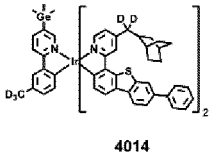

4009

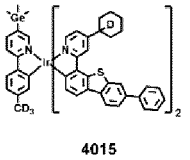

4010

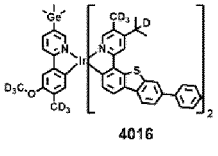

4011

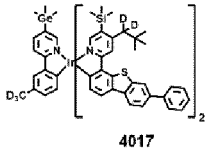

4012

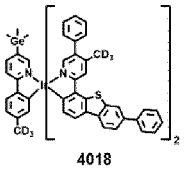

4013

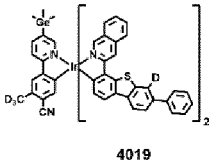

4014

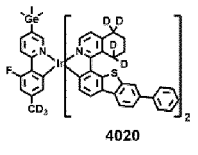

4015

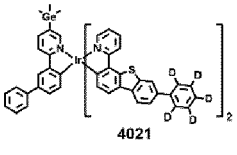

4016

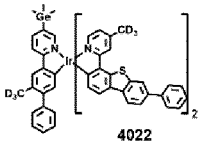

4017

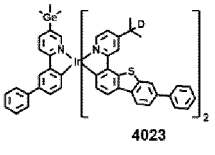

4018

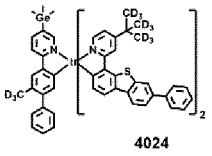

4019

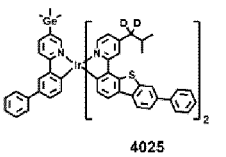

4020

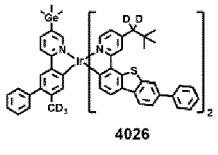

4021

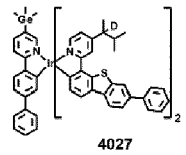

4022

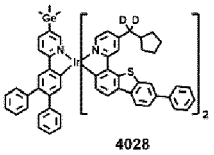

4023

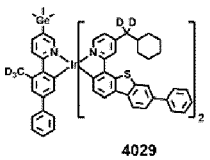

4024

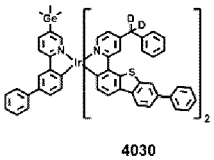

4025

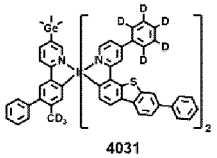

4026

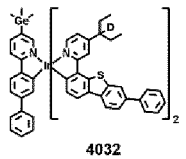

4027

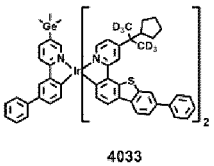

4028

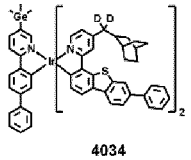

4029

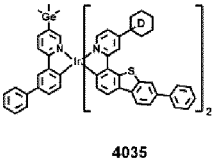

4030

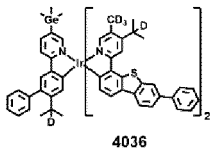

4031

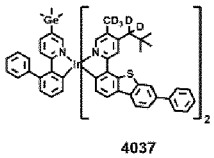

4032

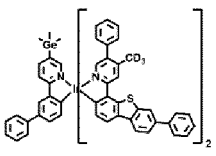

4033

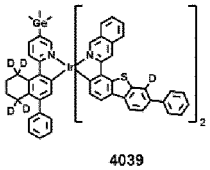

4034

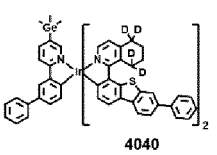

4035

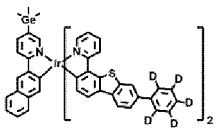

4036

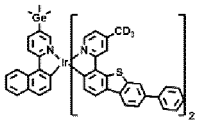

4037

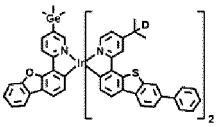

4038

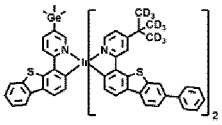

4039

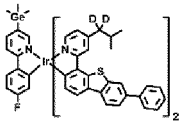

4040

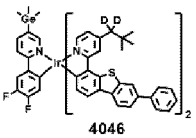

4041

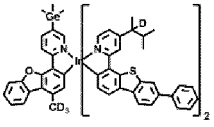

4042

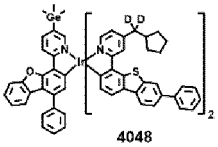

4043

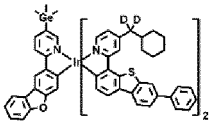

4044

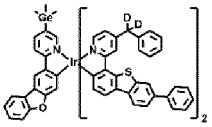

4045

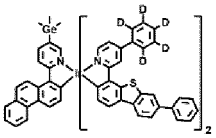

4046

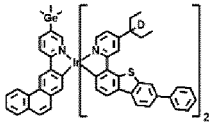

4047

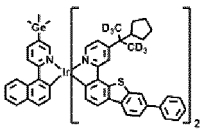

4048

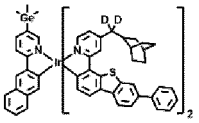

4049

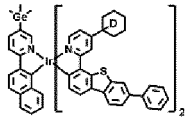

4050

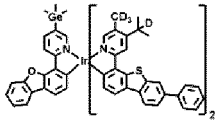

4051

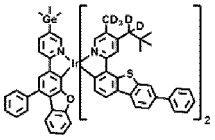

4052

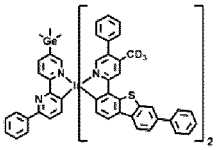

4053

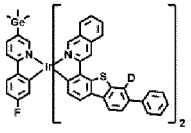

4054

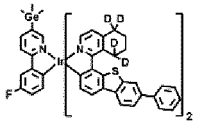

4055

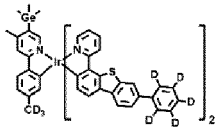

4056

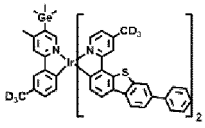

4057

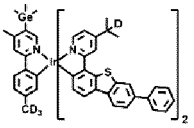

4058

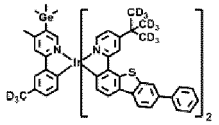

4059

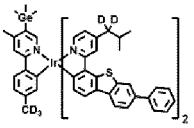

4060

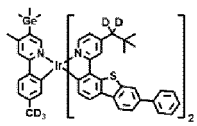

4061

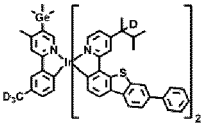

4062

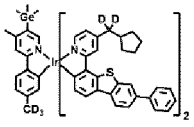

4063

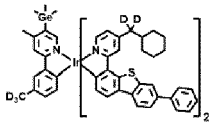

4064

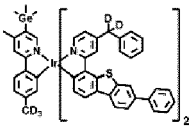

4065

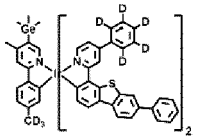

4066

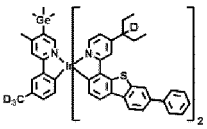

4067

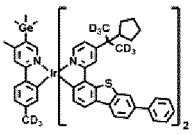

4068

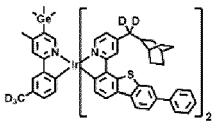

4069

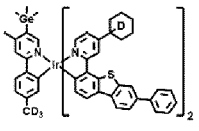

4070

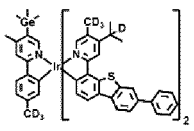

4071

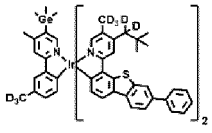

4072

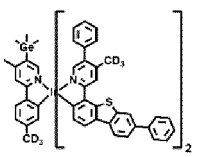

4073

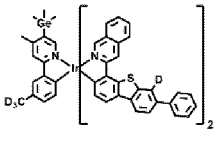

4074

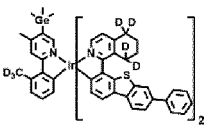

4075

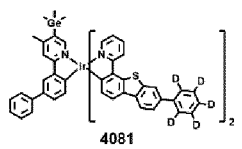

4076

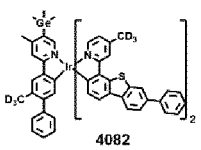

4077

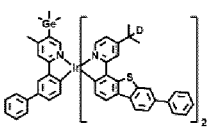

4078

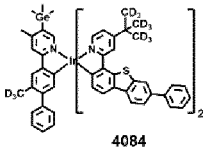

4079

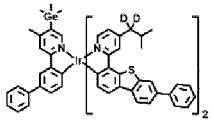

4080

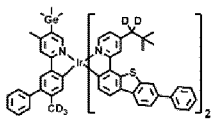

4081

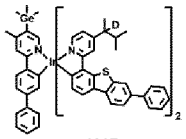

4082

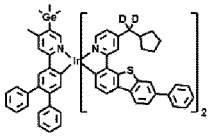

4083

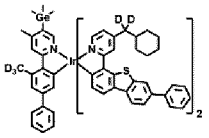

4084

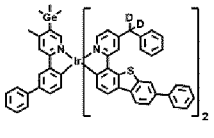

4085

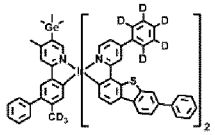

4086

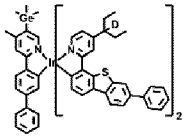

4087

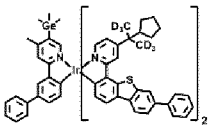

4088

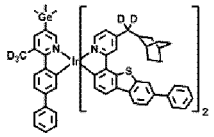

4089

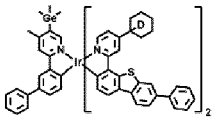

4090

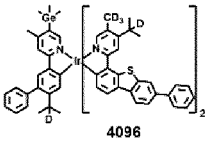

4091

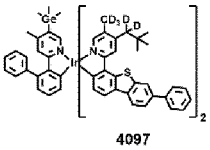

4092

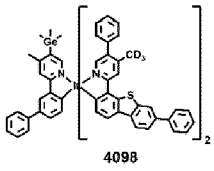

4093

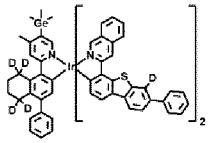

4094

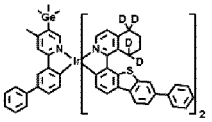

4095

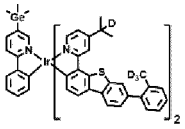

4096

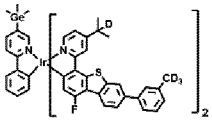

4097

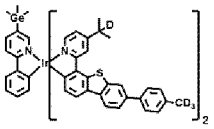

4098

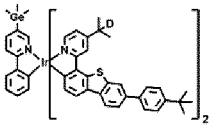

4099

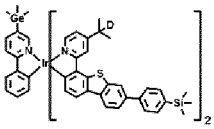

4100

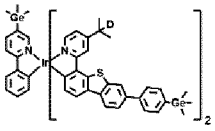

4101

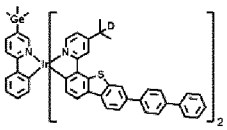

4102

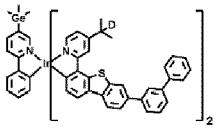

4103

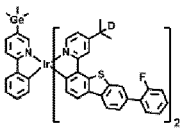

4104

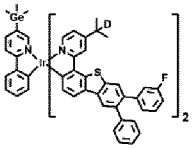

4105

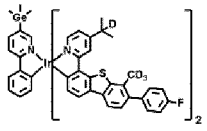

4106

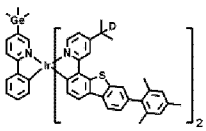

4107

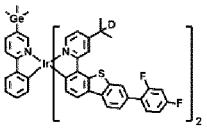

4108

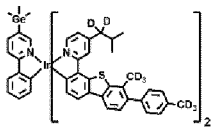

4109

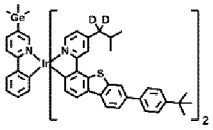

4110

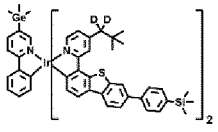

4111

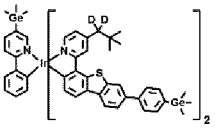

4112

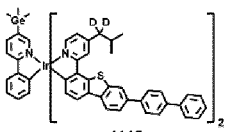

4113

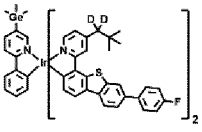

4114

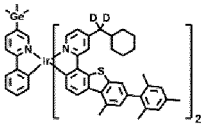

4115

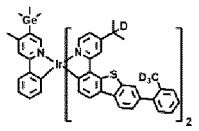

4116


4117

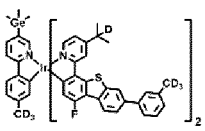

4118


4119

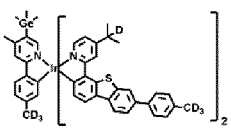

4120



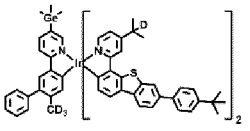
4121



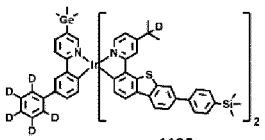
4122



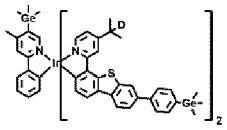
4123



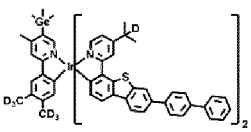
4124



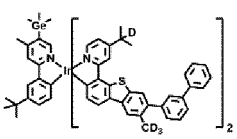
4125



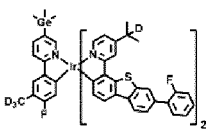
4126



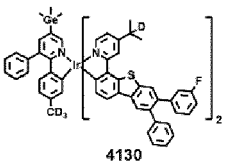
4127



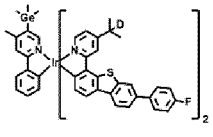
4128



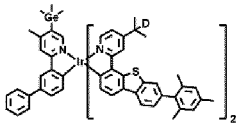
4129



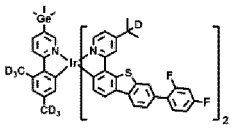
4130



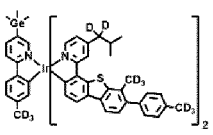
4131



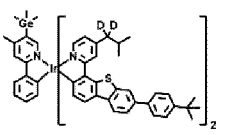
4132



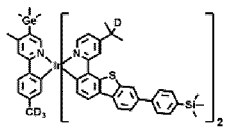
4133



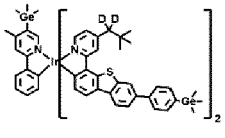
4134



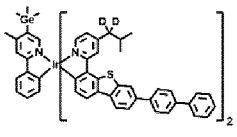
4135



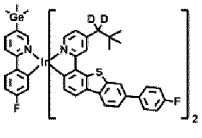
4136



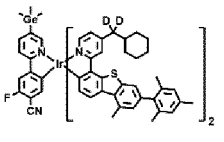
4137



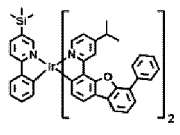
4138



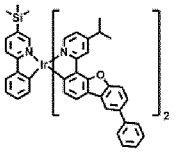
4139



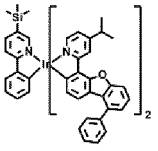
4140



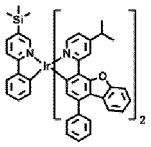
4141



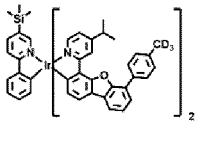
4142



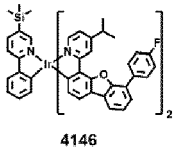
4143



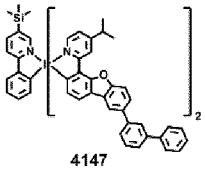
4144



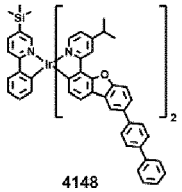
4145



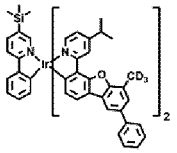
4146



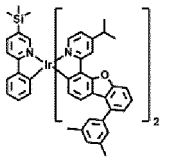
4147



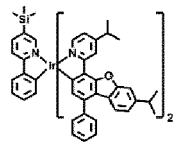
4148



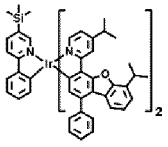
4149



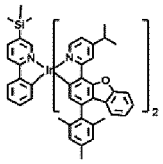
4150



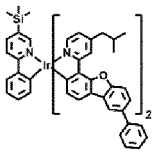
4151



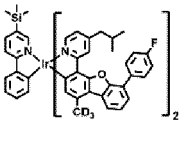
4152



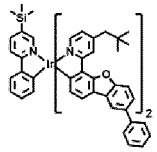
4153



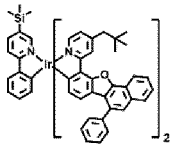
4154



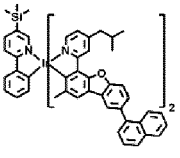
4155



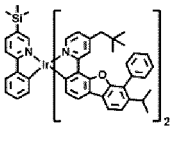
4156



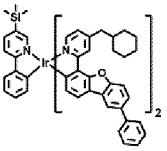
4157



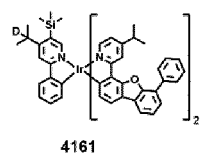
4158

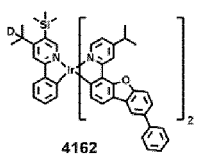


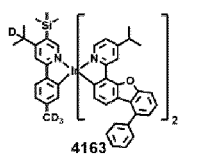
4159

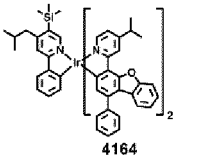


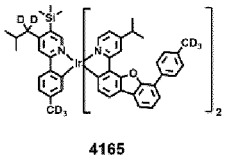
4160

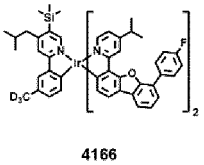

4161

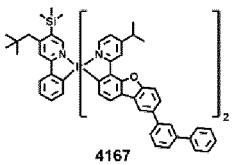

4162

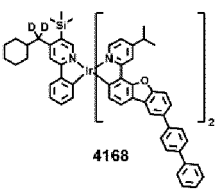

4163

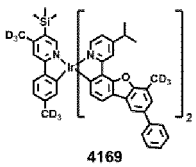

4164

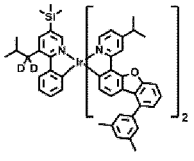

4165

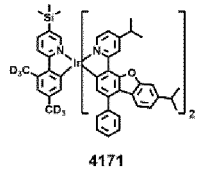

4166

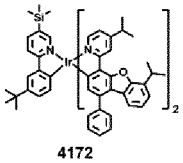

4167

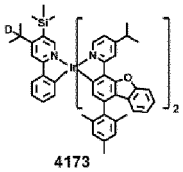

4168

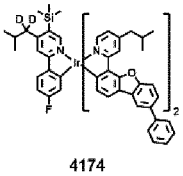

4169

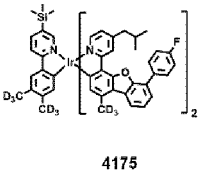

4170

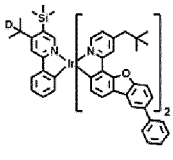

4171

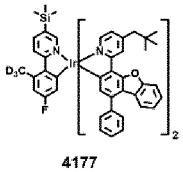

4172

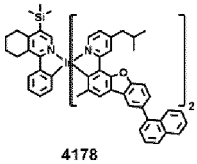

4173

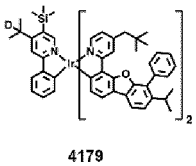

4174

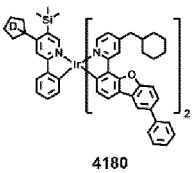

4175

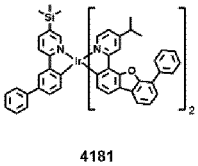

4176

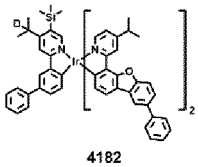

4177

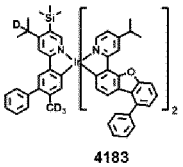

4178

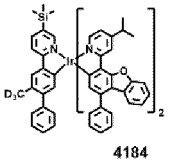

4179

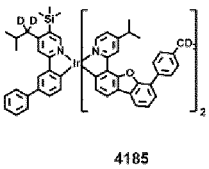

4180

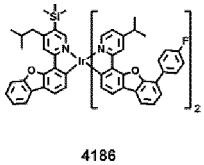

4181

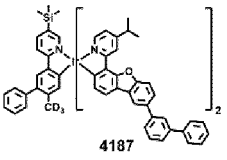

4182

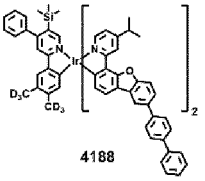

4183

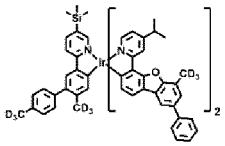

4184

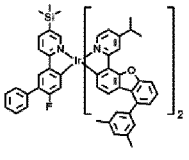

4185

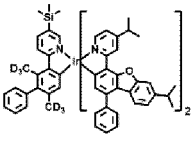

4186

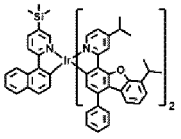

4187

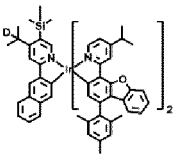

4188

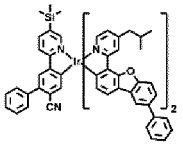

4189

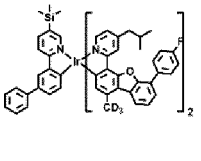

4190

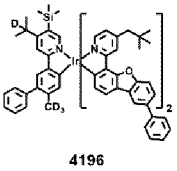

4191

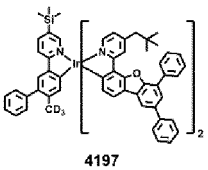

4192

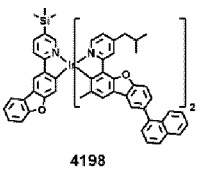

4193

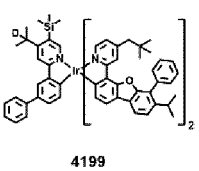

4194

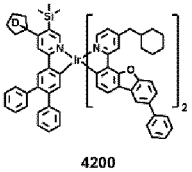

4195

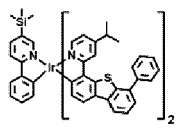

4196

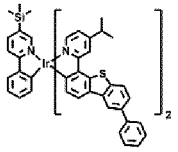

4197

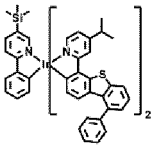

4198

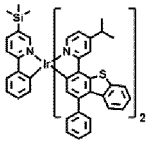

4199

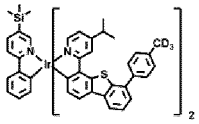

4200

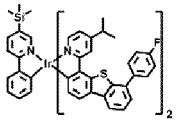

4201

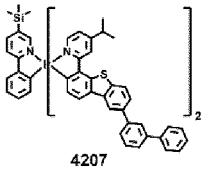

4202

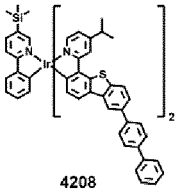

4203

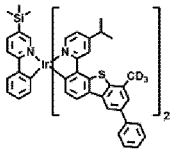

4204

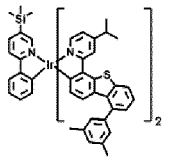

4205

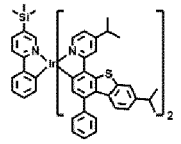

4206

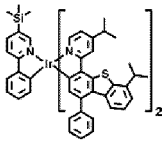

4207

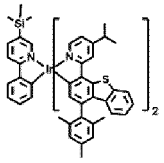

4208

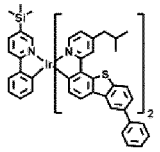

4209

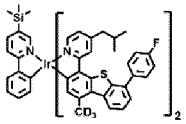

4210

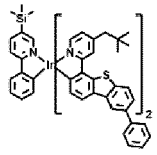

4211

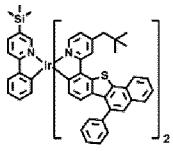

4212

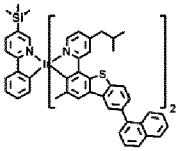

4213

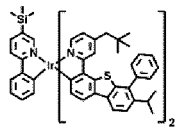

4214

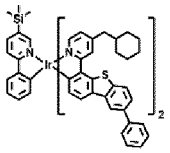

4215

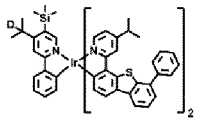

4216

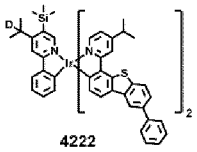

4217

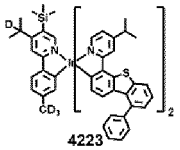

4218

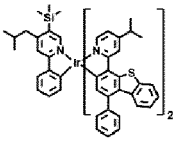

4219

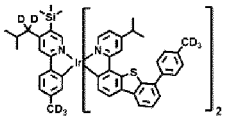

4220

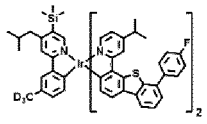

4221

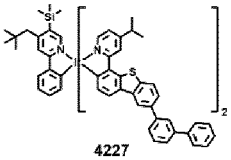

4222

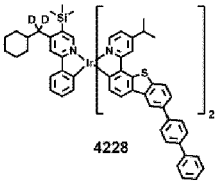

4223

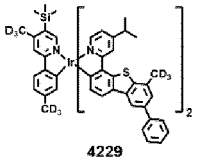

4224

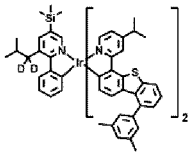

4225

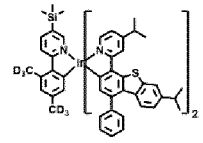

4226

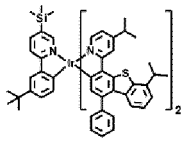

4227

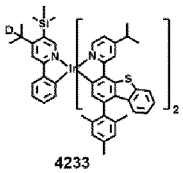

4228

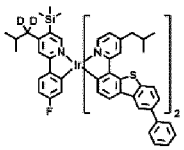

4229

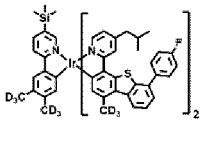

4230

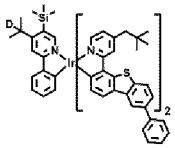

4231

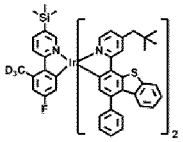

4232

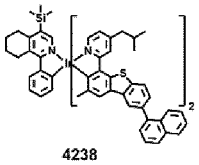

4233

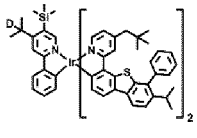

4234

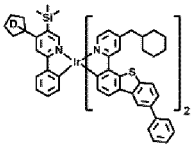

4235

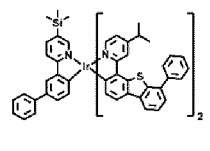

4236


4237

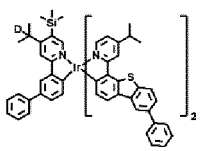

4238


4239

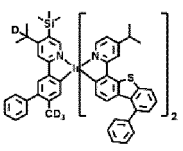

4240



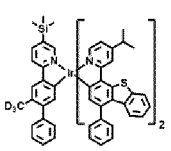
4241



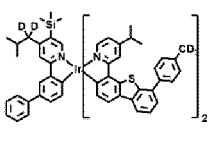
4242



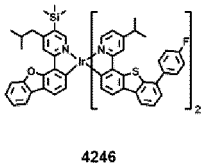
4243



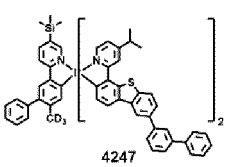
4244



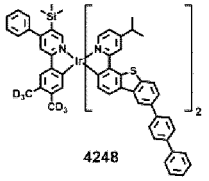
4245



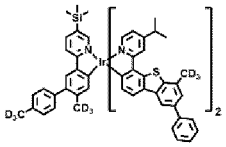
4246



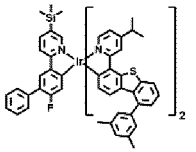
4247



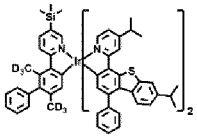
4248



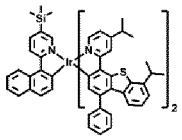
4249



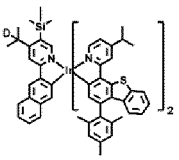
4250



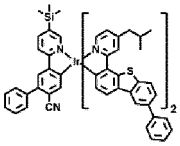
4251



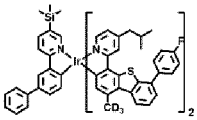
4252



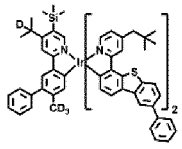
4253



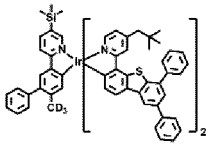
4254



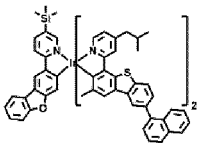
4255



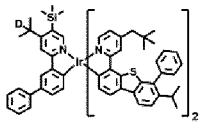
4256



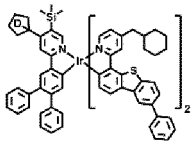
4257



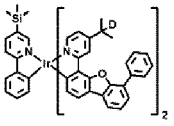
4258



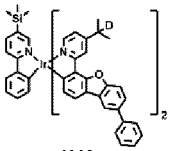
4259



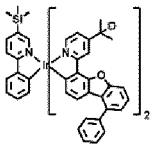
4260



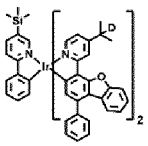
4261



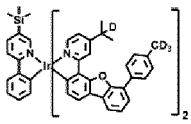
4262



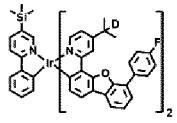
4263



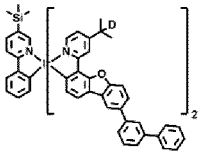
4264



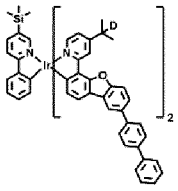
4265



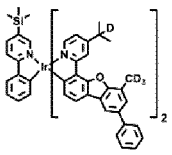
4266



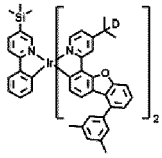
4267



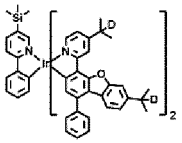
4268



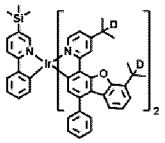
4269



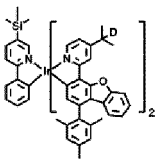
4270



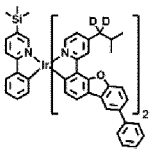
4271



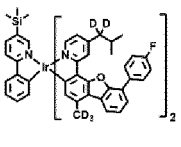
4272



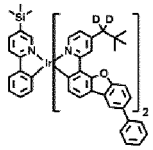
4273



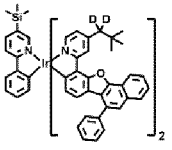
4274



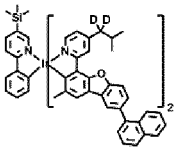
4275



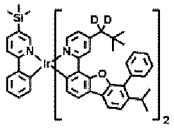
4276



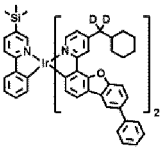
4277



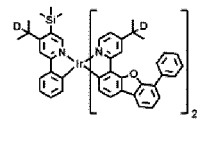
4278

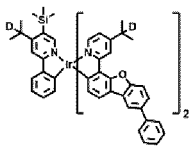


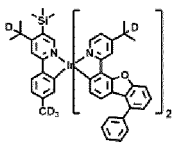
4279

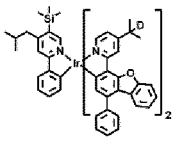


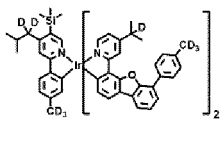
4280

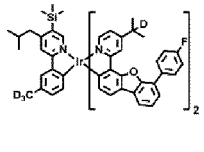

4281

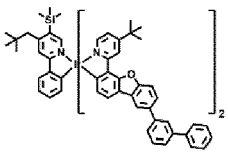

4282

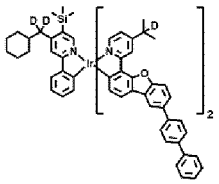

4283

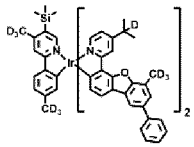

4284

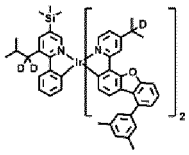

4285

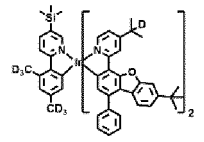

4286

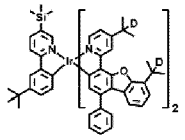

4287

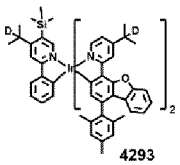

4288

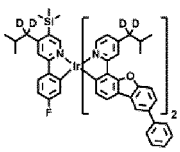

4289

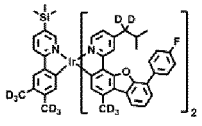

4290

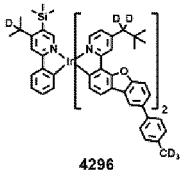

4291

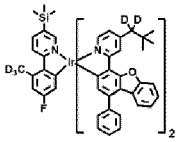

4292

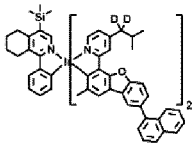

4293

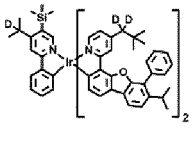

4294

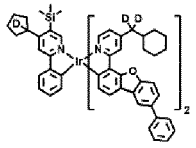

4295

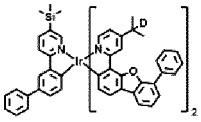

4296

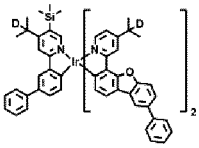

4297

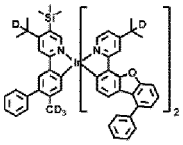

4298

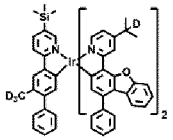

4299

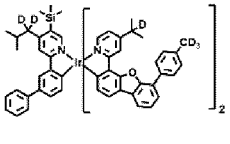

4300

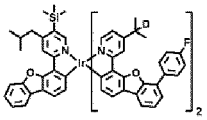

4301

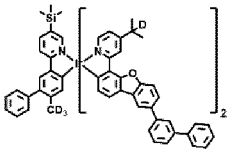

4302

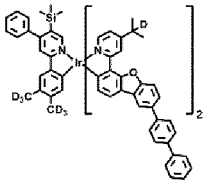

4303

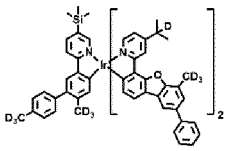

4304

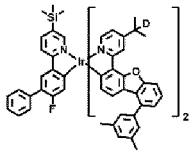

4305

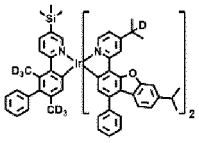

4306

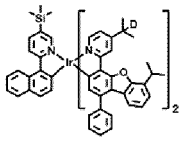

4307

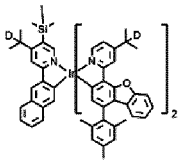

4308

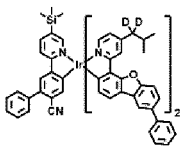

4309

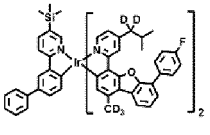

4310

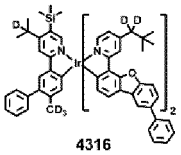

4311

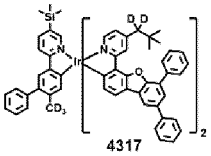

4312

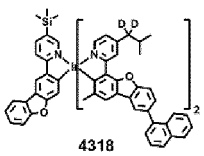

4313

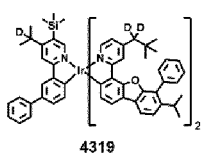

4314

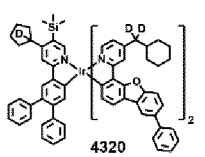

4315

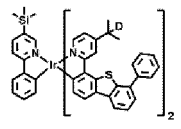

4316

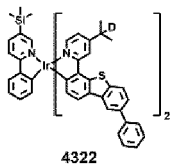

4317

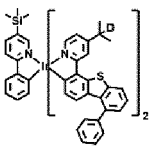

4318

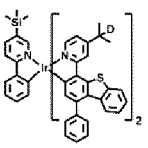

4319

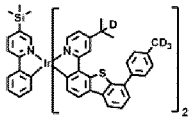

4320

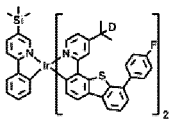

4321

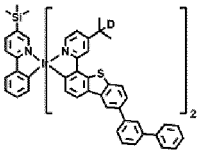

4322

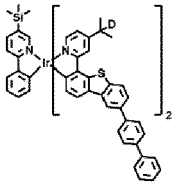

4323

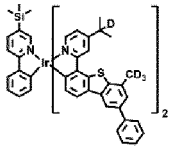

4324

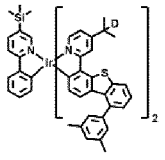

4325

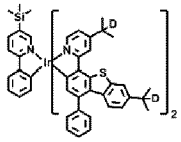

4326

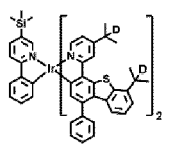

4327

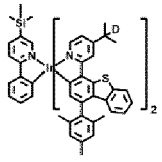

4328

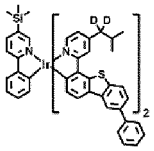

4329

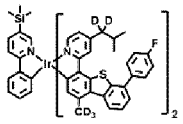

4330

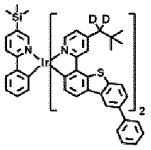

4331

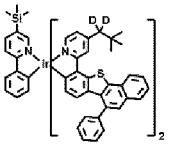

4332

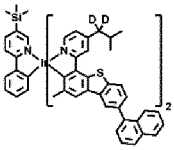

4333

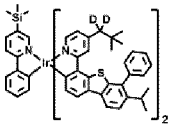

4334

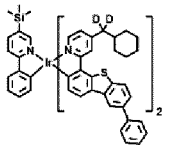

4335

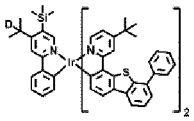

4336

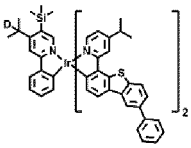

4337

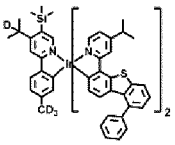

4338

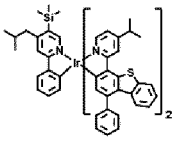

4339

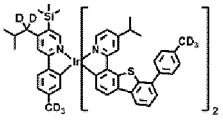

4340

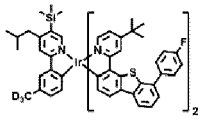

4341

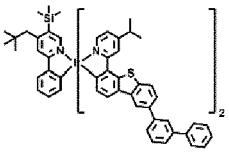

4342

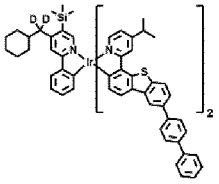

4343

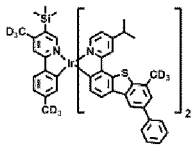

4344

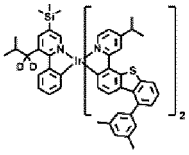

4345

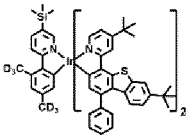

4346

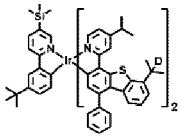

4347

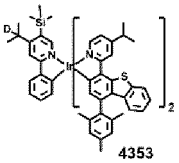

4348

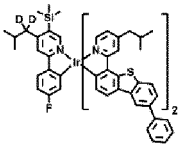

4349

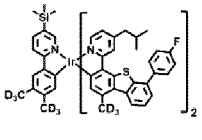

4350

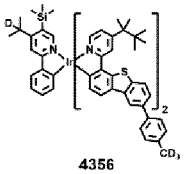

4351

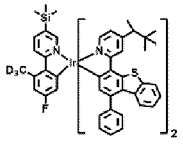

4352

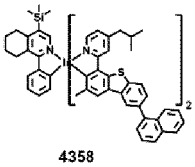

4353

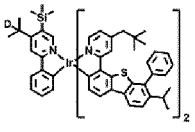

4354

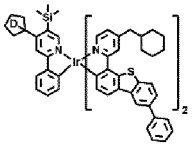

4355

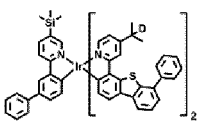

4356

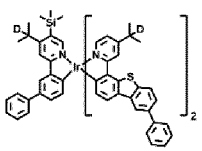

4357

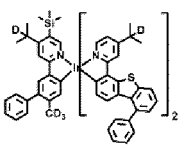

4358

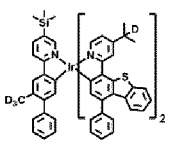

4359

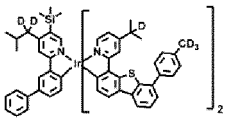

4360

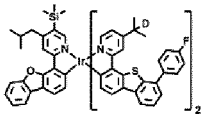

4361

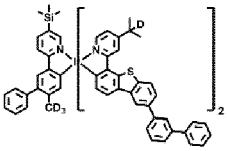

4362

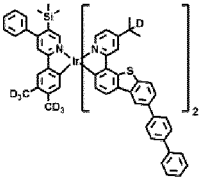

4363

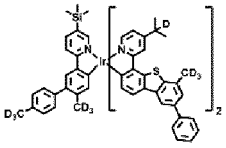

4364

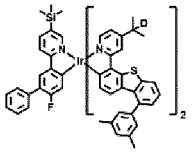

4365

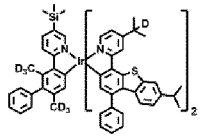

4366

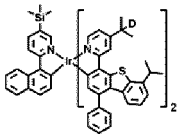

4367

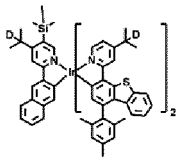

4368

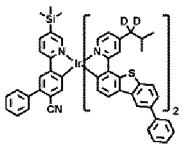

4369

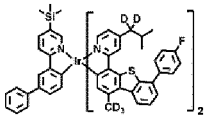

4370

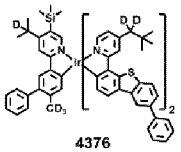

4371

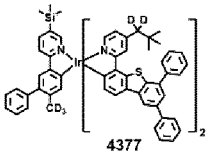

4372

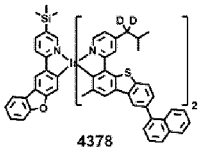

4373

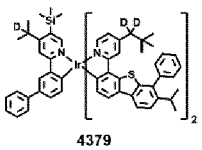

4374

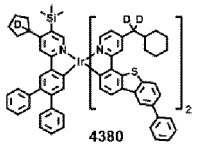

4375

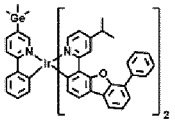

4376

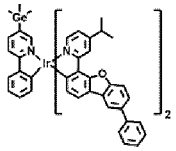

4377

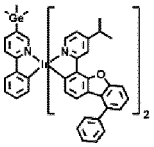

4378

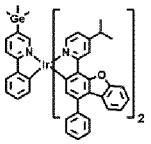

4379

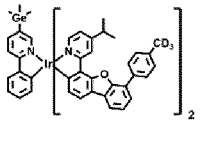

4380

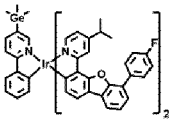

4381

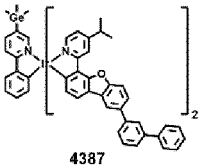

4382

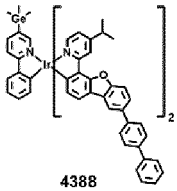

4383

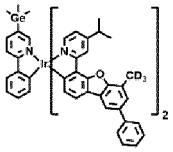

4384

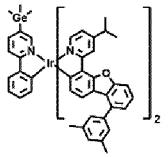

4385

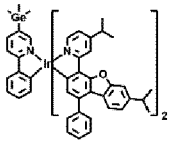

4386

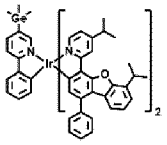

4387

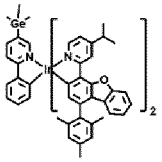

4388

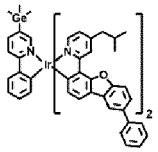

4389

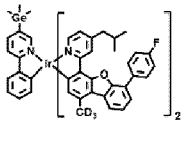

4390

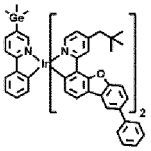

4391

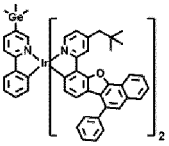

4392

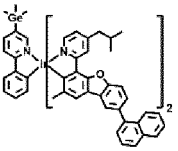

4393

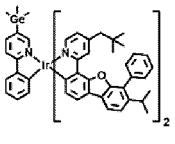

4394

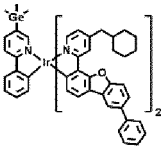

4395

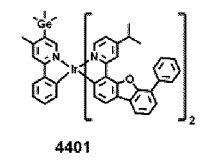

4396

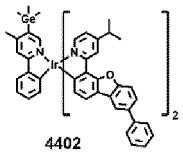

4397

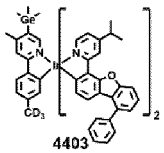

4398

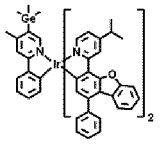

4399

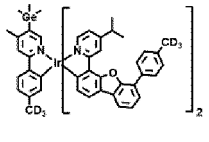

4400

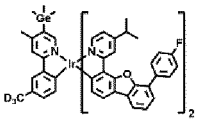

4401

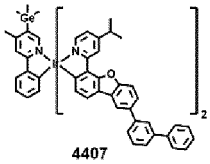

4402

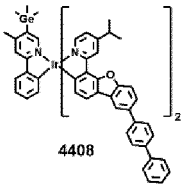

4403

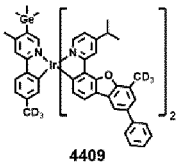

4404

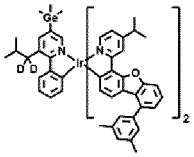

4405

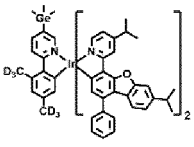

4406

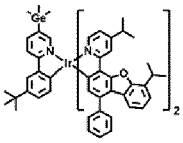

4407

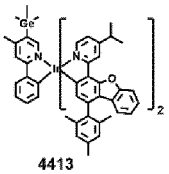

4408

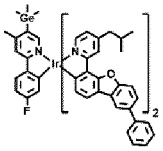

4409

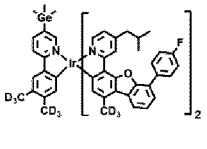

4410

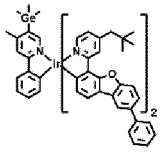

4411

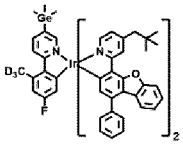

4412

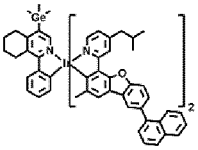

4413

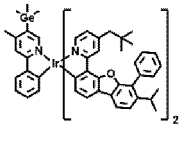

4414

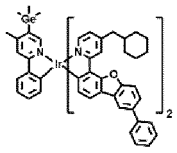

4415

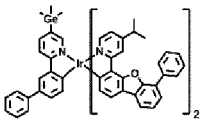

4416

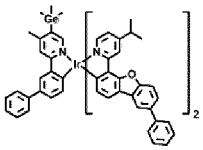

4417

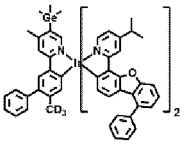

4418

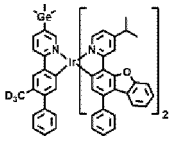

4419

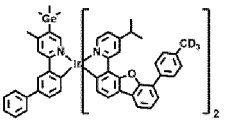

4420

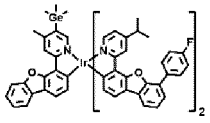

4421

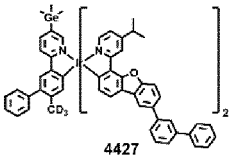

4422

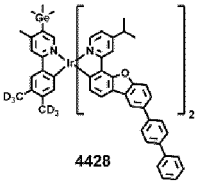

4423

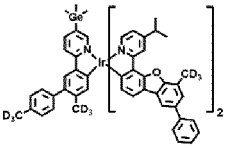

4424

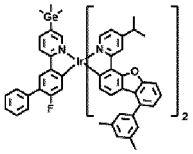

4425

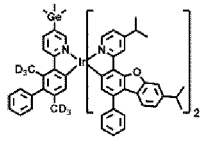

4426

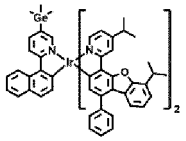

4427

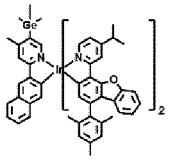

4428

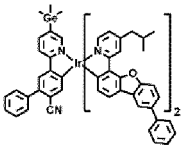

4429

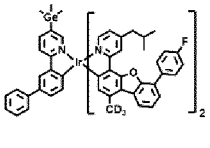

4430

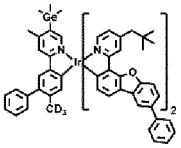

4431

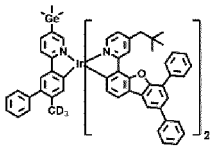

4432

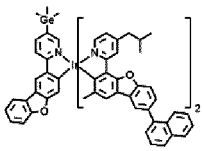

4433

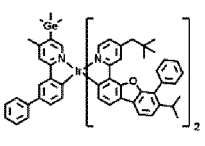

4434

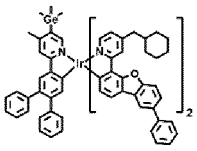

4435

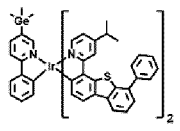

4436

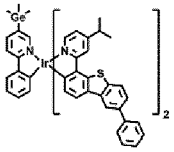

4437

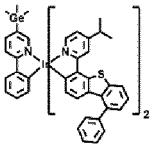

4438

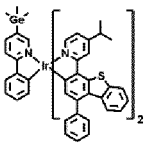

4439

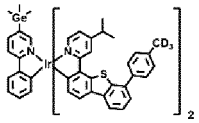

4440

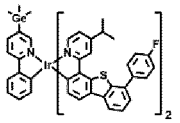

4441

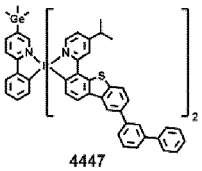

4442

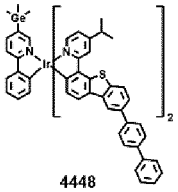

4443

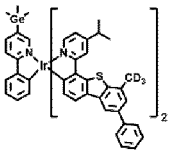

4444

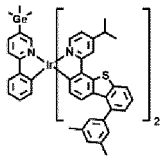

4445

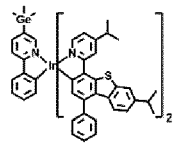

4446

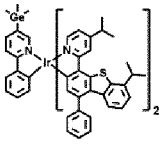

4447

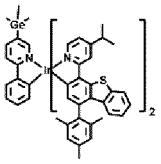

4448

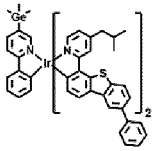

4449

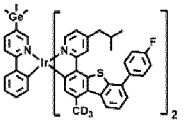

4450

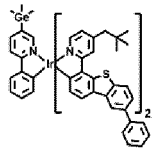

4451

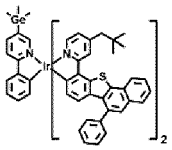

4452

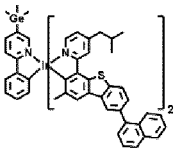

4453

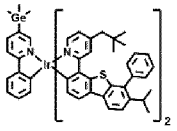

4454

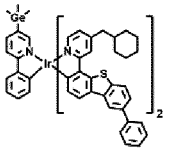

4455

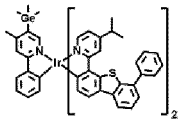

4456

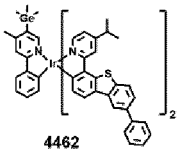

4457

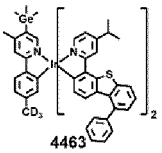

4458

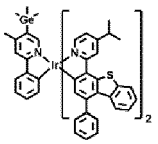

4459

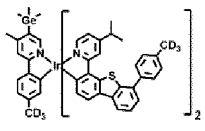

4460

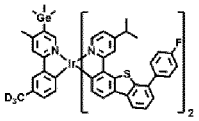

4461

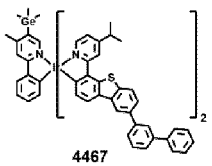

4462

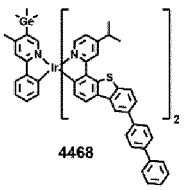

4463

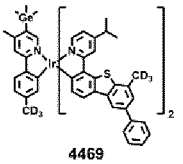

4464

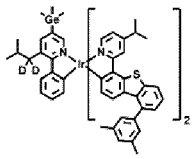

4465

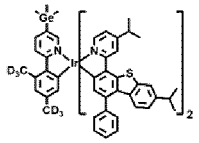

4466

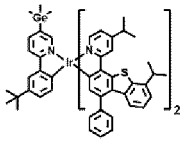

4467

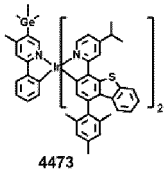

4468

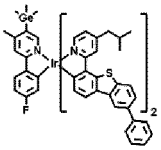

4469

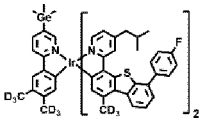

4470

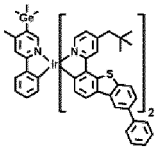

4471

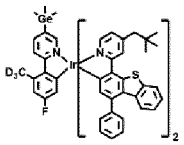

4472

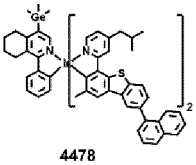

4473

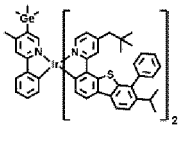

4474

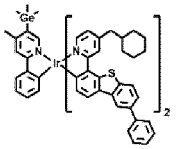

4475

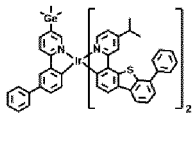

4476

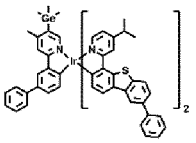

4477

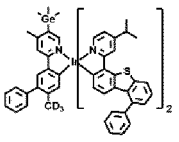

4478

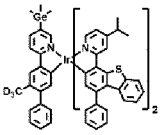

4479

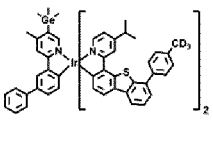

4480

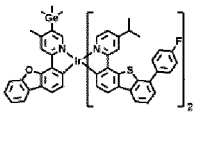

4481

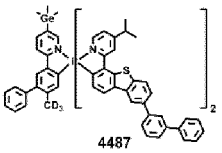

4482

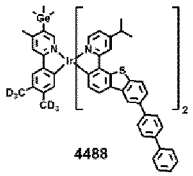

4483

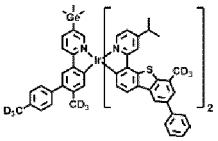

4484

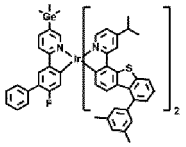

4485

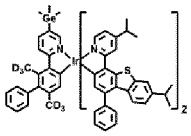

4486

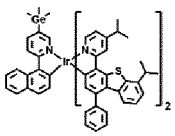

4487

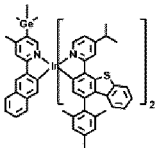

4488

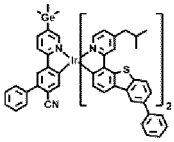

4489

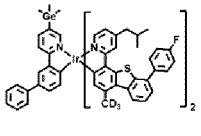

4490

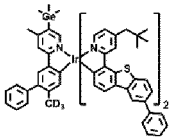

4491

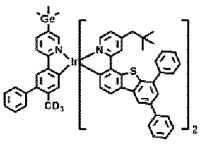

4492

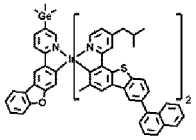

4493

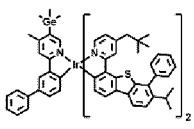

4494

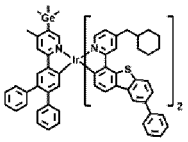

4495

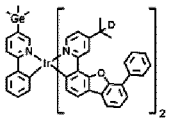

4496

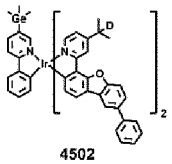

4497

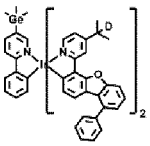

4498

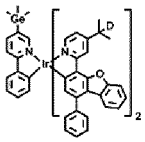

4499

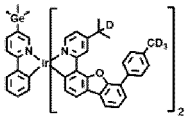

4500

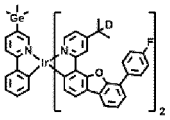

4501

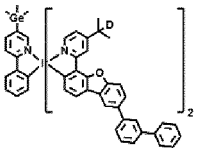

4502

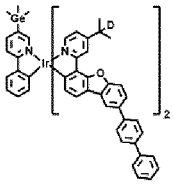

4503

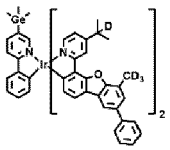

4504

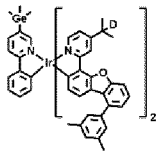

4505

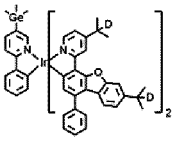

4506

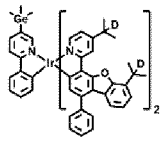

4507

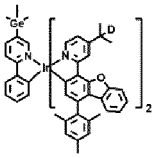

4508

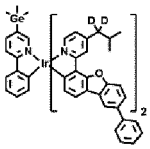

4509

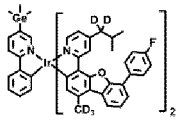

4510

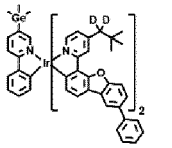

4511

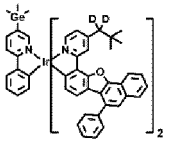

4512

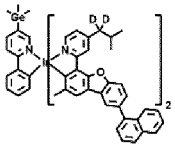

4513

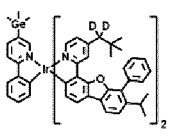

4514

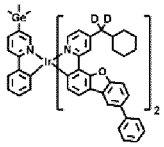

4515

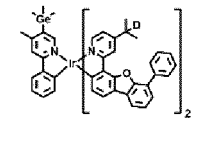

4516

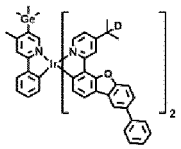

4517

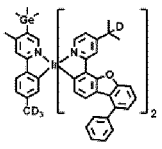

4518

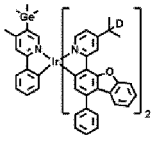

4519

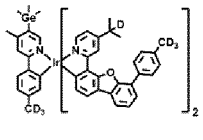

4520

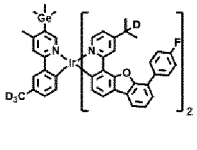

4521

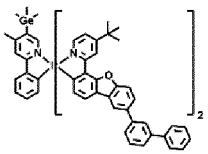

4522

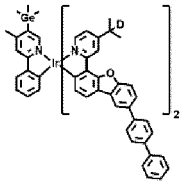

4523

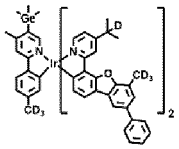

4524

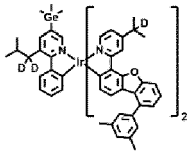

4525

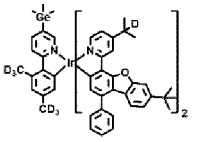

4526

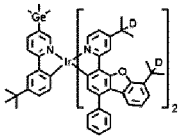

4527

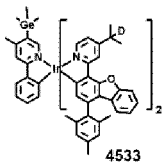

4528

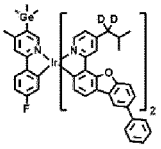

4529

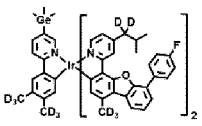

4530

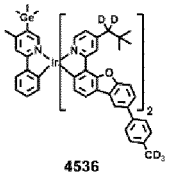

4531

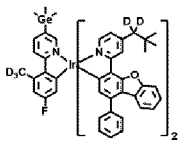

4532

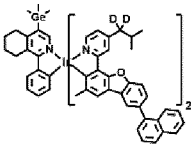

4533

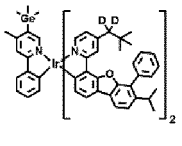

4534

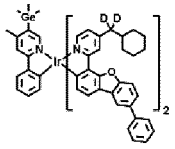

4535

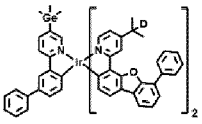

4536

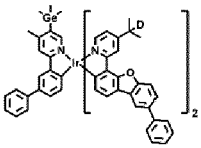

4537

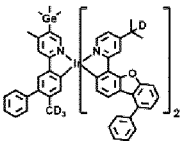

4538

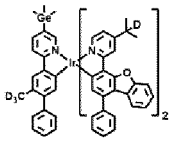

4539

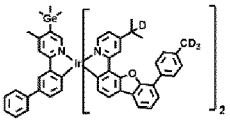

4540

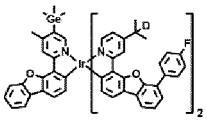

4541

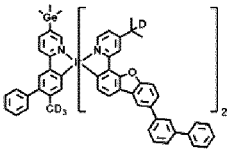

4542

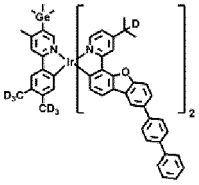

4543

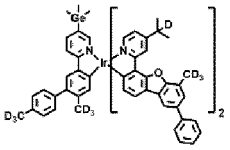

4544

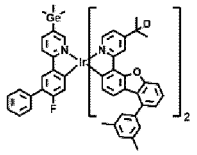

4545

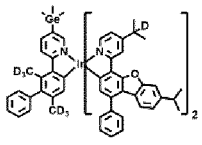

4546

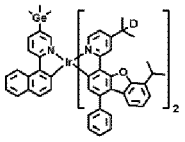

4547

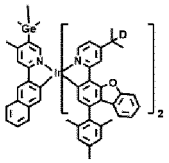

4548

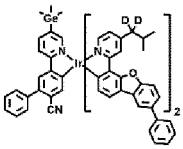

4549

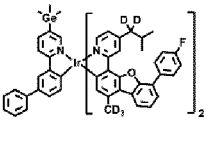

4550

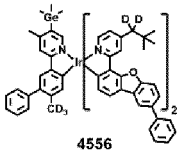

4551

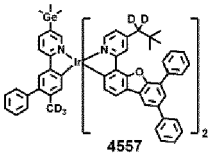

4552

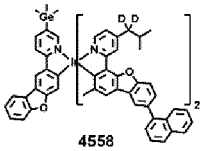

4553

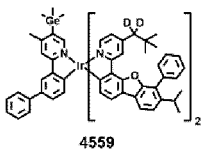

4554

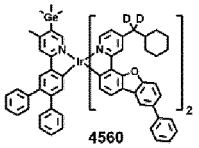

4555

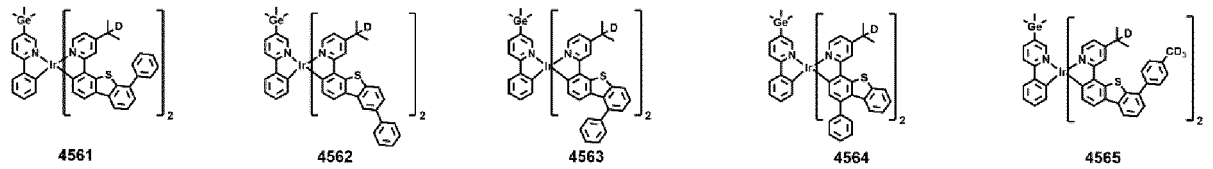

4556


4557

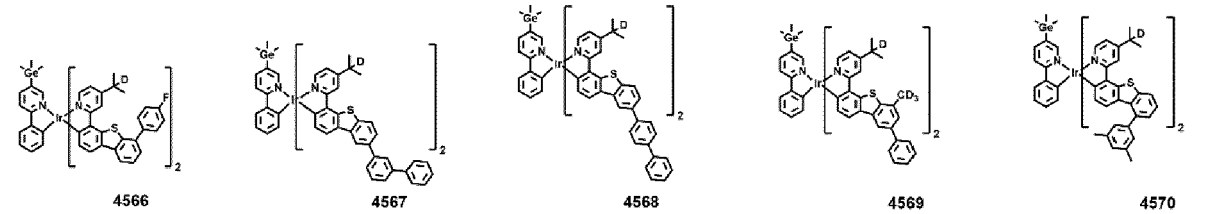

4558


4559

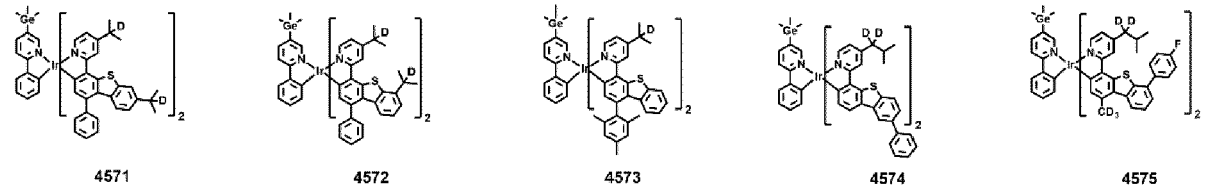

4560



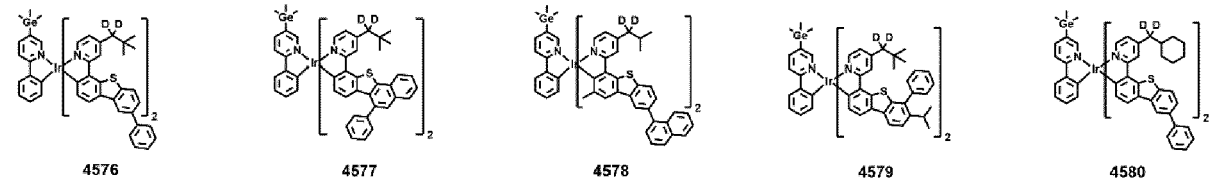
4561 4562 4563 4564 4565



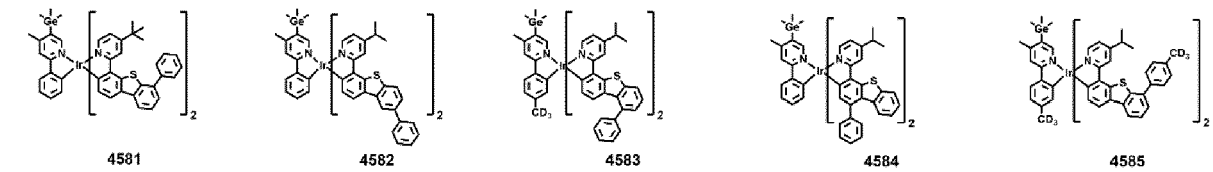
4566 4567 4568 4569 4570



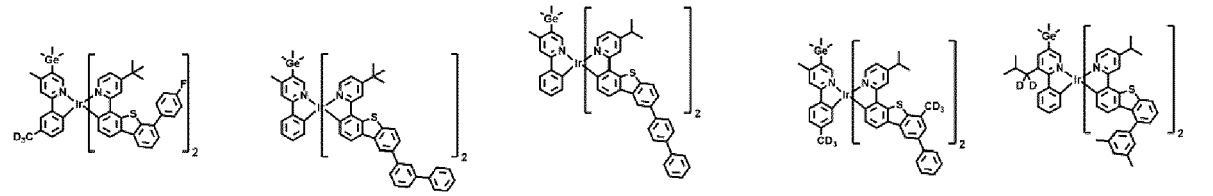
4571 4572 4573 4574 4575



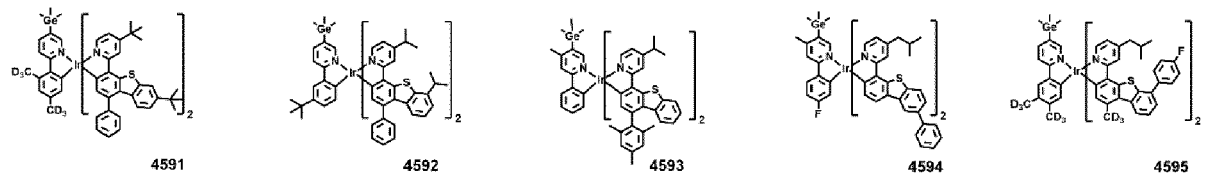
4576 4577 4578 4579 4580



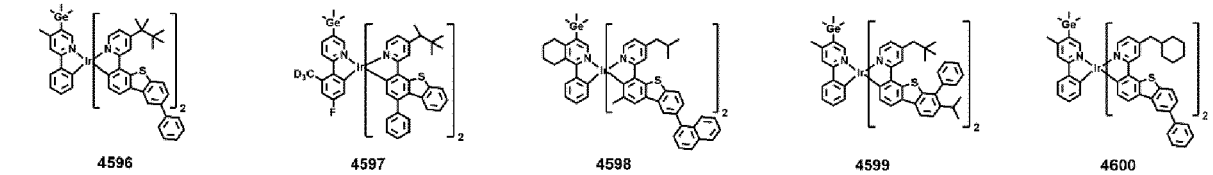
4581 4582 4583 4584 4585



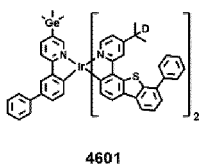
4586 4587 4588 4589 4590

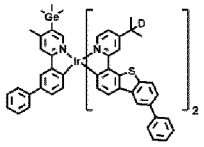


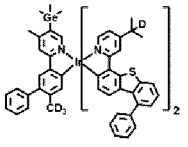
4591 4592 4593 4594 4595

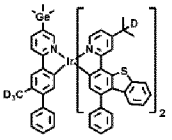


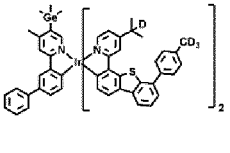
4596 4597 4598 4599 4600

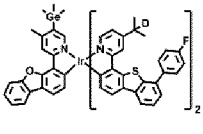

4601

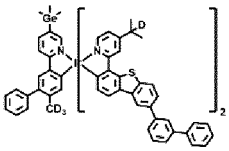

4602

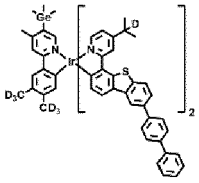

4603

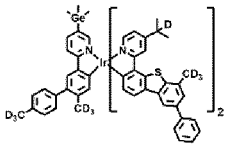

4604

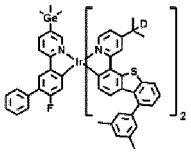

4605

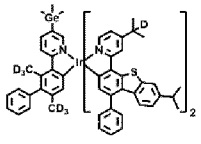

4606

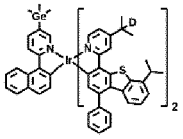

4607

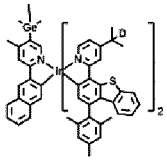

4608

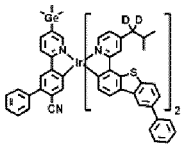

4609

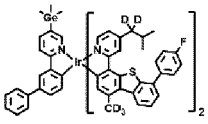

4610

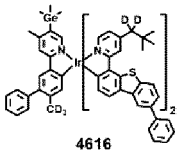

4611

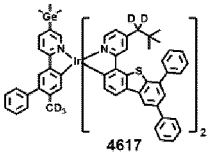

4612

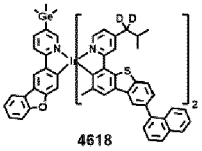

4613

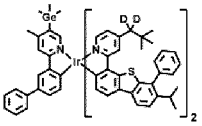

4614

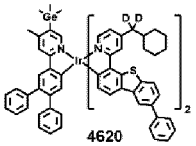

4615

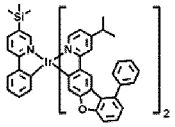

4616

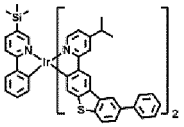

4617

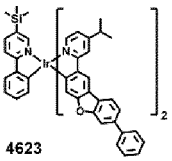

4618

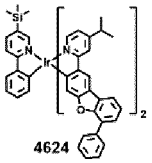

4619

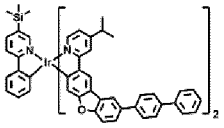

4620

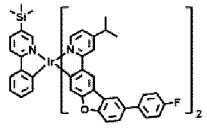

4621

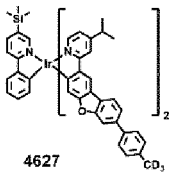

4622

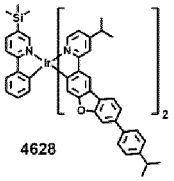

4623

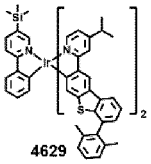

4624

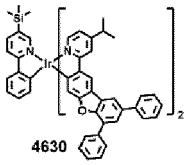

4625

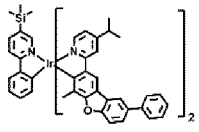

4626

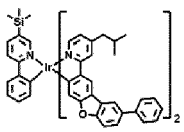

4627

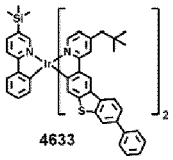

4628

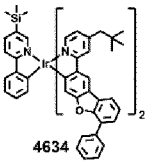

4629

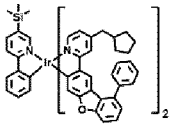

4630

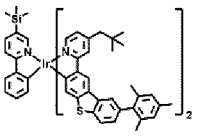

4631

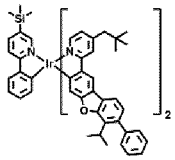

4632

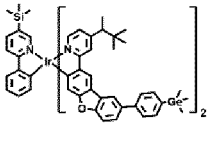

4633

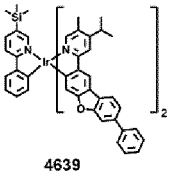

4634

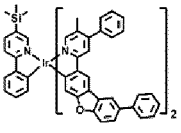

4635

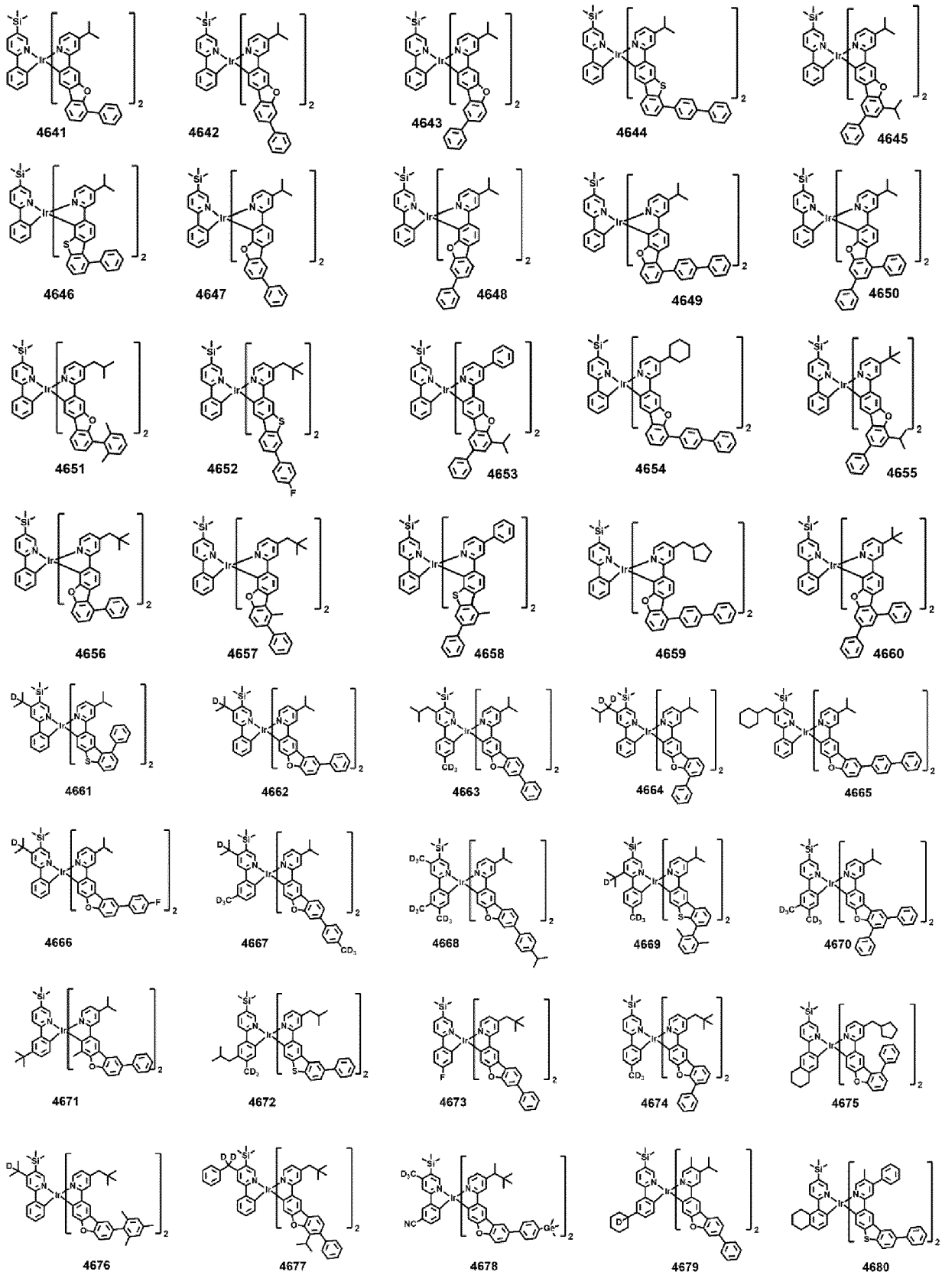

4636

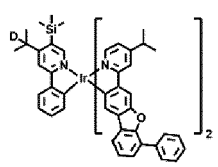

4637

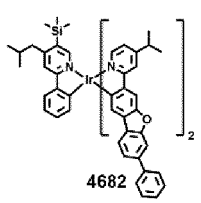

4638

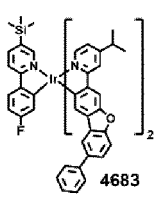

4639

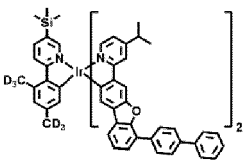

4640

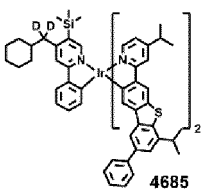

4641
4642
4643
4644
4645
4646
4647
4648
4649
4650
4651
4652
4653
4654
4655
4656
4657
4658
4659
4660
4661
4662
4663
4664
4665
4666
4667
4668
4669
4670
4671
4672
4673
4674
4675
4676
4677
4678
4679
4680

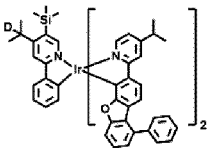

4681

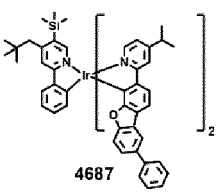

4682

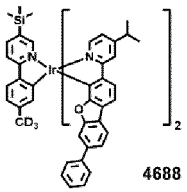

4683

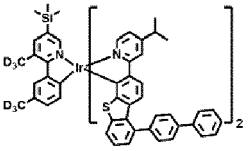

4684

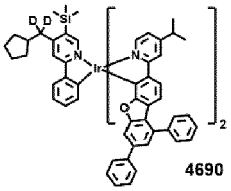

4685

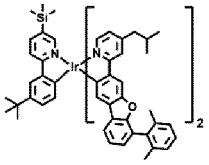

4686

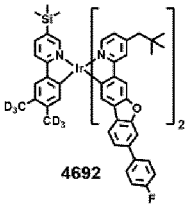

4687

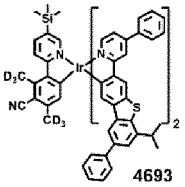

4688

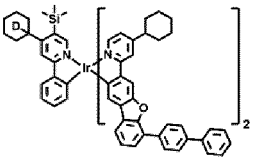

4689

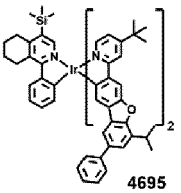

4690

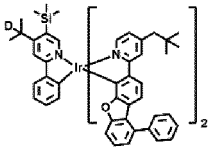

4691

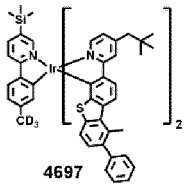

4692

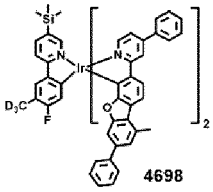

4693

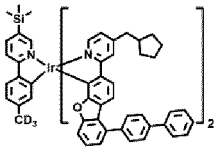

4694

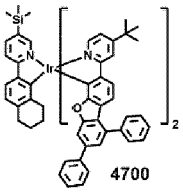

4695

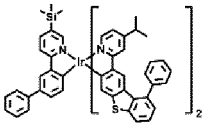

4696

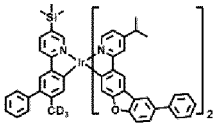

4697

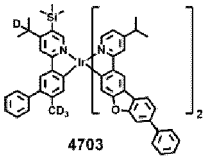

4698

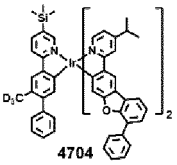

4699

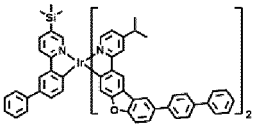

4700

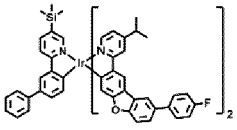

4701

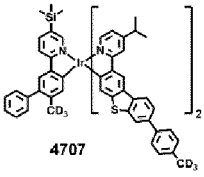

4702

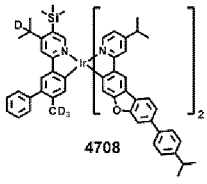

4703

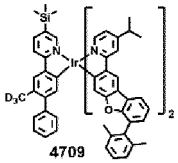

4704

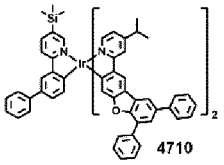

4705

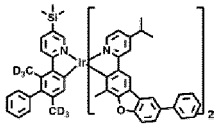

4706

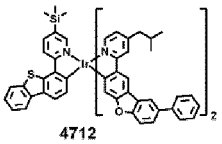

4707

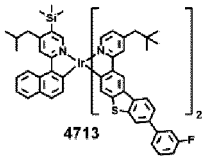

4708

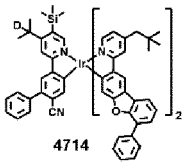

4709

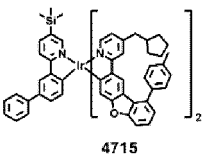

4710

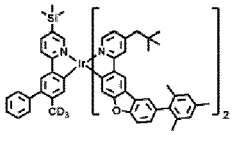

4711

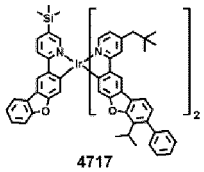

4712

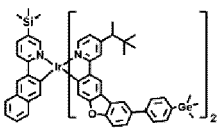

4713

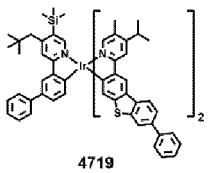

4714

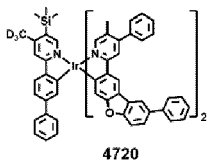

4715

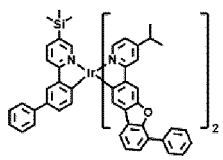

4716

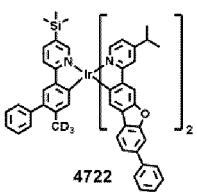

4717

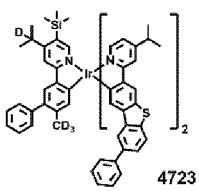

4718

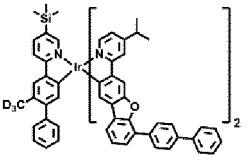

4719

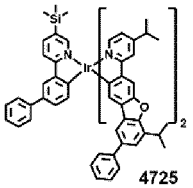

4720

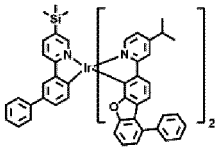

4721

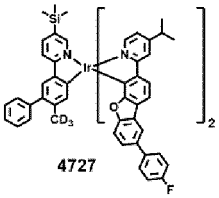

4722

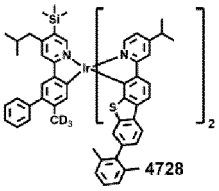

4723

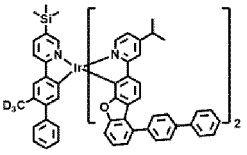

4724

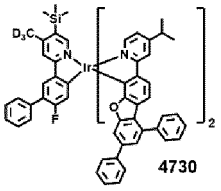

4725

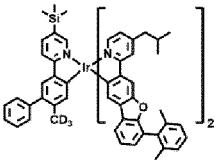

4726

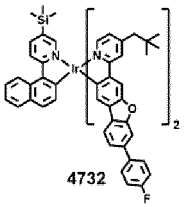

4727

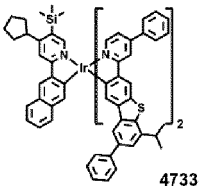

4728

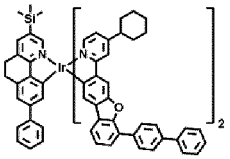

4729

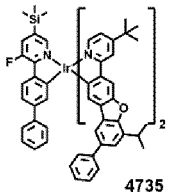

4730

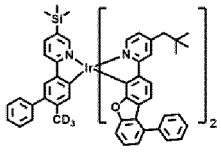

4731

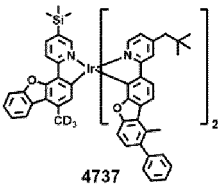

4732

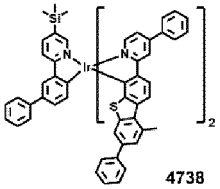

4733

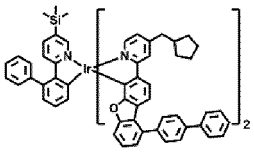

4734

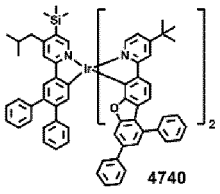

4735

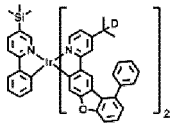

4736

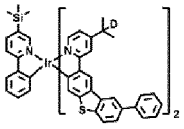

4737

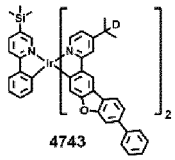

4738

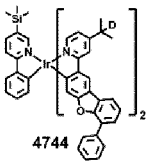

4739

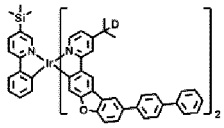

4740

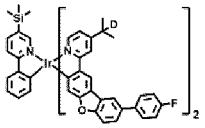

4741

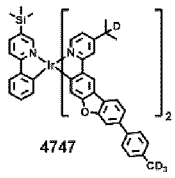

4742

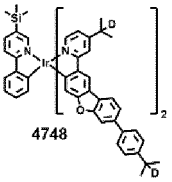

4743

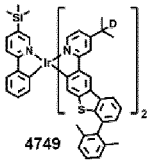

4744

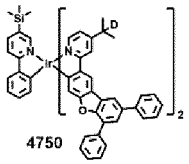

4745

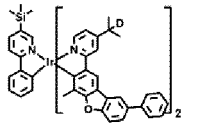

4746

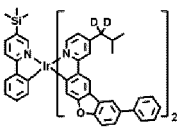

4747

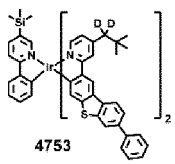

4748

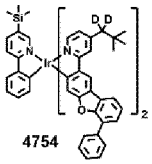

4749

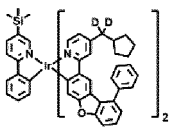

4750

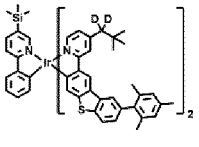

4751

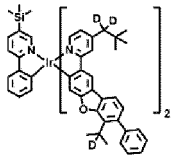

4752

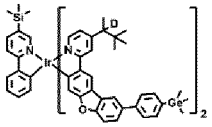

4753

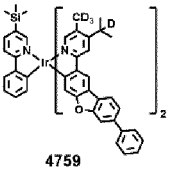

4754

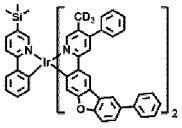

4755

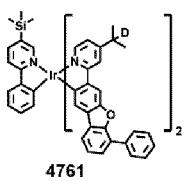

4756

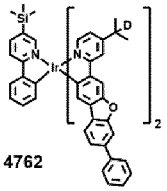

4757

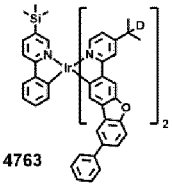

4758

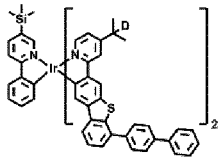

4759

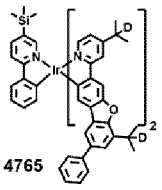

4760

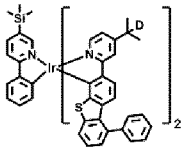

4761

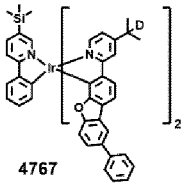

4762

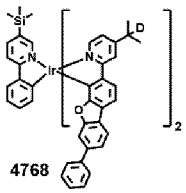

4763

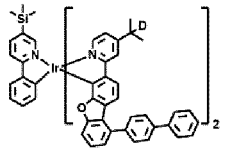

4764

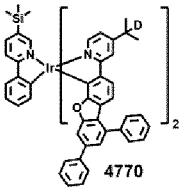

4765

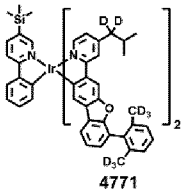

4766

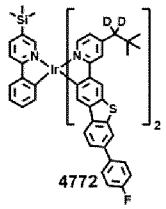

4767

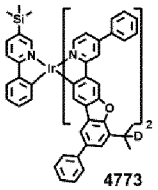

4768

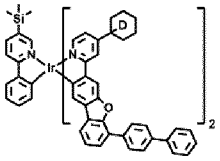

4769

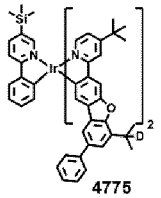

4770

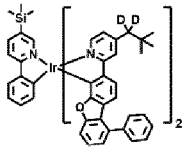

4771

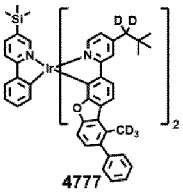

4772

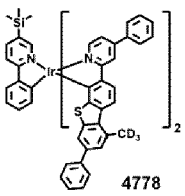

4773

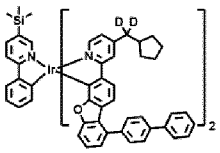

4774

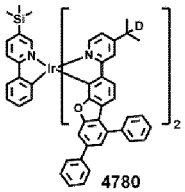

4775

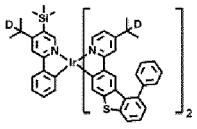

4776

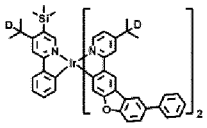

4777

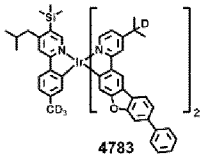

4778

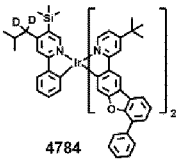

4779

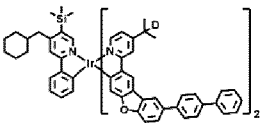

4780

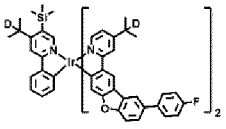

4781

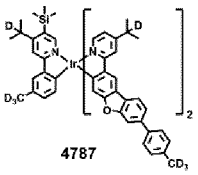

4782

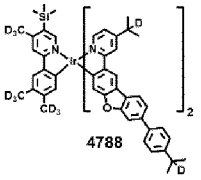

4783

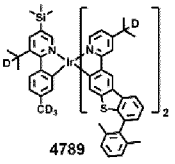

4784

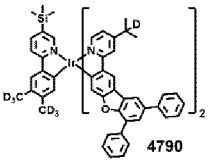

4785

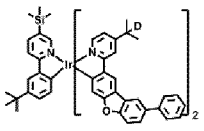

4786

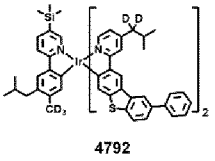

4787

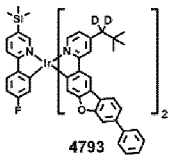

4788

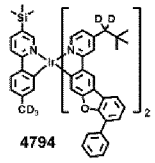

4789

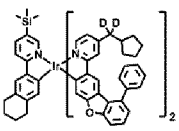

4790

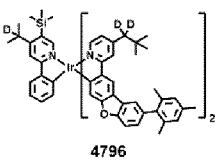

4791

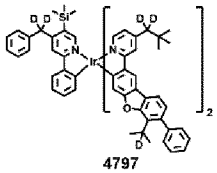

4792

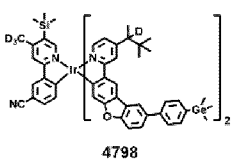

4793

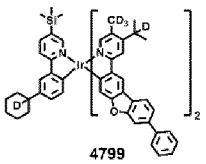

4794

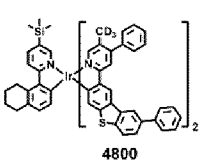

4795

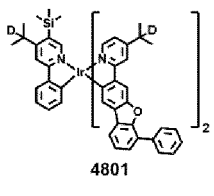

4796

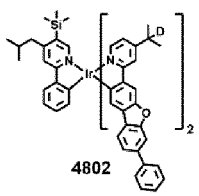

4797

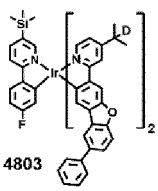

4798

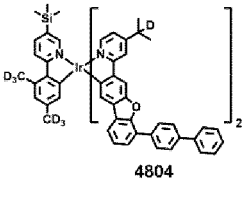

4799

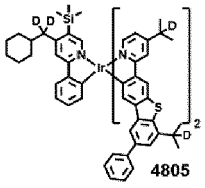

4800

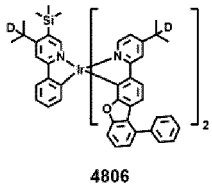

4801

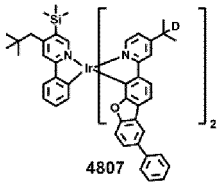

4802

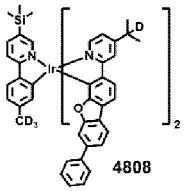

4803

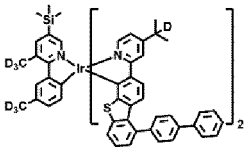

4804

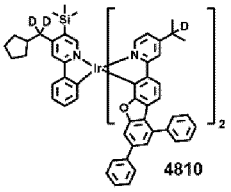

4805

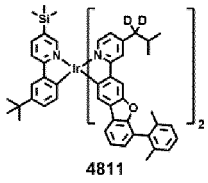

4806

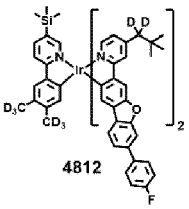

4807

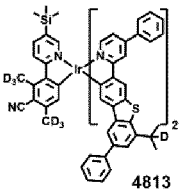

4808

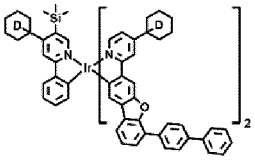

4809

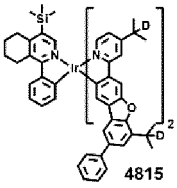

4810

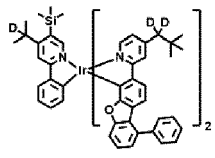

4811

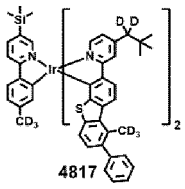

4812

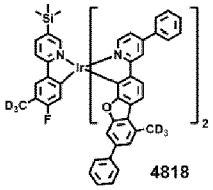

4813

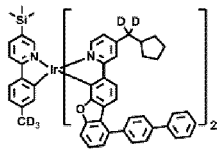

4814

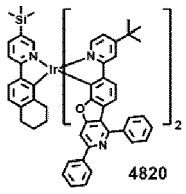

4815

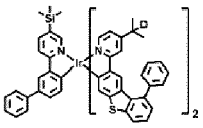

4816

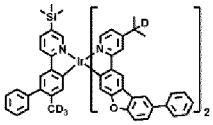

4817

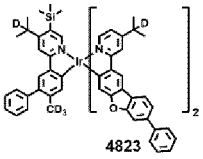

4818

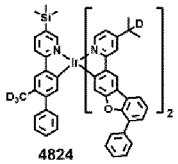

4819

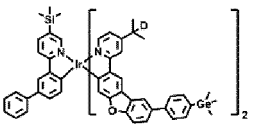

4820

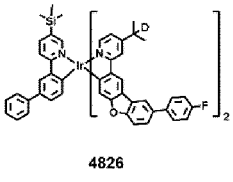

4821

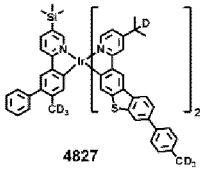

4822

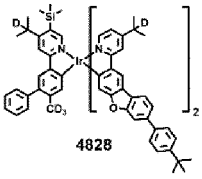

4823

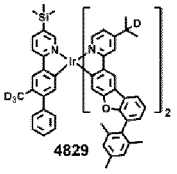

4824

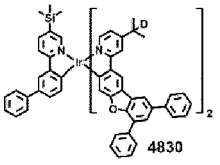

4825

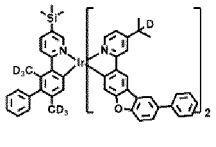

4826

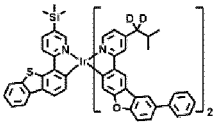

4827

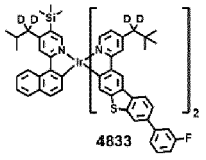

4828

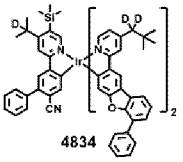

4829

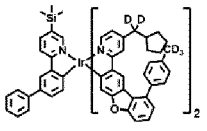

4830

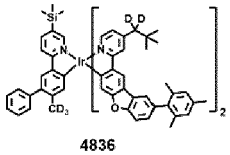

4831

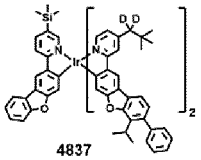

4832

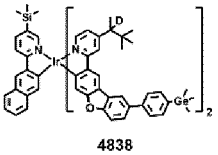

4833

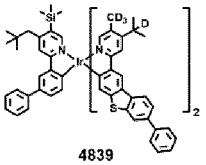

4834

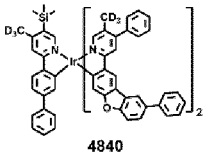

4835

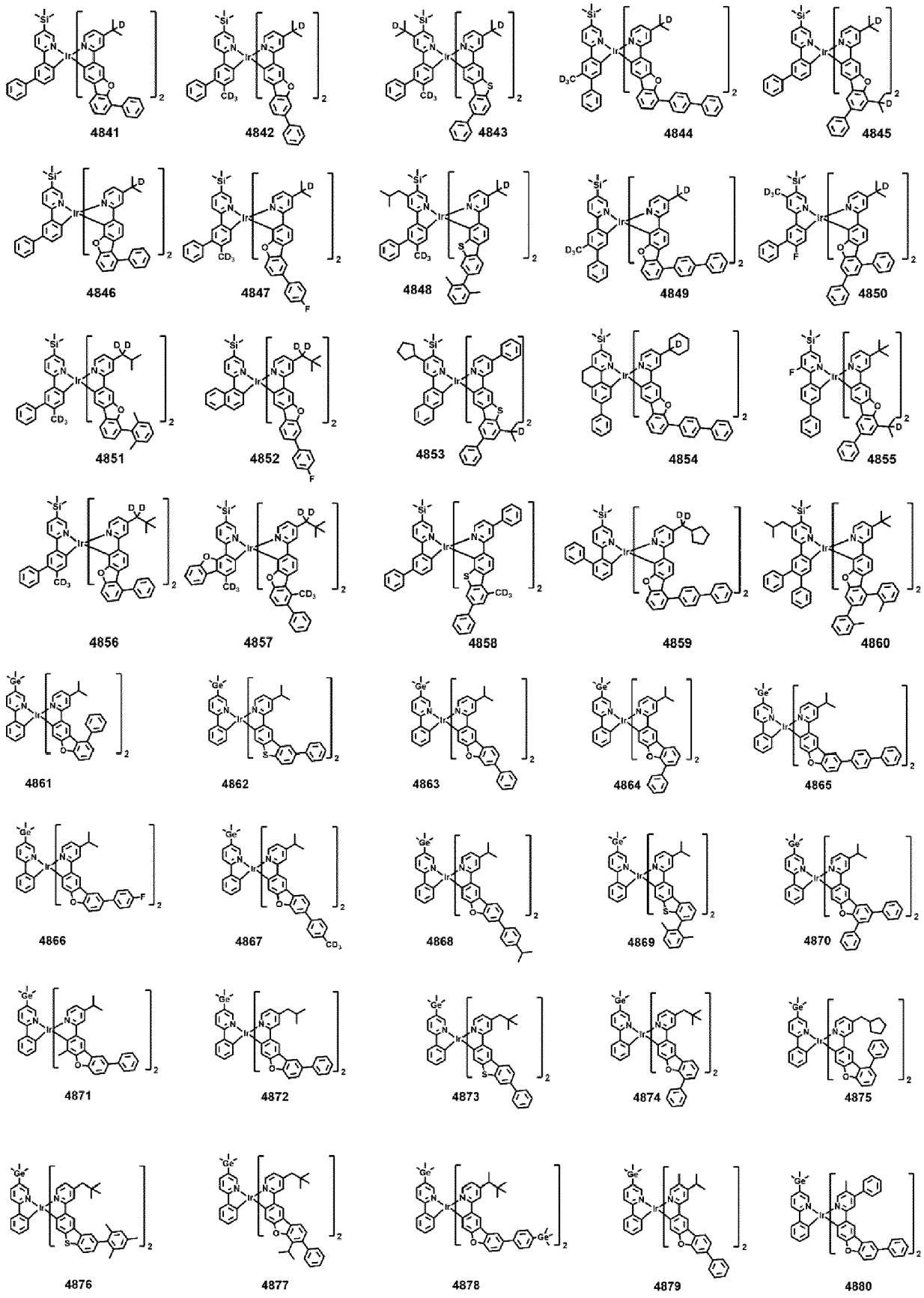

4836

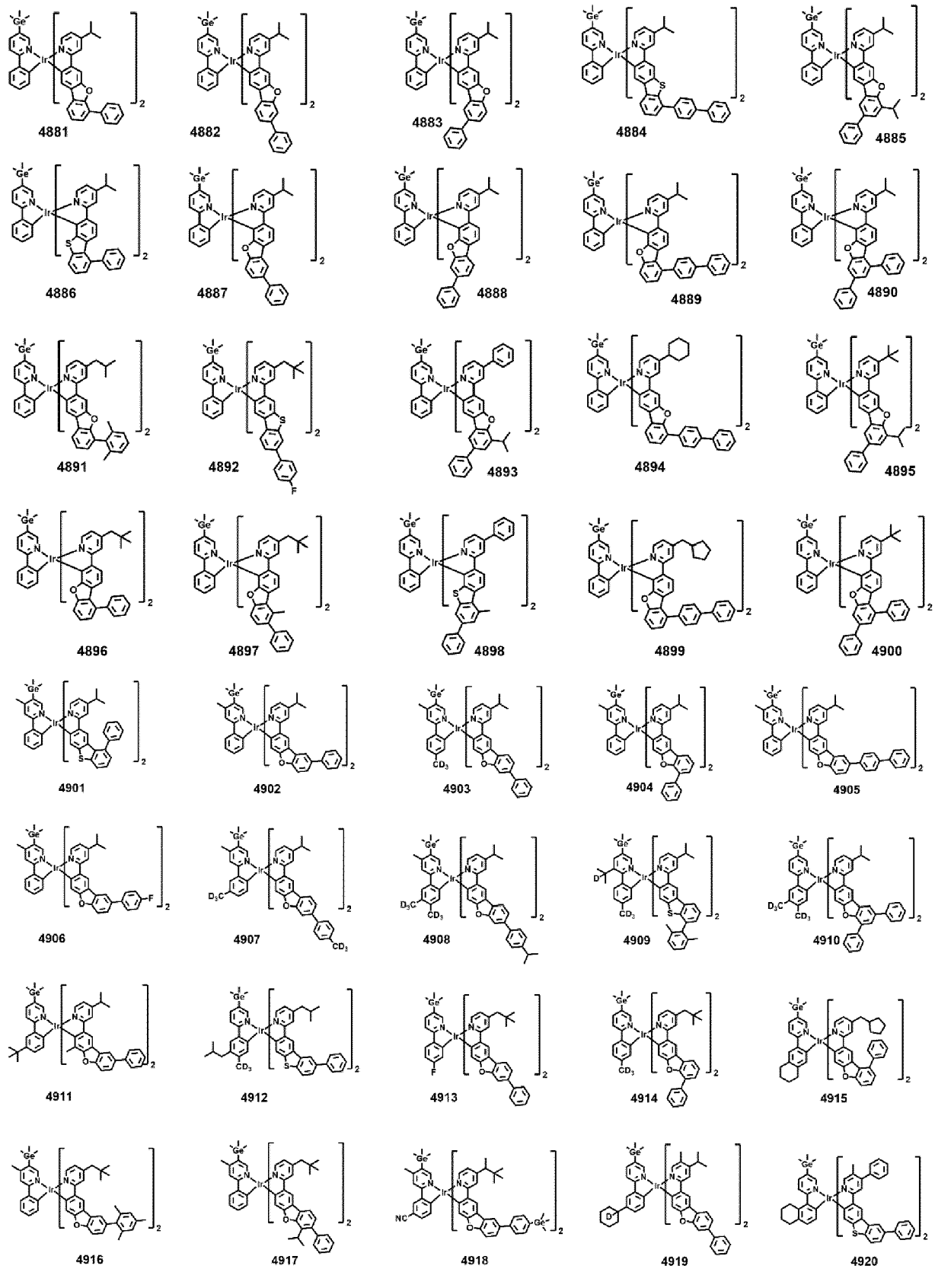

4837

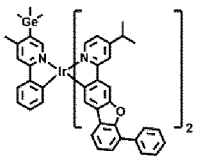

4838

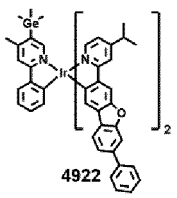

4839

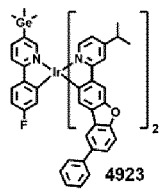

4840

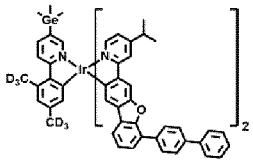

4841
4842
4843
4844
4845
4846
4847
4848
4849
4850
4851
4852
4853
4854
4855
4856
4857
4858
4859
4860
4861
4862
4863
4864
4865
4866
4867
4868
4869
4870
4871
4872
4873
4874
4875
4876
4877
4878
4879
4880

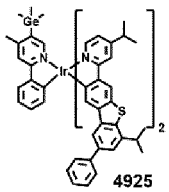

4881
4882
4883
4884
4885
4886
4887
4888
4889
4890
4891
4892
4893
4894
4895
4896
4897
4898
4899
4900
4901
4902
4903
4904
4905
4906
4907
4908
4909
4910
4911
4912
4913
4914
4915
4916
4917
4918
4919
4920

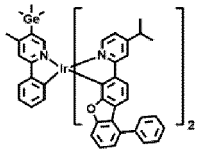

4921

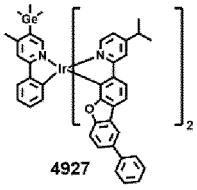

4922

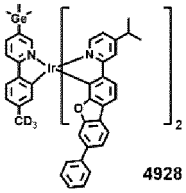

4923

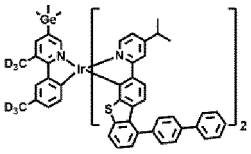

4924

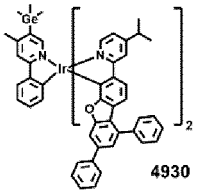

4925

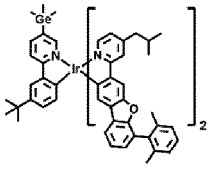

4926

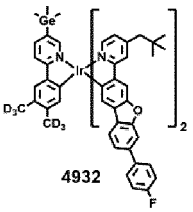

4927

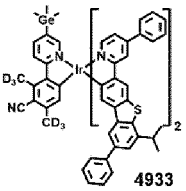

4928

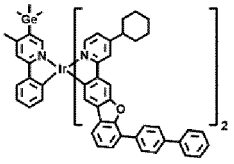

4929

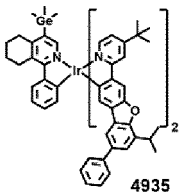

4930

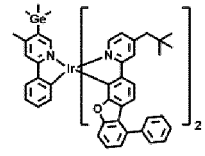

4931

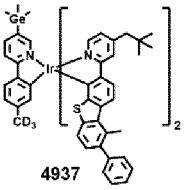

4932

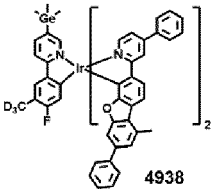

4933

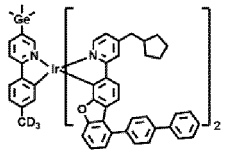

4934

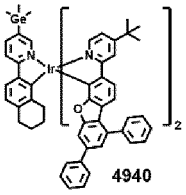

4935

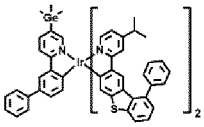

4936

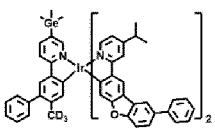

4937

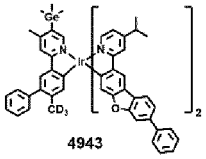

4938

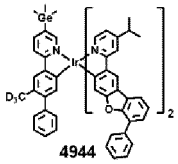

4939

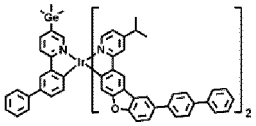

4940

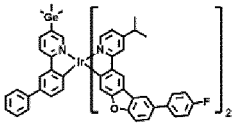

4941

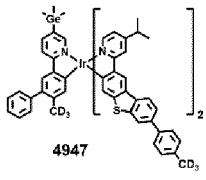

4942

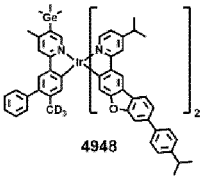

4943

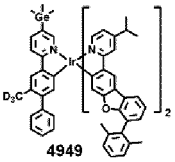

4944

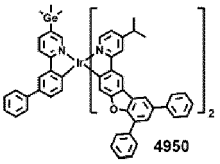

4945

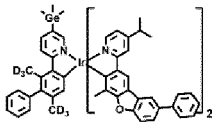

4946

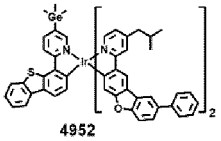

4947

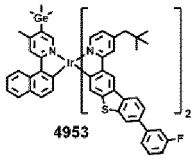

4948

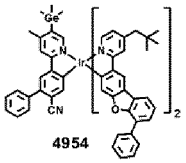

4949

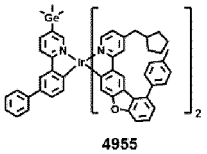

4950

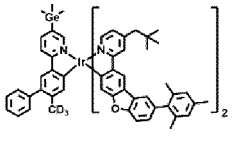

4951

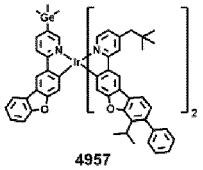

4952

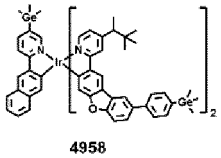

4953

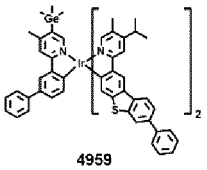

4954

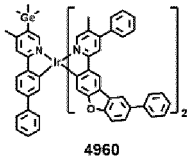

4955

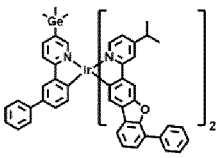

4956

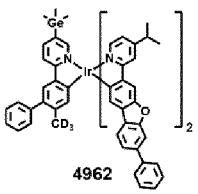

4957

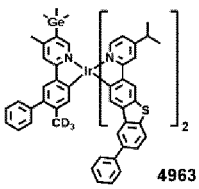

4958

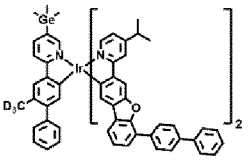

4959

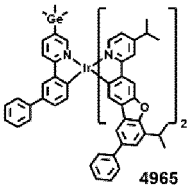

4960

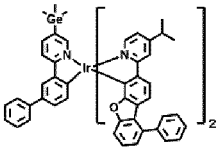

4961

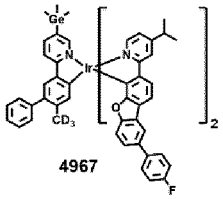

4962

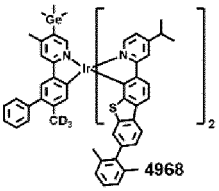

4963

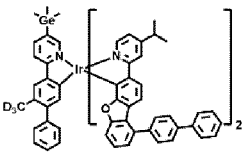

4964

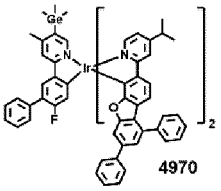

4965

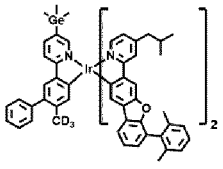

4966

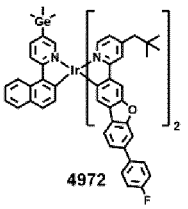

4967

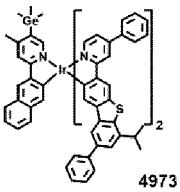

4968

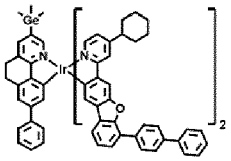

4969

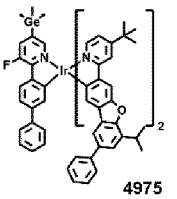

4970

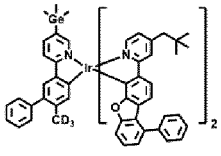

4971

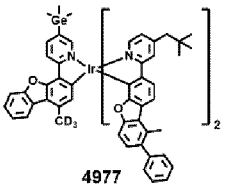

4972

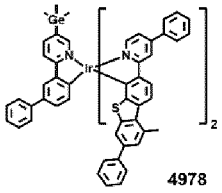

4973

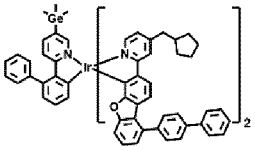

4974

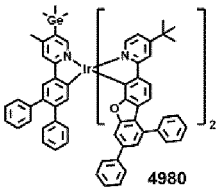

4975

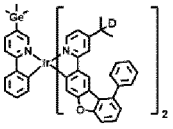

4976

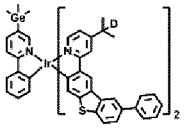

4977

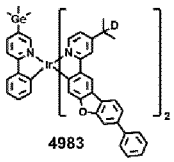

4978

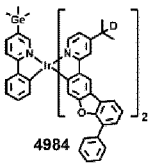

4979

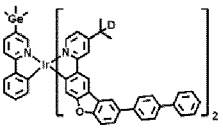

4980

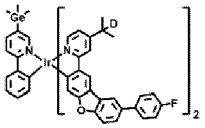

4981

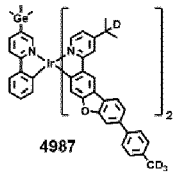

4982

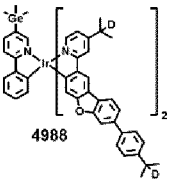

4983

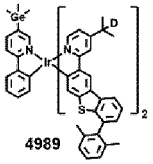

4984

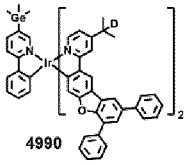

4985

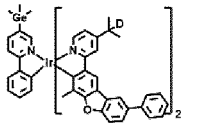

4986

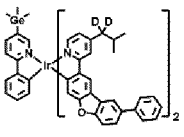

4987

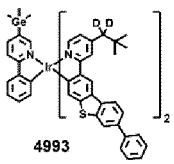

4988

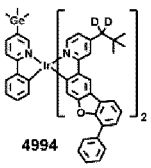

4989

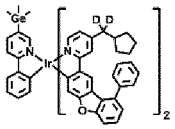

4990

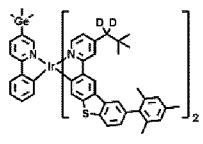

4991

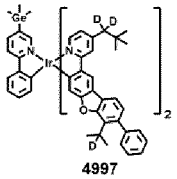

4992

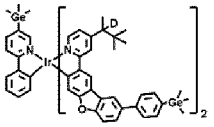

4993

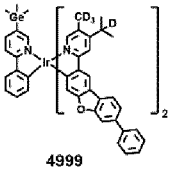

4994

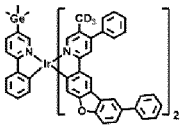

4995

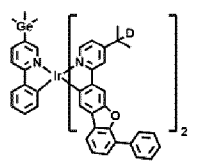

4996

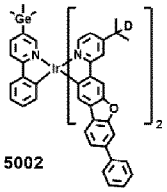

4997

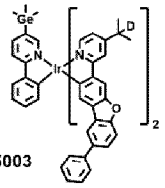

4998

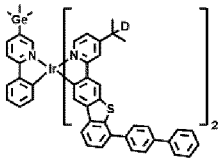

4999

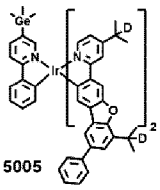

5000

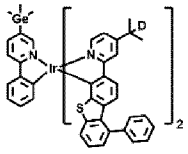

5001

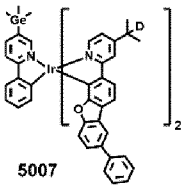

5002

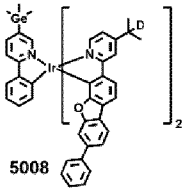

5003

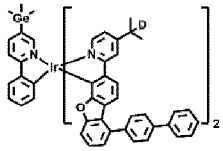

5004

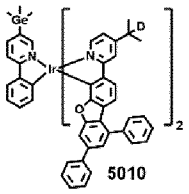

5005

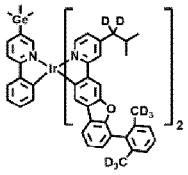

5006

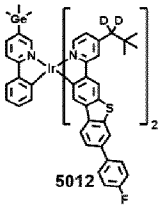

5007

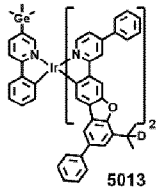

5008

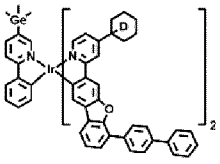

5009

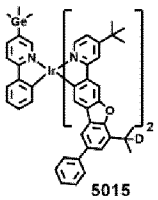

5010

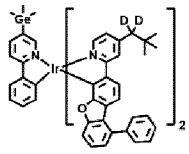

5011

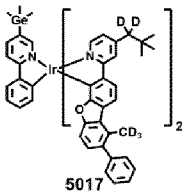

5012

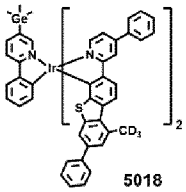

5013

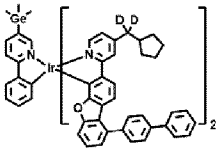

5014

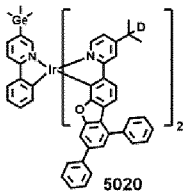

5015

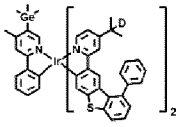

5016

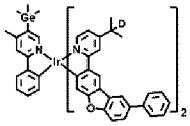

5017

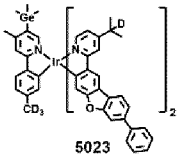

5018

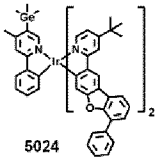

5019

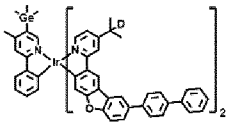

5020

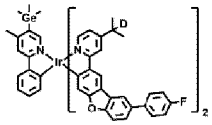

5021

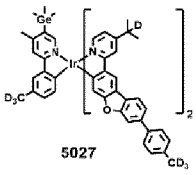

5022

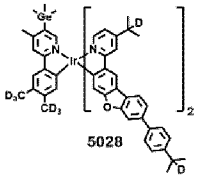

5023

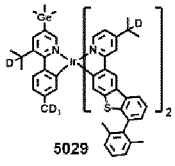

5024

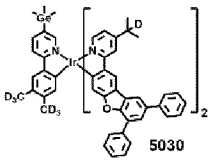

5025

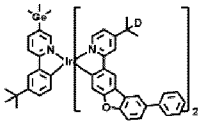

5026

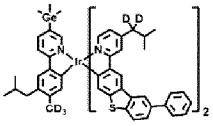

5027

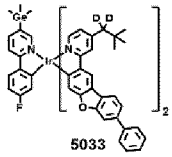

5028

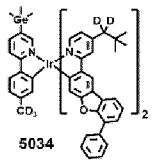

5029

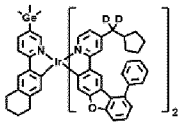

5030

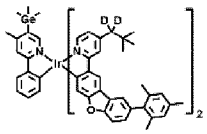

5031

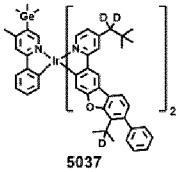

5032

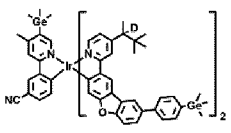

5033

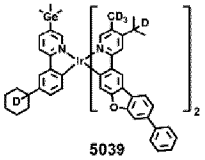

5034

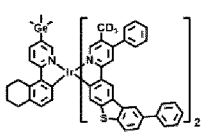

5035

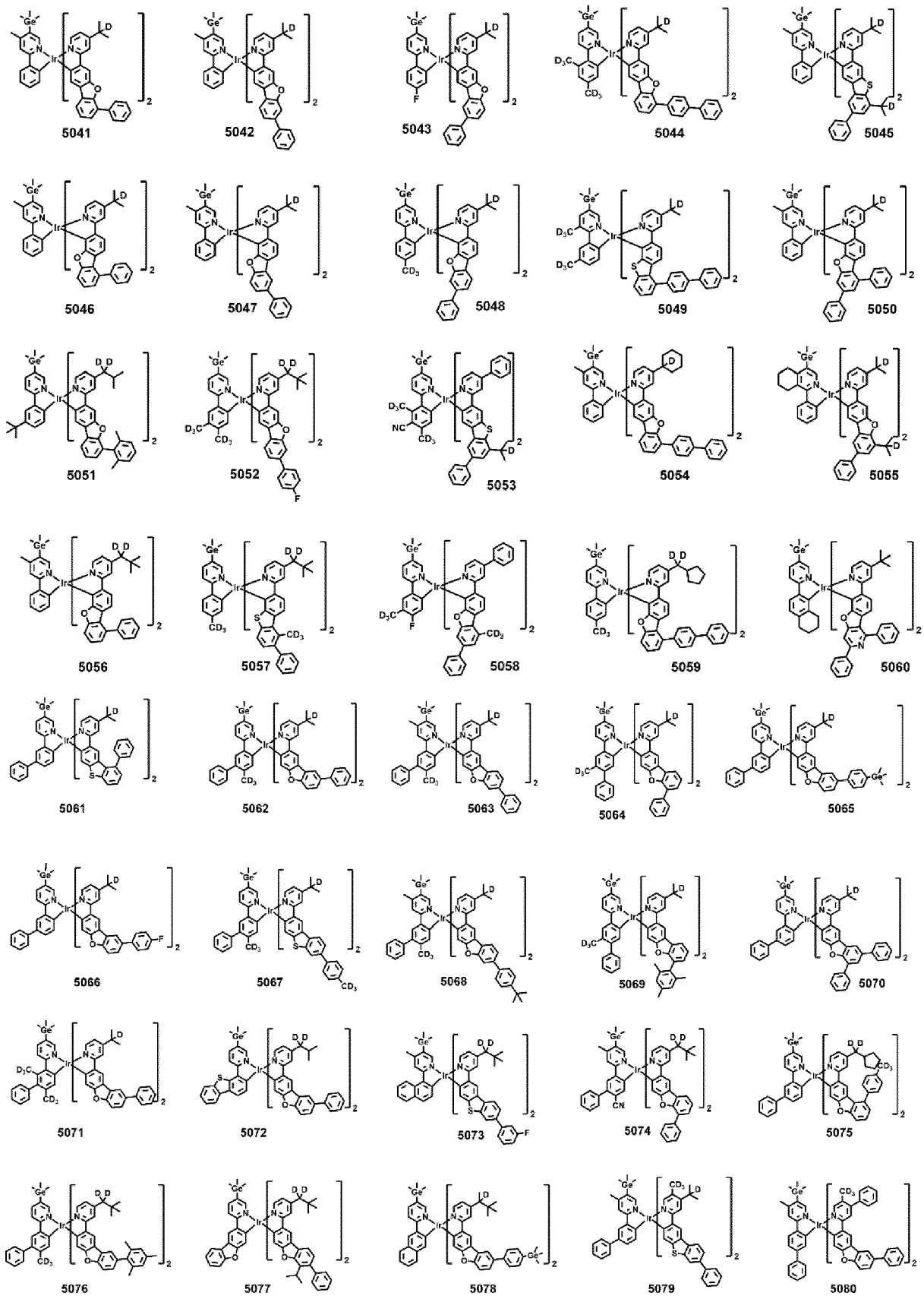

5036

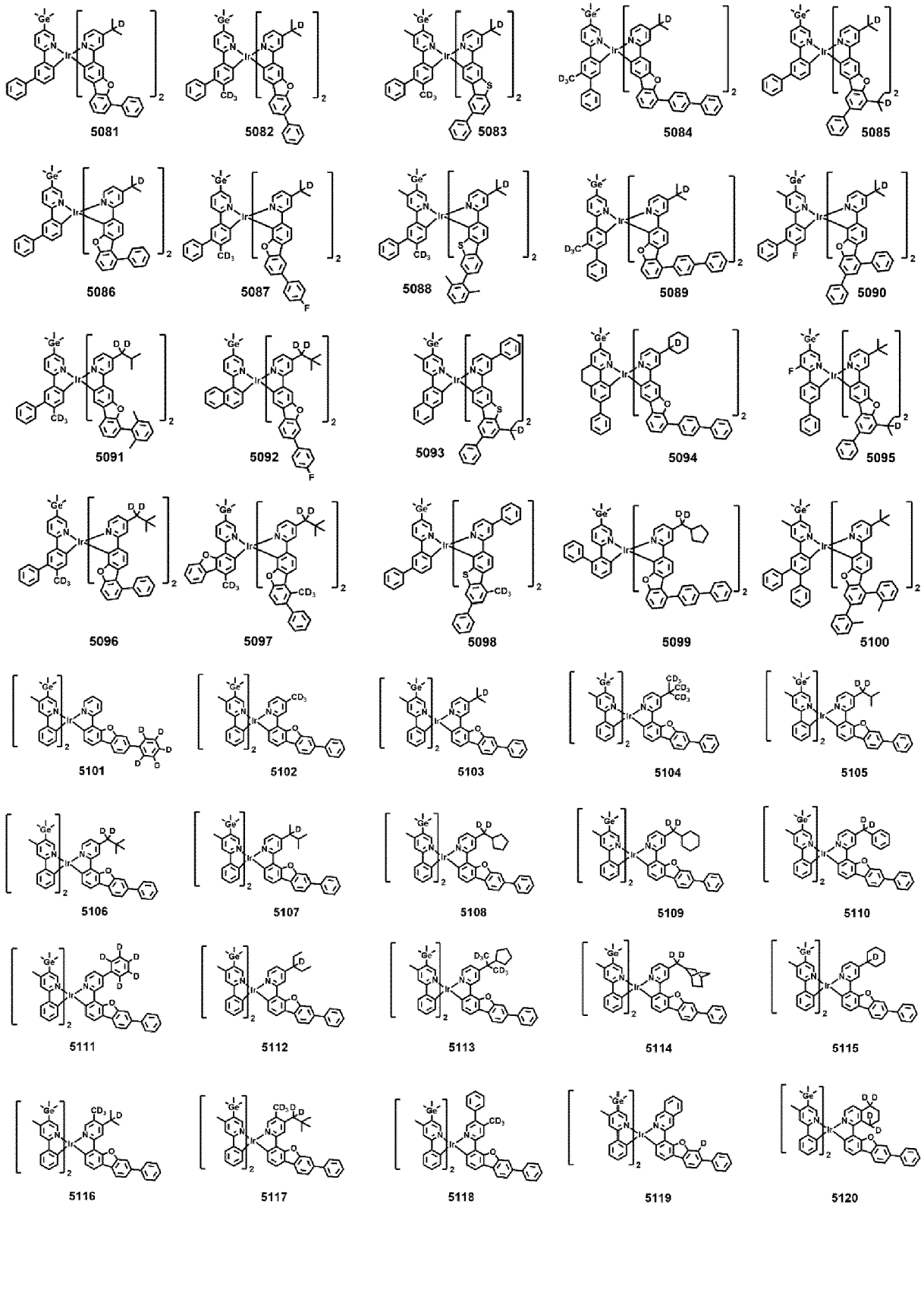

5037

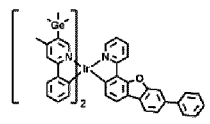

5038

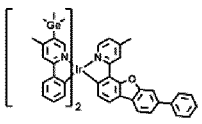

5039

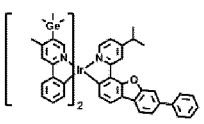

5040

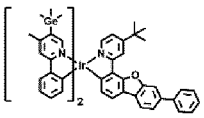

5041
5042
5043
5044
5045
5046
5047
5048
5049
5050
5051
5052
5053
5054
5055
5056
5057
5058
5059
5060
5061
5062
5063
5064
5065
5066
5067
5068
5069
5070
5071
5072
5073
5074
5075
5076
5077
5078
5079
5080

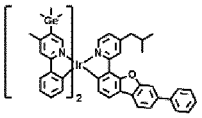

5081
5082
5083
5084
5085
5086
5087
5088
5089
5090
5091
5092
5093
5094
5095
5096
5097
5098
5099
5100
5101
5102
5103
5104
5105
5106
5107
5108
5109
5110
5111
5112
5113
5114
5115
5116
5117
5118
5119
5120

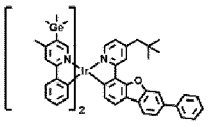

5121

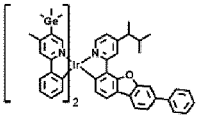

5122

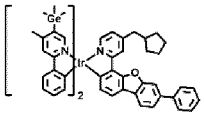

5123

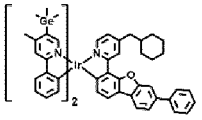

5124

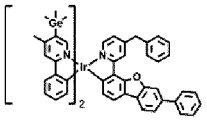

5125

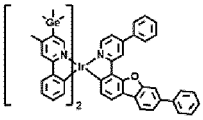

5126

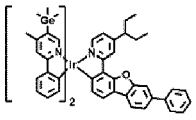

5127

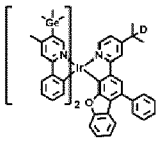

5128

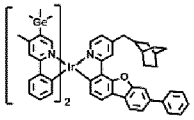

5129

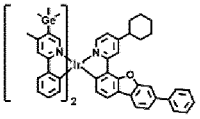

5130

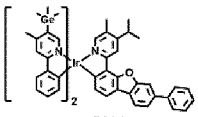

5131

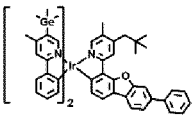

5132

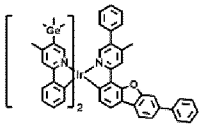

5133

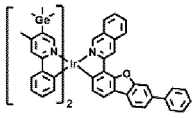

5134

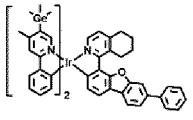

5135


5136

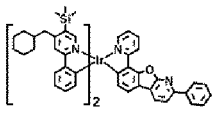

5137

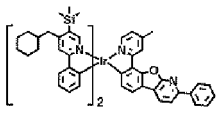

5138

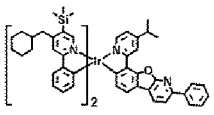

5139

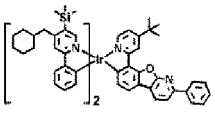

5140

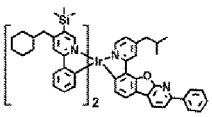
Group B

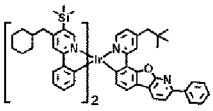

661

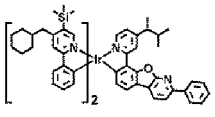

662

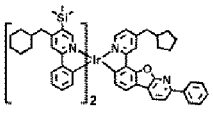

663

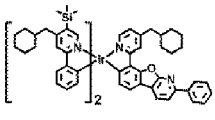

664

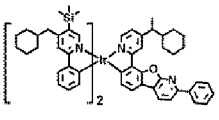

665

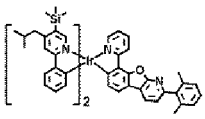

666

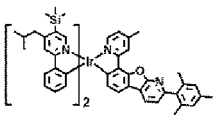

667

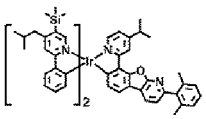

668

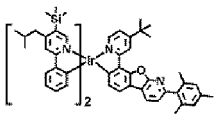

669

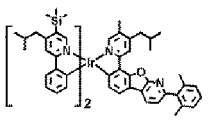

670

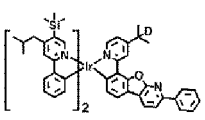

671

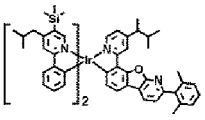

672

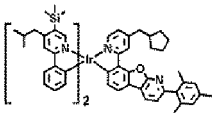

673

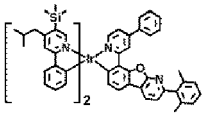

674

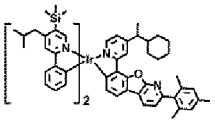

675

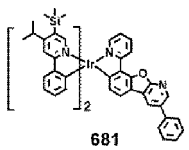

676

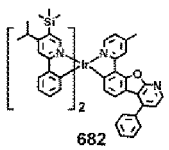

677

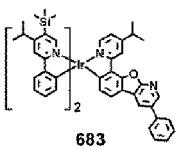

678

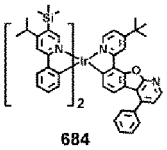

679

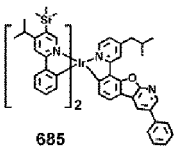

680

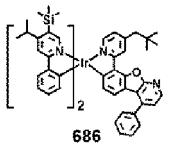

681

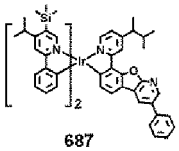

682

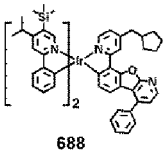

683

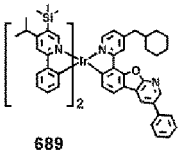

684

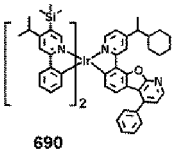

685

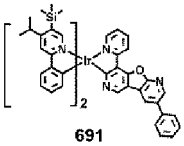

686

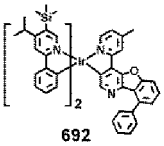

687

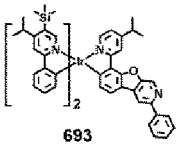

688

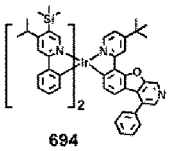

689

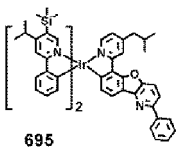

690

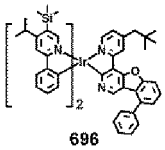

691

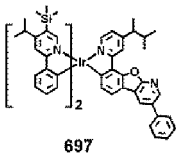

692

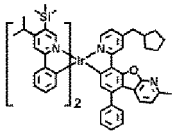

693

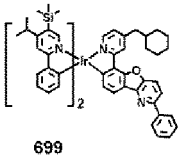

694

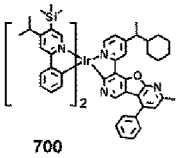

695

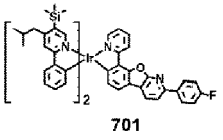

696

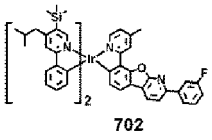

697

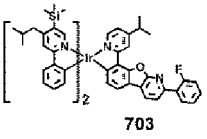

698

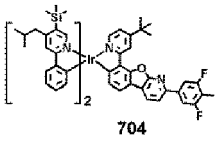

699

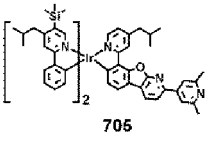

700

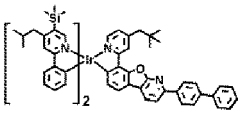

701

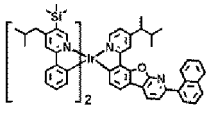

702

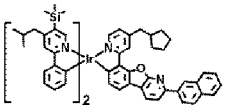

703

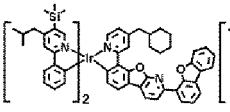

704

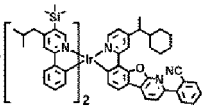

705

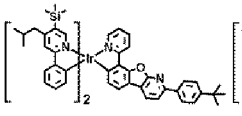

706

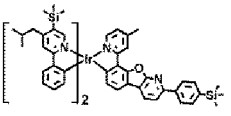

707

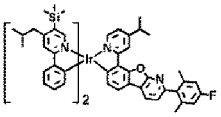

708

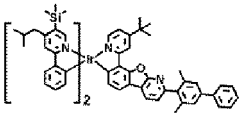

709

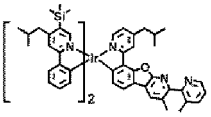

710

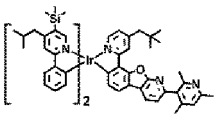

711

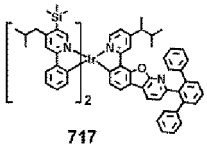

712

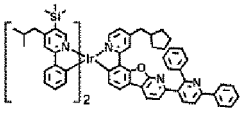

713

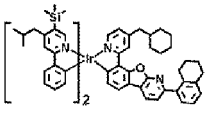

714

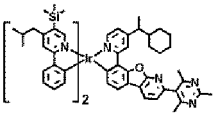

715

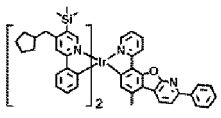

716

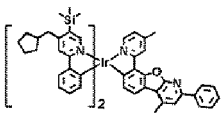

717

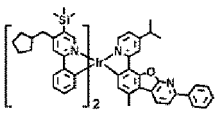

718

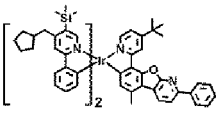

719

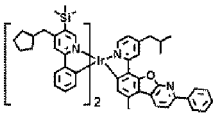

720

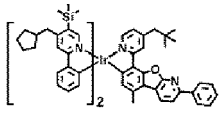

721

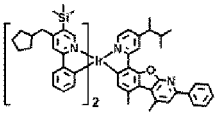

722

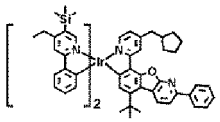

723

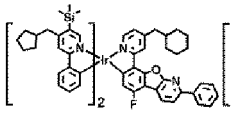

724

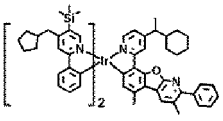

725

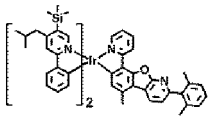

726

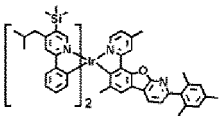

727

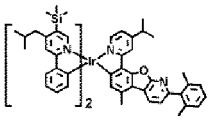

728

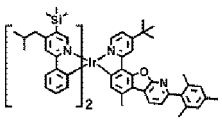

729

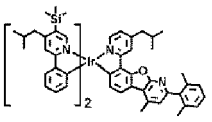

730

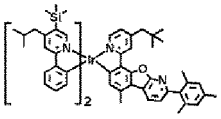

731

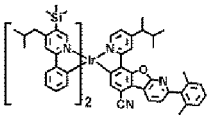

732

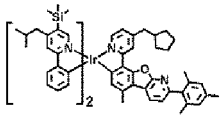

733

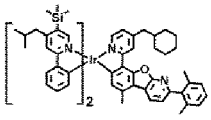

734

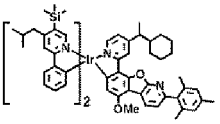

735

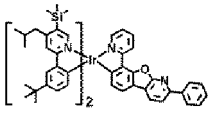

736

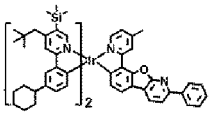

737

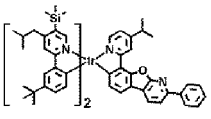

738

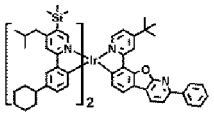

739

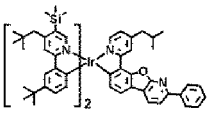

740

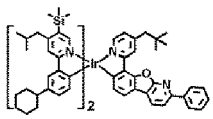

741

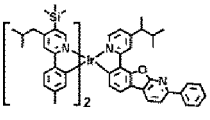

742

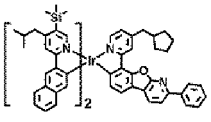

743

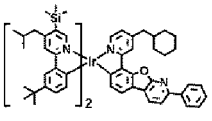

744

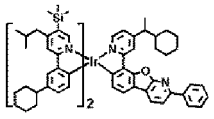

745

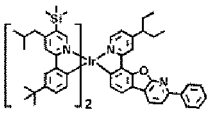

746

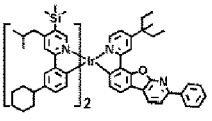

747

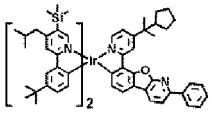

748

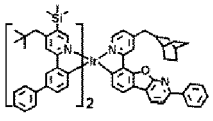

749

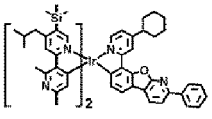

750

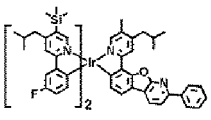

751

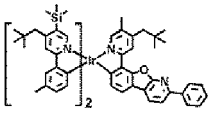

752

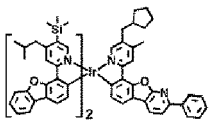

753

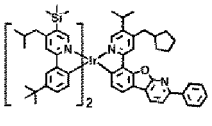

754

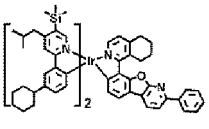

755

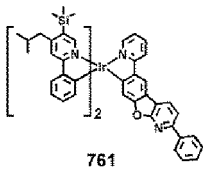

756

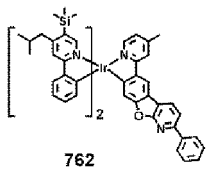

757

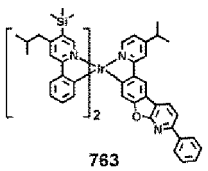

758

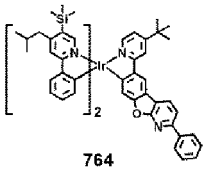

759

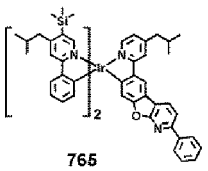

760

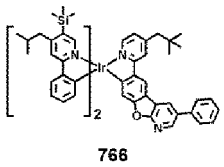

761

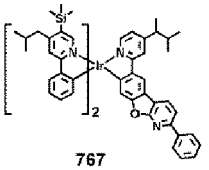

762

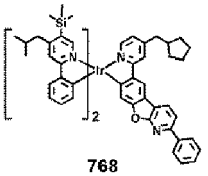

763

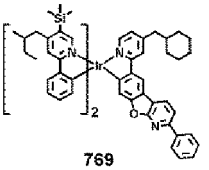

764

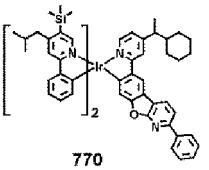

765

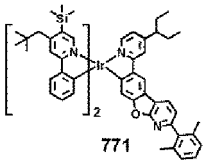

766

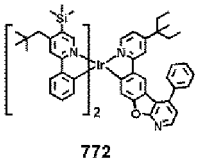

767

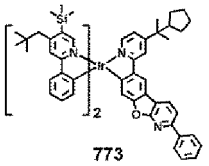

768

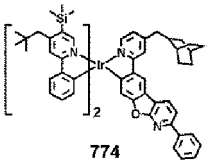

769

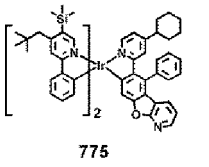

770

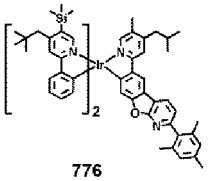

771

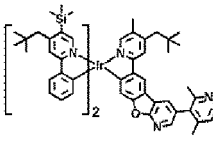

772

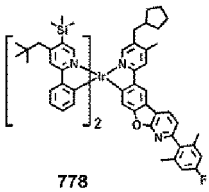

773

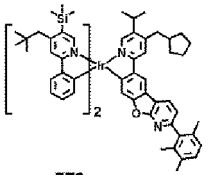

774

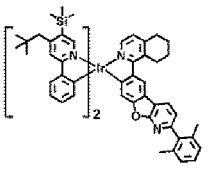

775

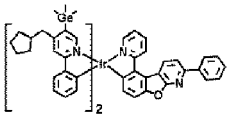

776

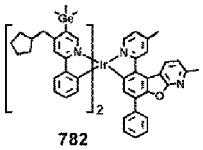

777

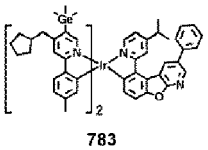

778

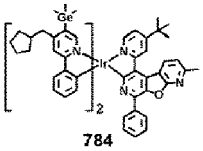

779

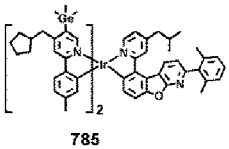

780

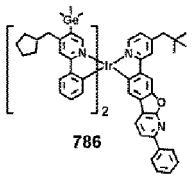

781

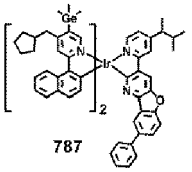

782

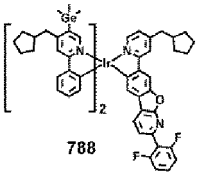

783

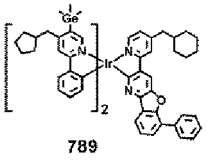

784

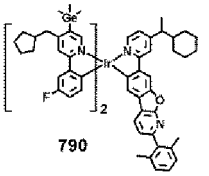

785

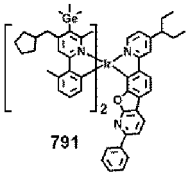

786

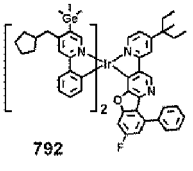

787

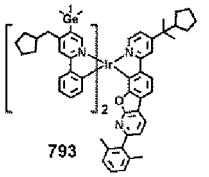

788

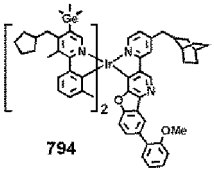

789

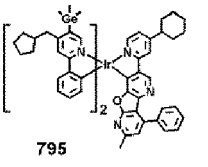

790

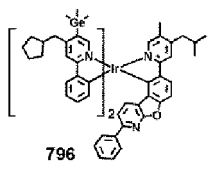

791

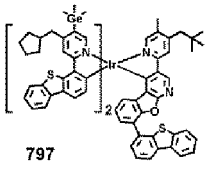

792

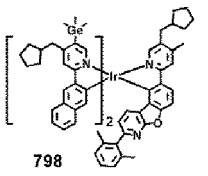

793

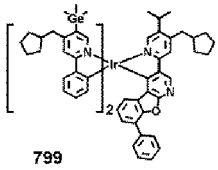

794

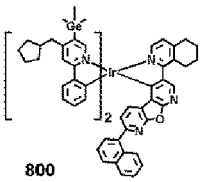

795

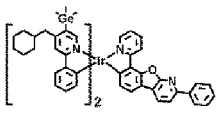

796

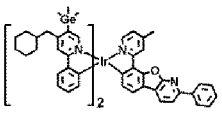

797

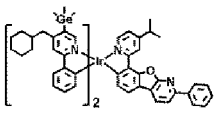

798

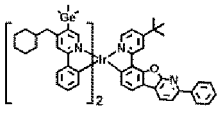

799

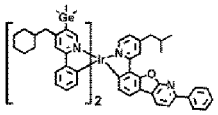

800

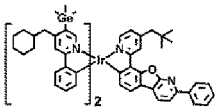

1001

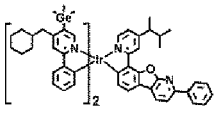

1002

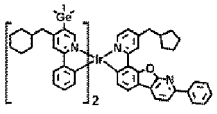

1003

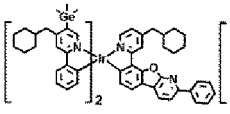

1004

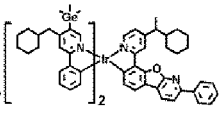

1005

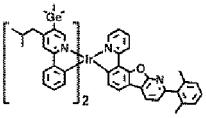

1006

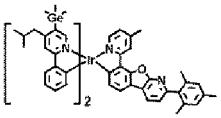

1007

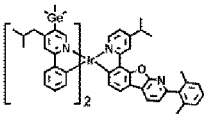

1008

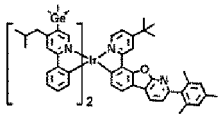

1009

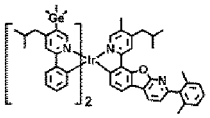

1010

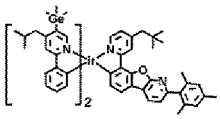

1011

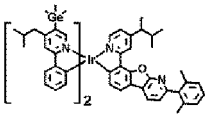

1012

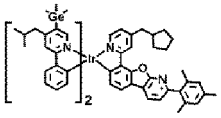

1013

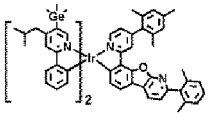

1014

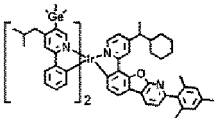

1015

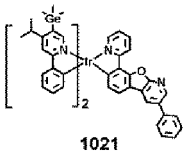

1016

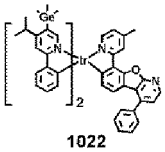

1017

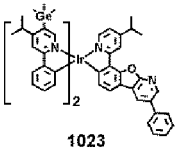

1018

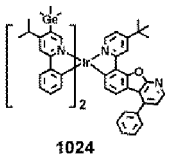

1019

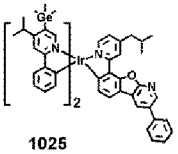

1020

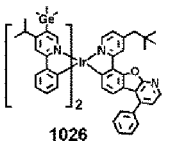

1021

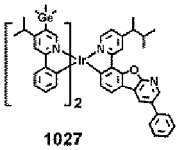

1022

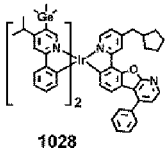

1023

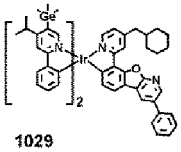

1024

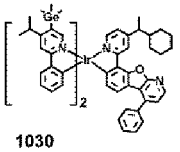

1025

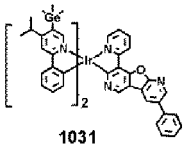

1026

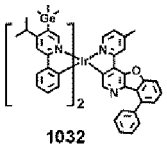

1027

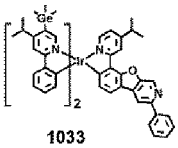

1028

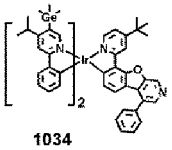

1029

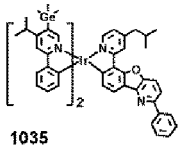

1030

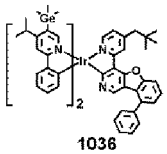

1031

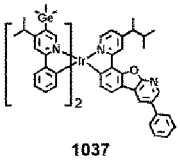

1032

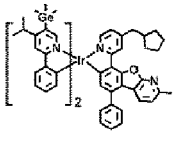

1033

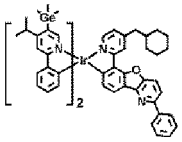

1034

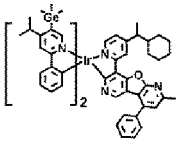

1035

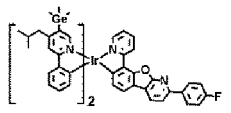

1036


1037

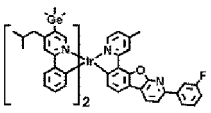

1038


1039

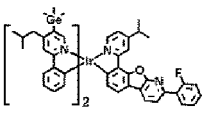

1040



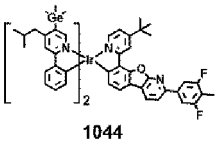
1041



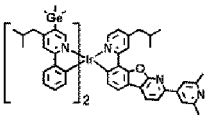
1042



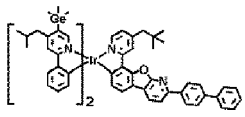
1043



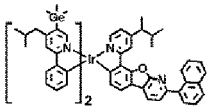
1044



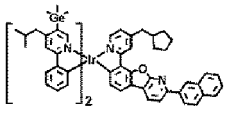
1045



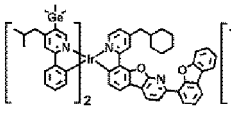
1046



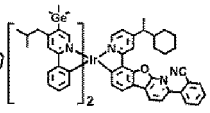
1047



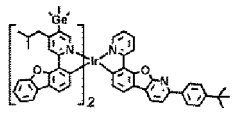
1048



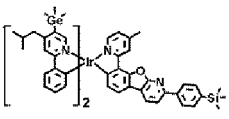
1049



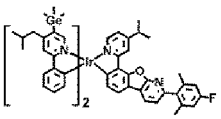
1050



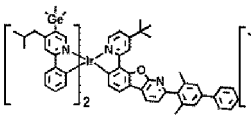
1051



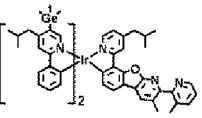
1052



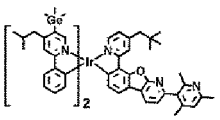
1053



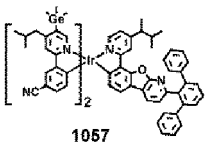
1054



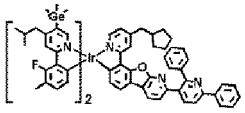
1055



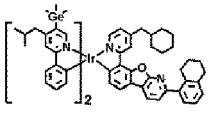
1056



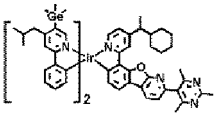
1057



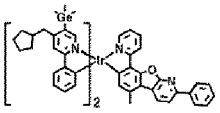
1058



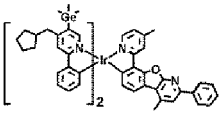
1059



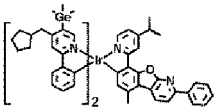
1060



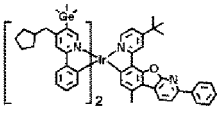
1061



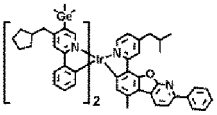
1062



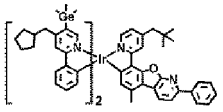
1063



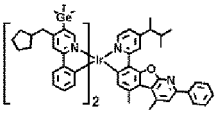
1064



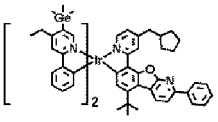
1065



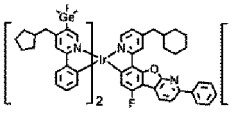
1066



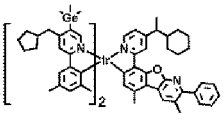
1067



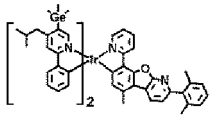
1068



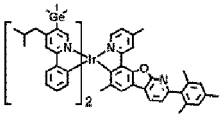
1069



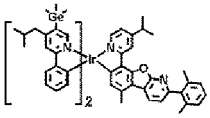
1070



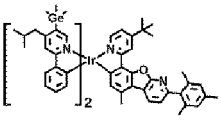
1071



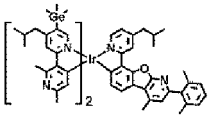
1072



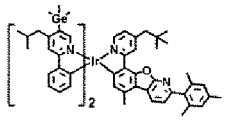
1073



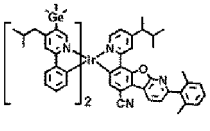
1074



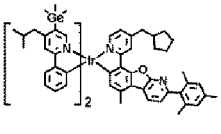
1075



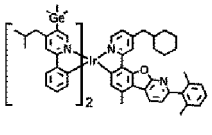
1076



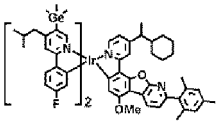
1077



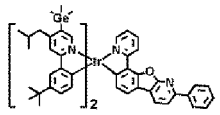
1078

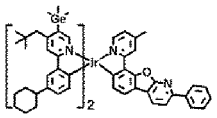


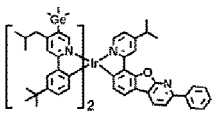
1079

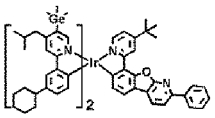


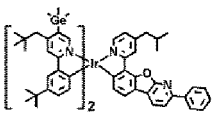
1080

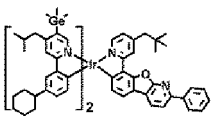

1081

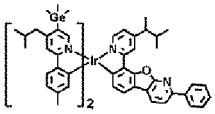

1082

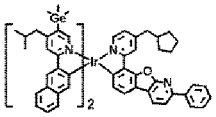

1083

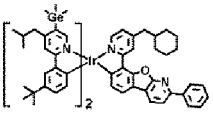

1084

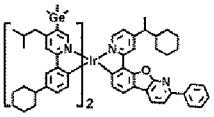

1085

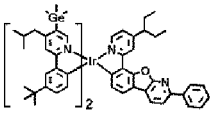

1086

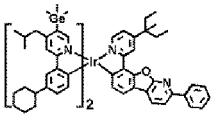

1087

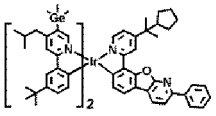

1088

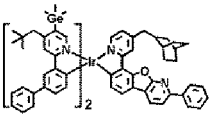

1089

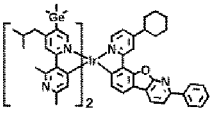

1090

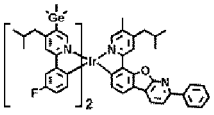

1091

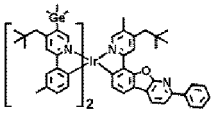

1092

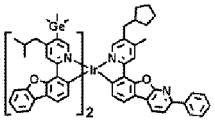

1093

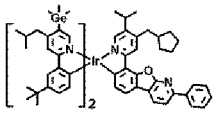

1094

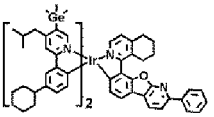

1095

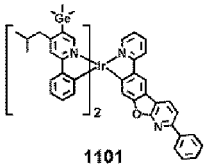

1096

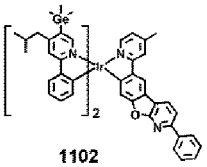

1097

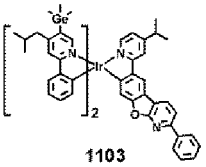

1098

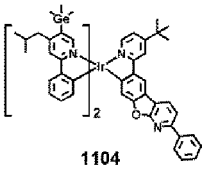

1099

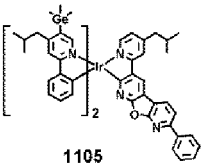

1100

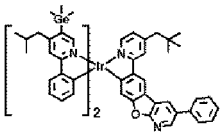

1101

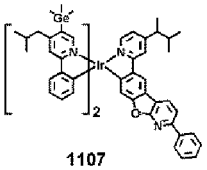

1102

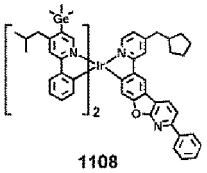

1103

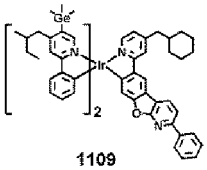

1104

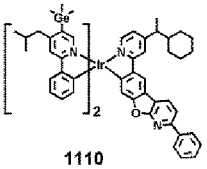

1105

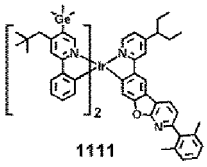

1106

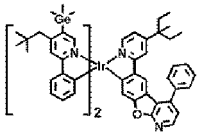

1107

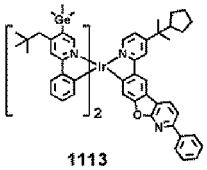

1108

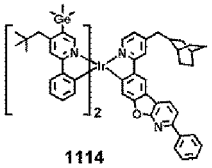

1109

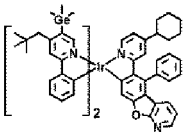

1110

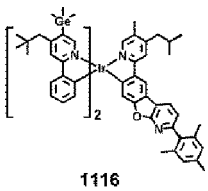

1111

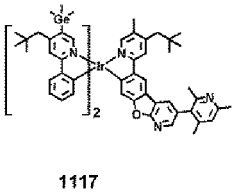

1112

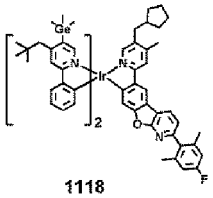

1113

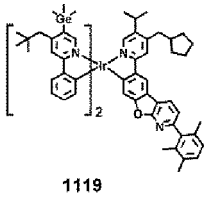

1114

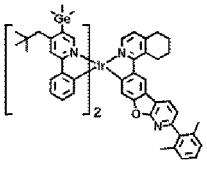

1115

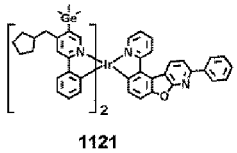

1116

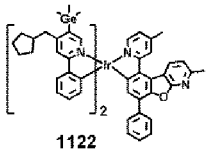

1117

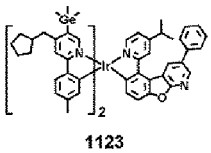

1118

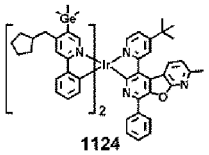

1119

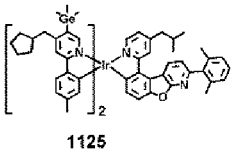

1120

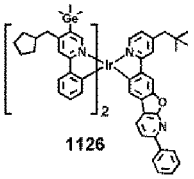

1121

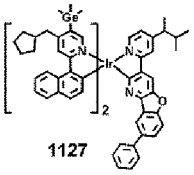

1122

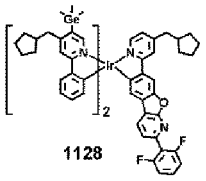

1123

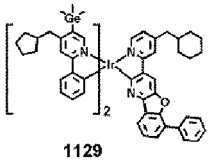

1124

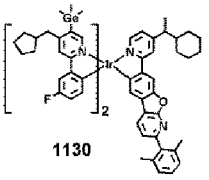

1125

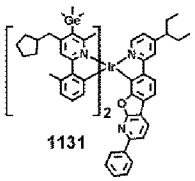

1126

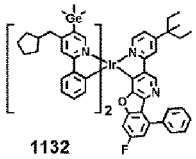

1127

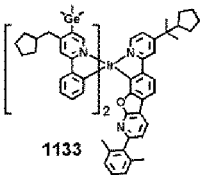

1128

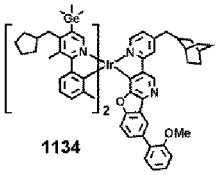

1129

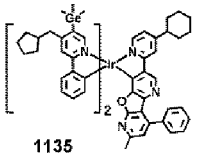

1130

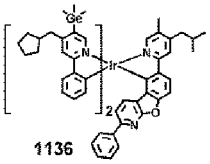

1131

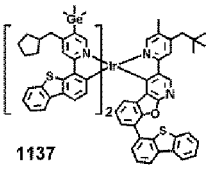

1132

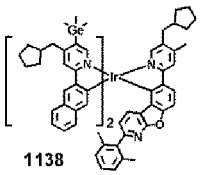

1133

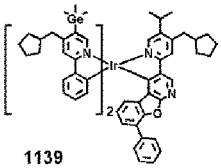

1134

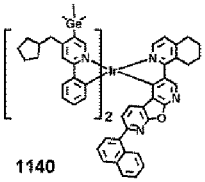

1135

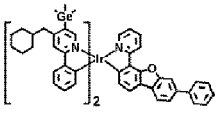

1136

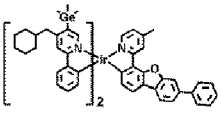

1137

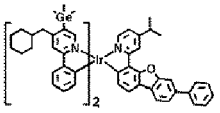

1138

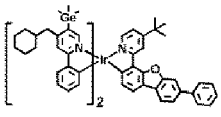

1139

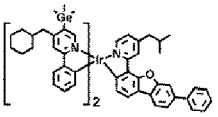

1140

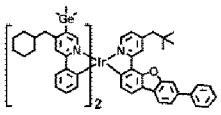

1141

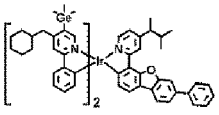

1142

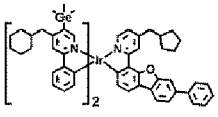

1143

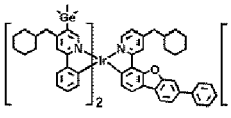

1144

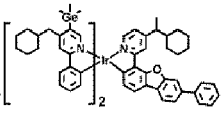

1145

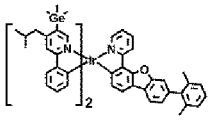

1146

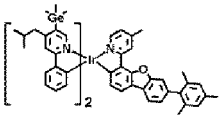

1147

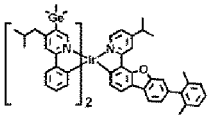

1148

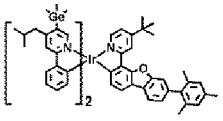

1149

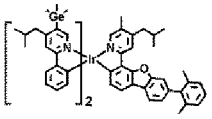

1150

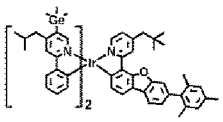

1151

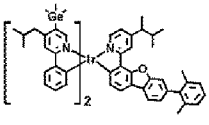

1152

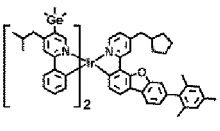

1153

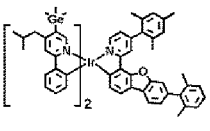

1154

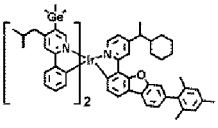

1155

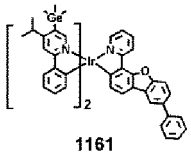

1156

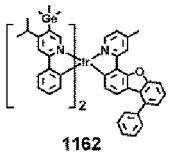

1157

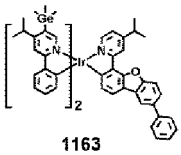

1158

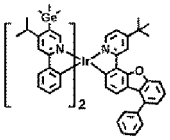

1159

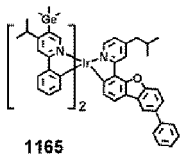

1160

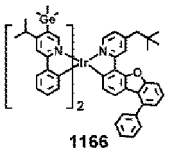

1161

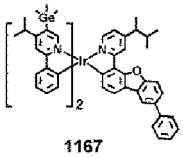

1162

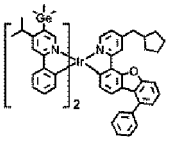

1163

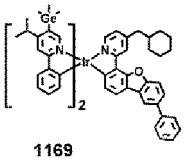

1164

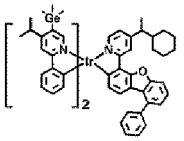

1165

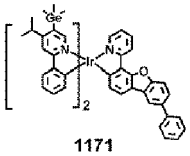

1166

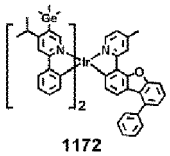

1167

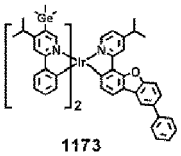

1168

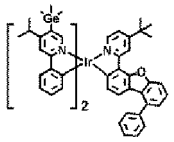

1169

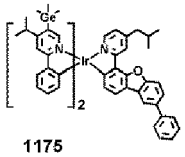

1170

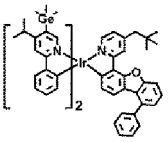

1171

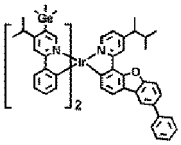

1172

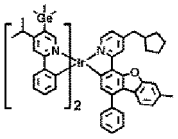

1173

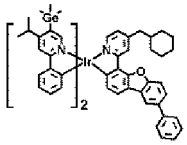

1174

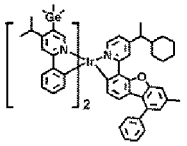

1175

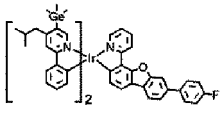

1176

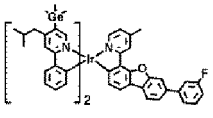

1177

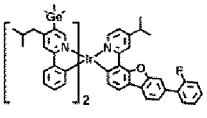

1178

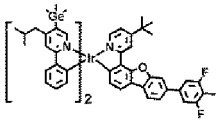

1179

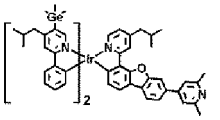

1180

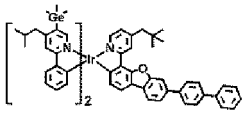

1181

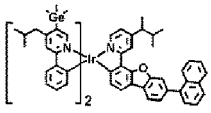

1182

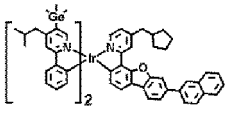

1183

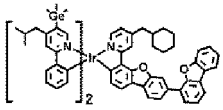

1184

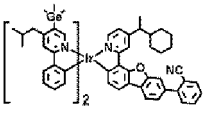

1185

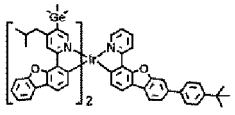

1186

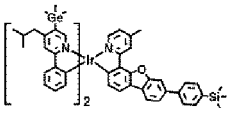

1187

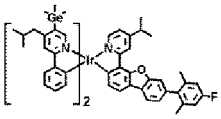

1188

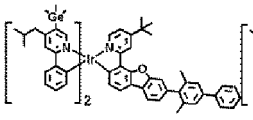

1189

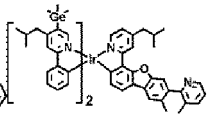

1190

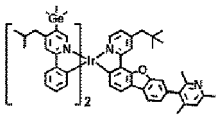

1191

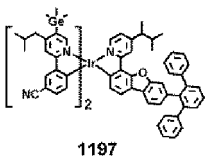

1192

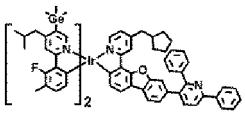

1193

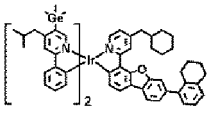

1194

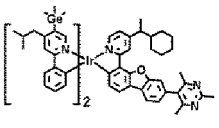

1195

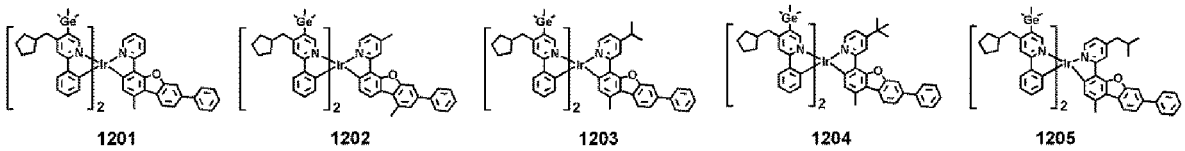

1196


1197

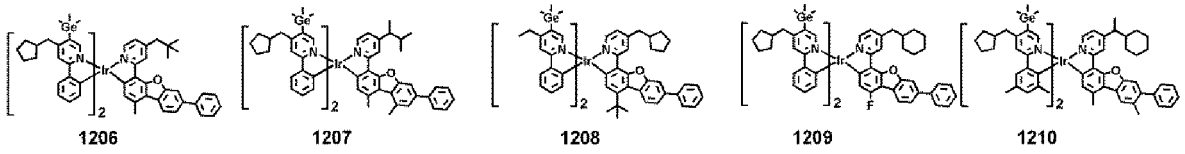

1198


1199

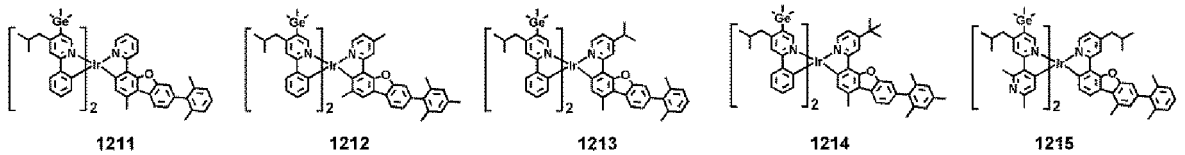

1200



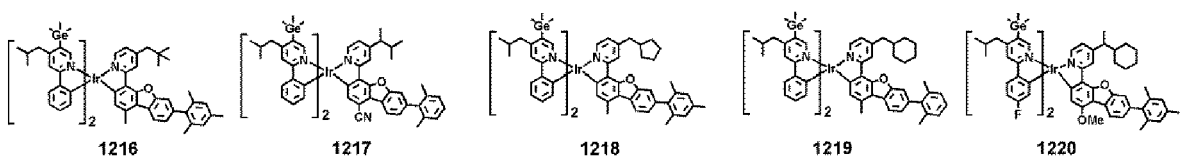
1201 1202 1203 1204 1205



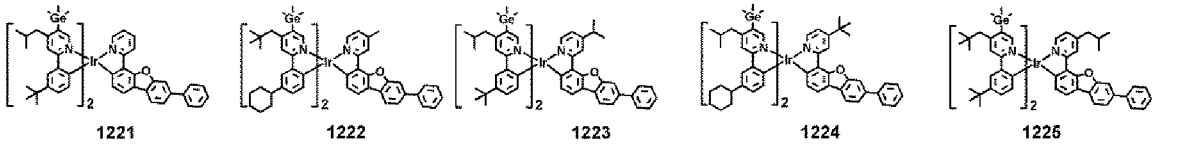
1206 1207 1208 1209 1210



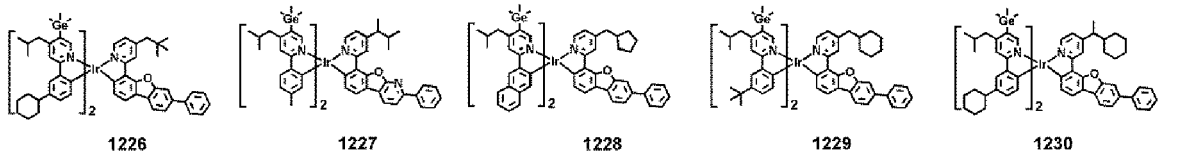
1211 1212 1213 1214 1215



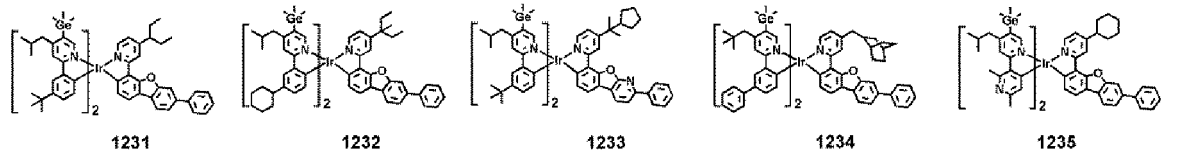
1216 1217 1218 1219 1220



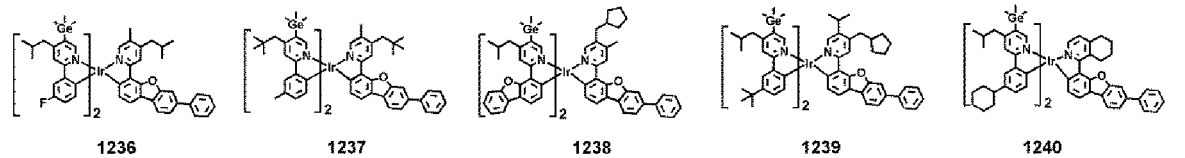
1221 1222 1223 1224 1225



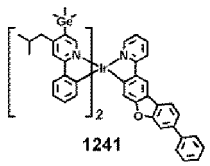
1226 1227 1228 1229 1230

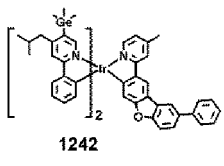


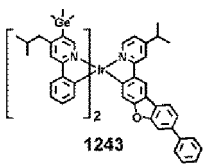
1231 1232 1233 1234 1235

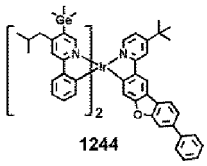


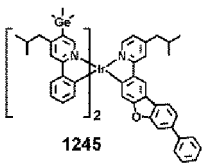
1236 1237 1238 1239 1240

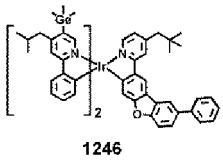

1241

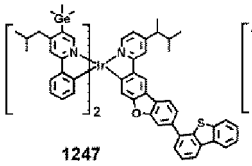

1242

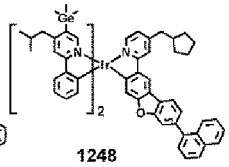

1243

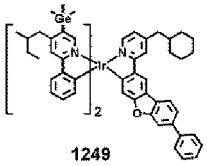

1244

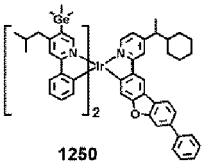

1245

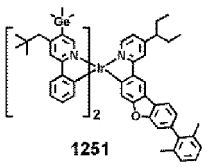

1246

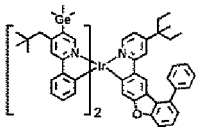

1247

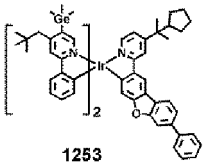

1248

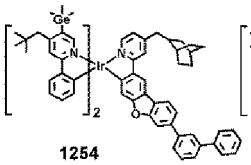

1249

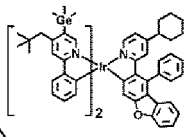

1250

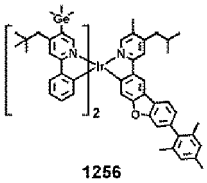

1251

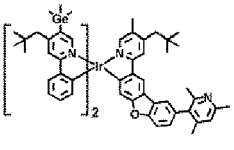

1252

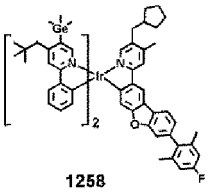

1253

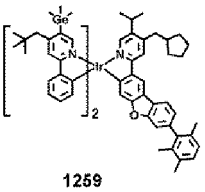

1254

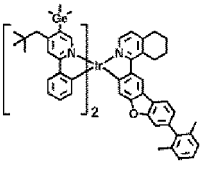

1255

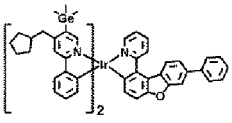

1256

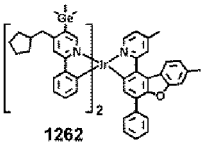

1257

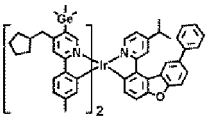

1258

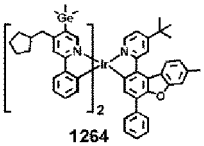

1259

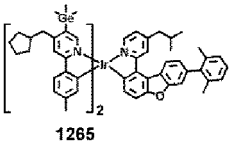

1260

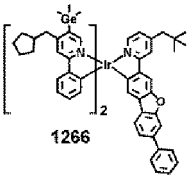

1261

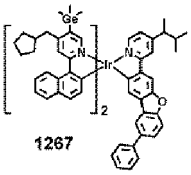

1262

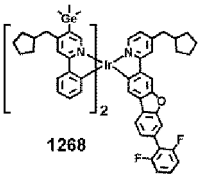

1263

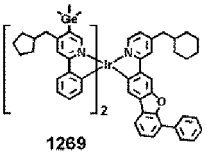

1264

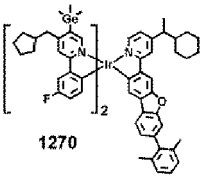

1265

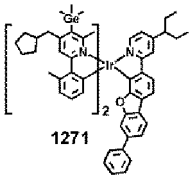

1266

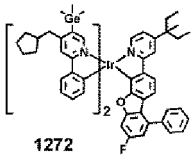

1267

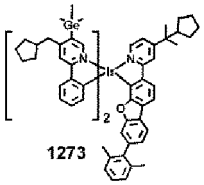

1268

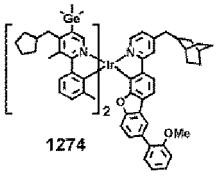

1269

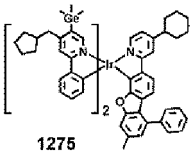

1270

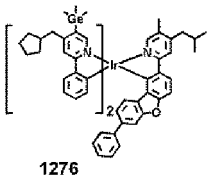

1271

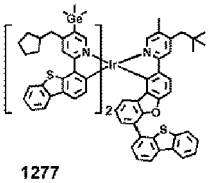

1272

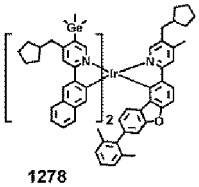

1273

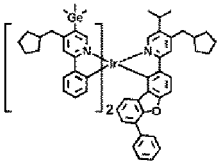

1274

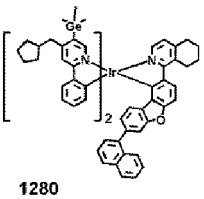

1275

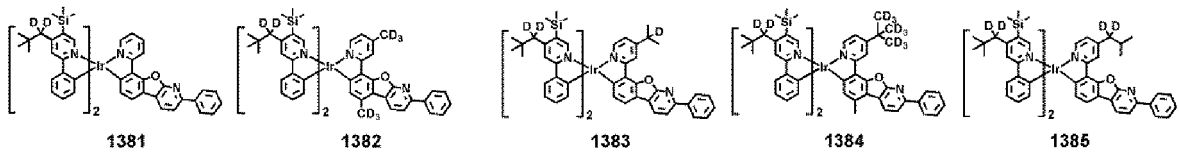

1276

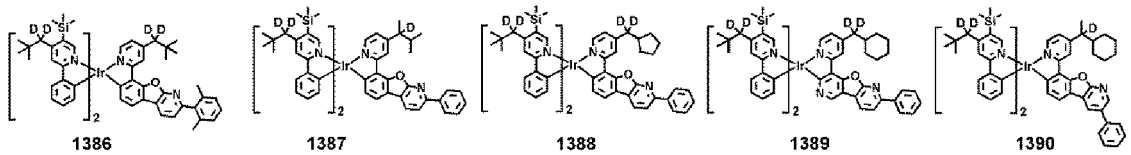

1277

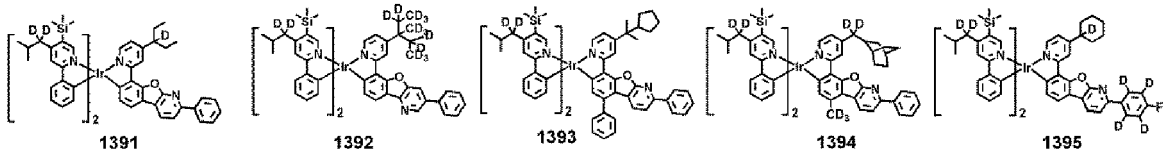

1278

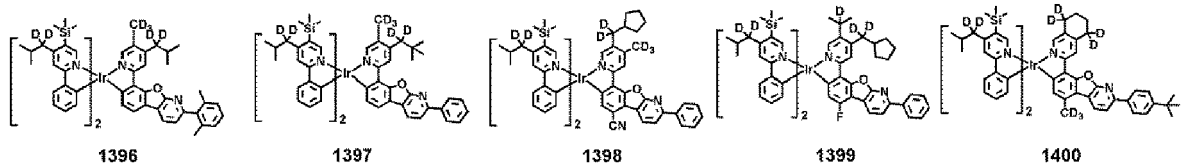

1279

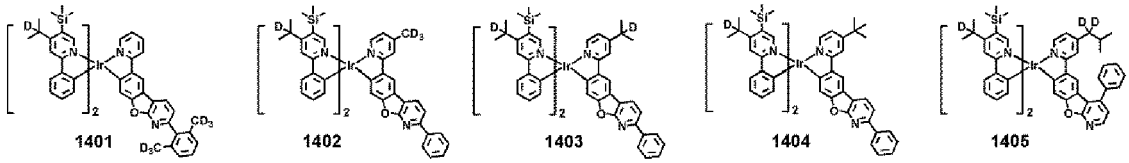

1280

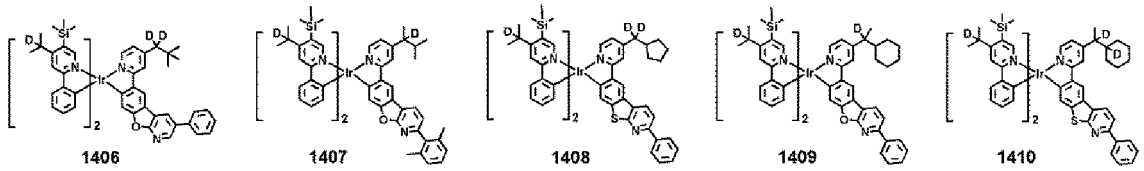

1381 1382 1383 1384 1385

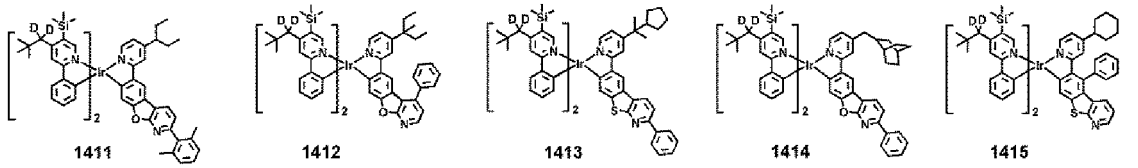

1386 1387 1388 1389 1390

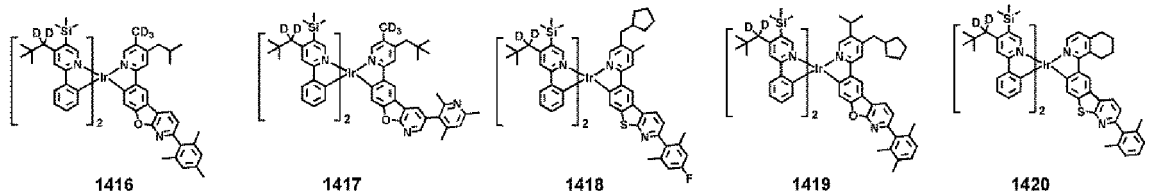

1391 1392 1393 1394 1395

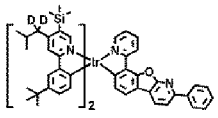

1396 1397 1398 1399 1400


1401 1402 1403 1404 1405

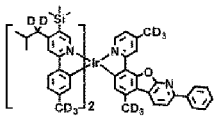

1406 1407 1408 1409 1410


1411 1412 1413 1414 1415

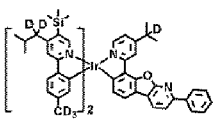

1416 1417 1418 1419 1420



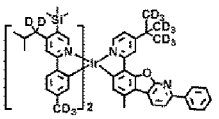
1421



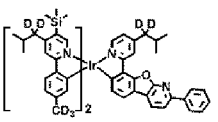
1422



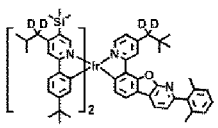
1423



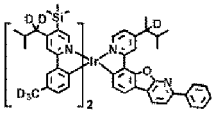
1424



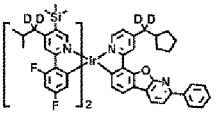
1425



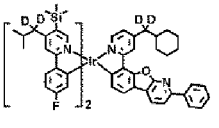
1426



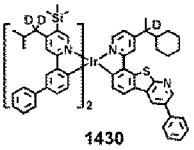
1427



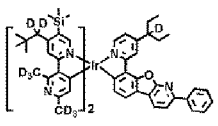
1428



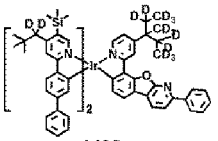
1429



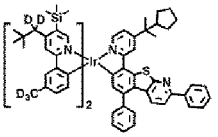
1430



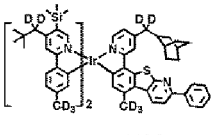
1431



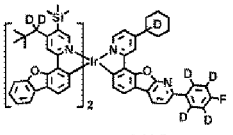
1432



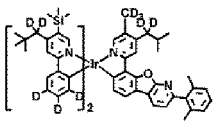
1433



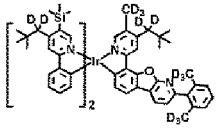
1434



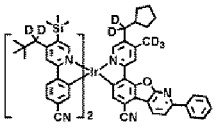
1435



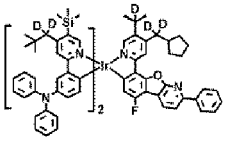
1436



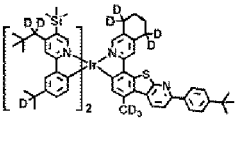
1437



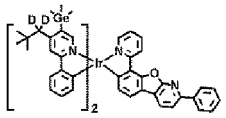
1438



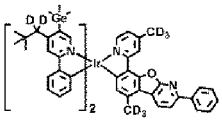
1439



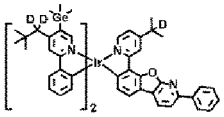
1440



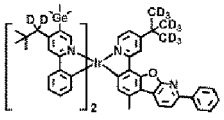
1441



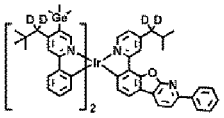
1442



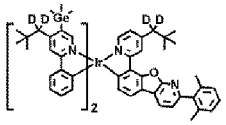
1443



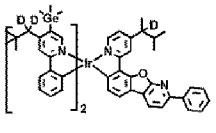
1444



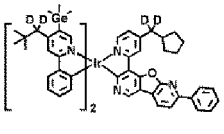
1445



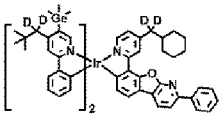
1446



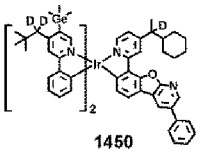
1447



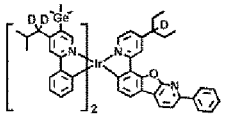
1448



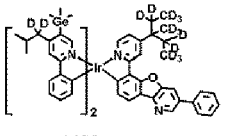
1449



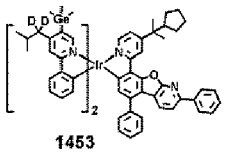
1450



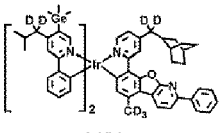
1451



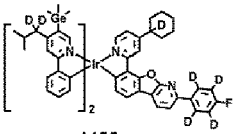
1452



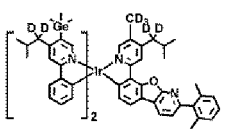
1453



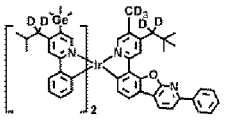
1454



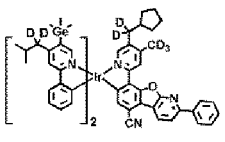
1455



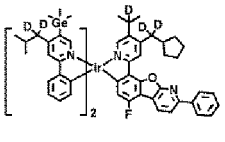
1456



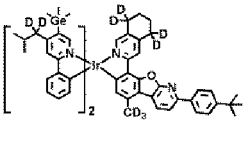
1457



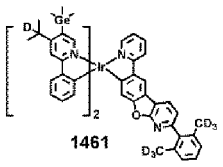
1458

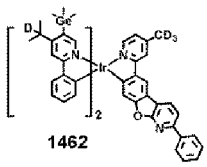


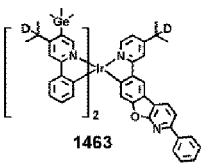
1459

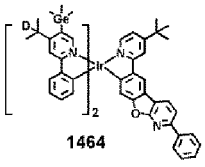


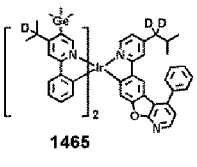
1460

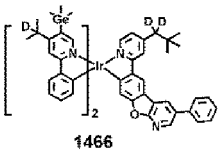

1461

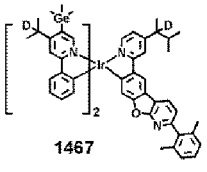

1462

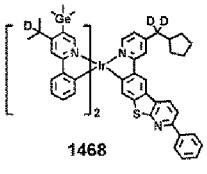

1463

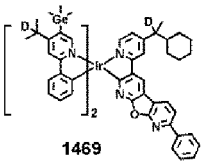

1464

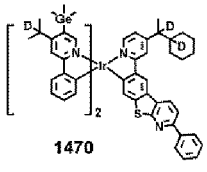

1465

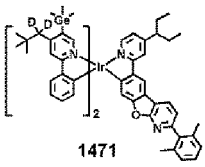

1466

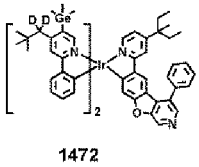

1467

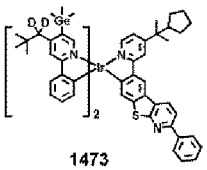

1468

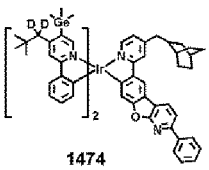

1469

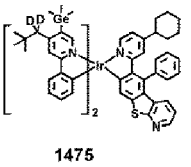

1470

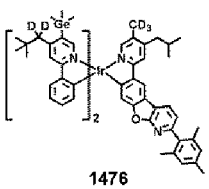

1471

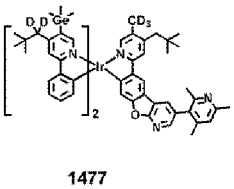

1472

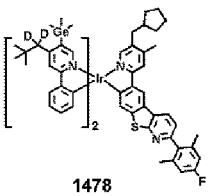

1473

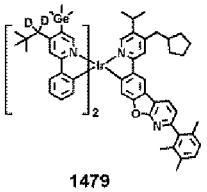

1474

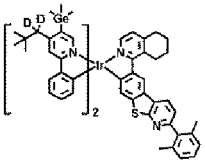

1475

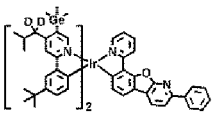

1476

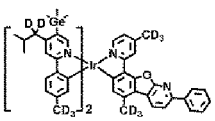

1477

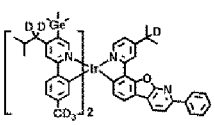

1478

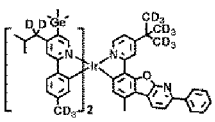

1479

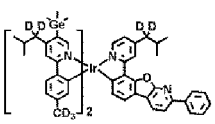

1480

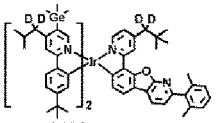

1481

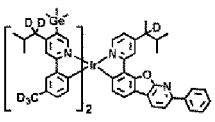

1482

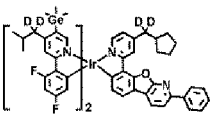

1483

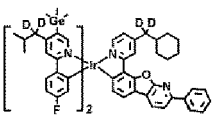

1484

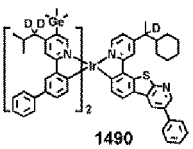

1485

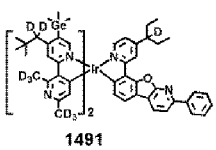

1486

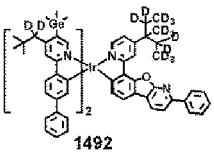

1487

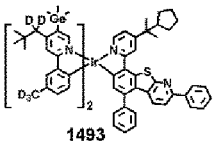

1488

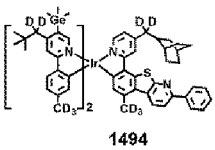

1489

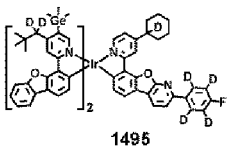

1490

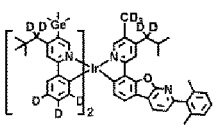

1491

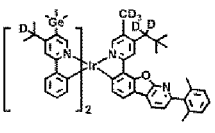

1492

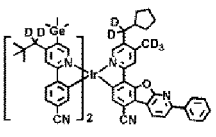

1493

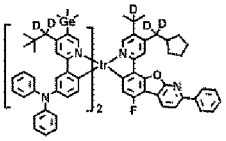

1494

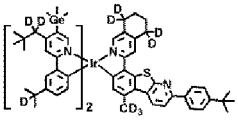

1495

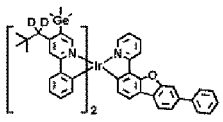

1496

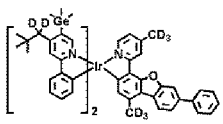

1497

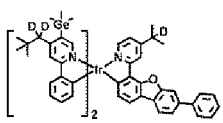

1498

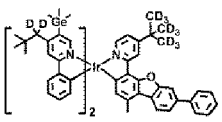

1499

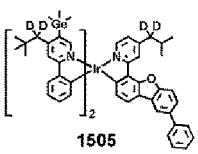

1500

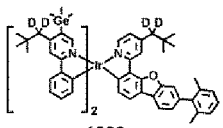

1501

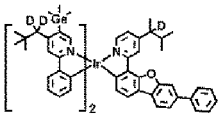

1502

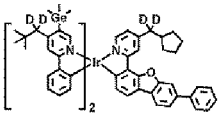

1503

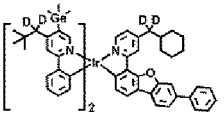

1504

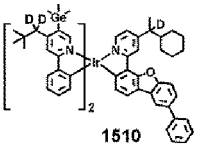

1505

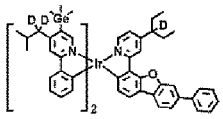

1506

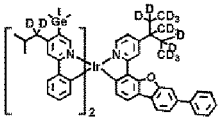

1507

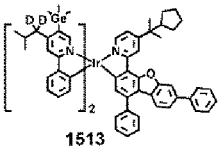

1508

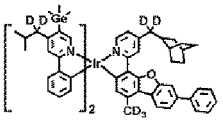

1509

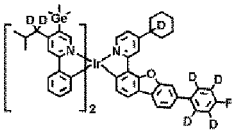

1510

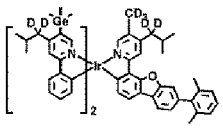

1511

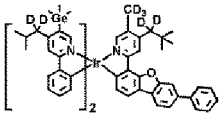

1512

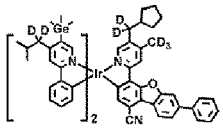

1513

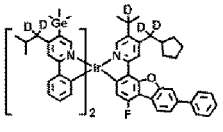

1514

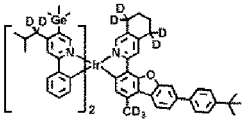

1515

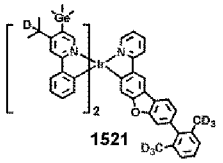

1516

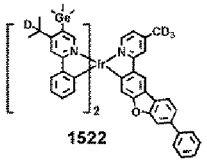

1517

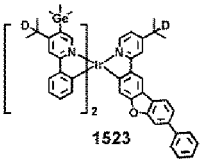

1518

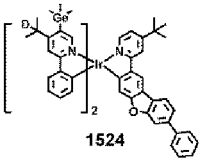

1519

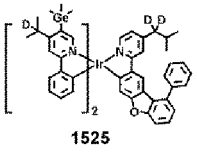

1520

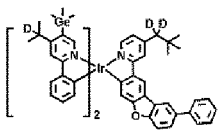

1521

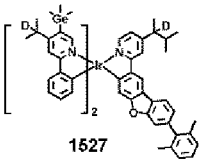

1522

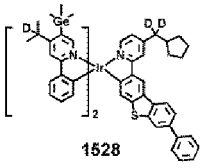

1523

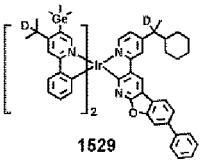

1524

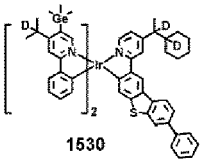

1525

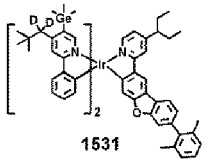

1526

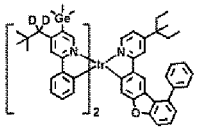

1527

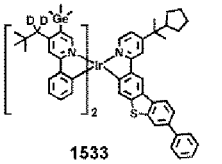

1528

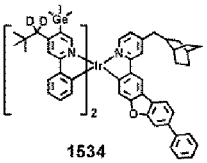

1529

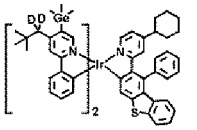

1530

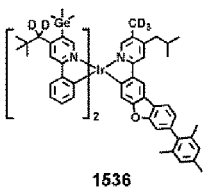

1531

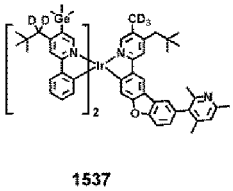

1532

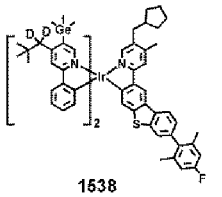

1533

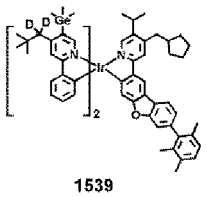

1534

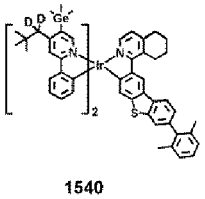

1535

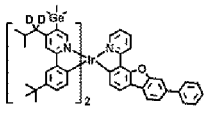

1536

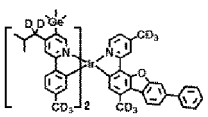

1537

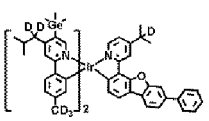

1538

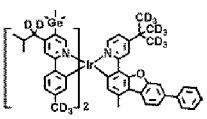

1539

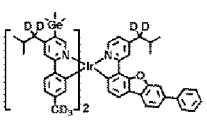

1540

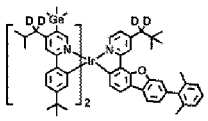

1541

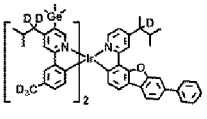

1542

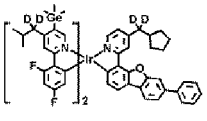

1543

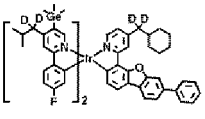

1544

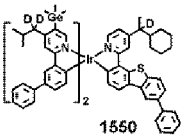

1545

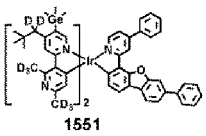

1546

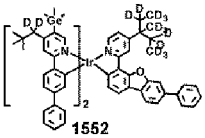

1547

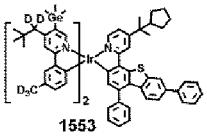

1548

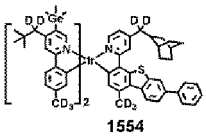

1549

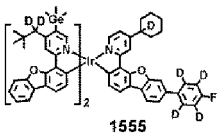

1550

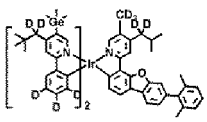

1551

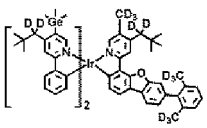

1552

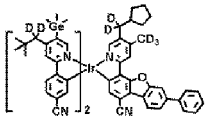

1553

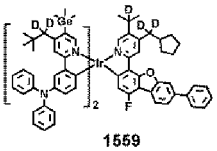

1554

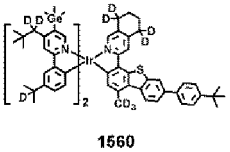

1555

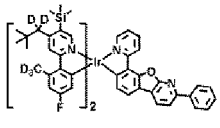

1556

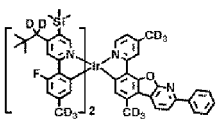

1557

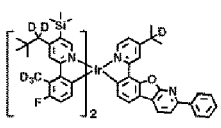

1558

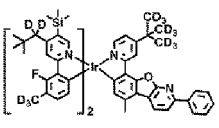

1559

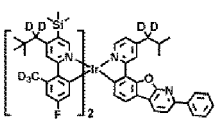

1560

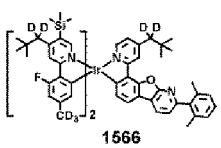

1561

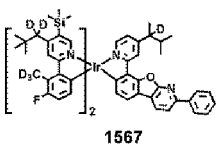

1562

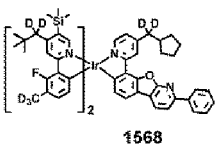

1563

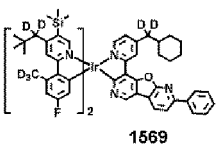

1564

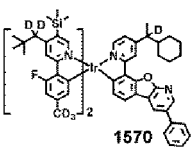

1565

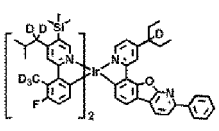

1566

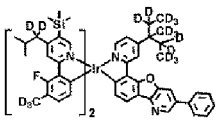

1567

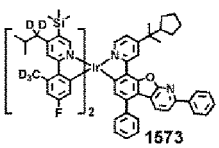

1568

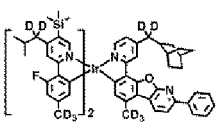

1569

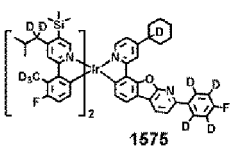

1570

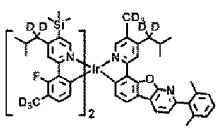

1571

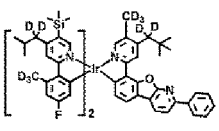

1572

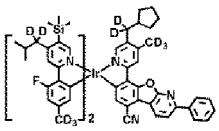

1573

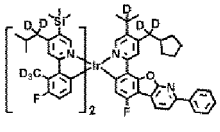

1574

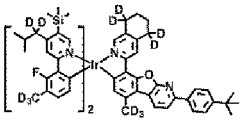

1575

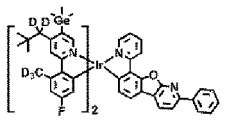

1576

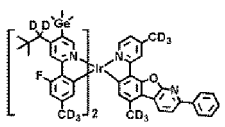

1577

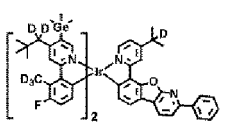

1578

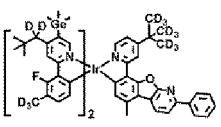

1579

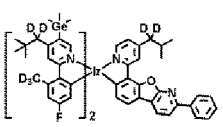

1580

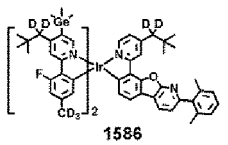

1581

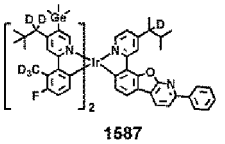

1582

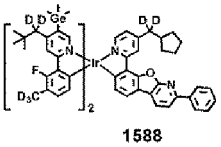

1583

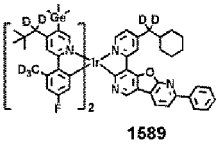

1584

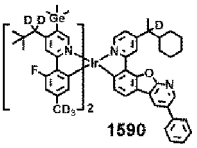

1585

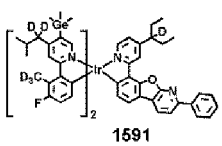

1586

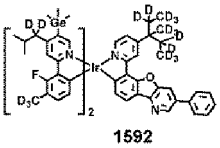

1587

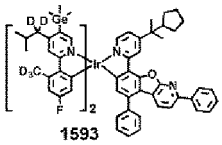

1588

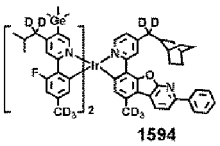

1589

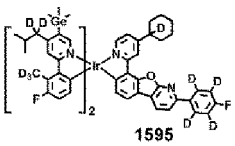

1590

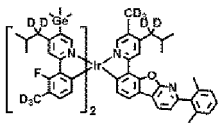

1591

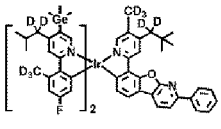

1592

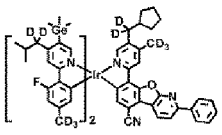

1593

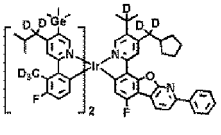

1594

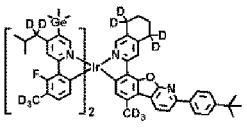

1595

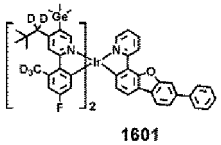

1596

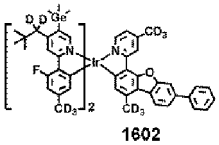

1597

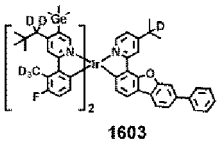

1598

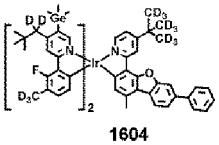

1599

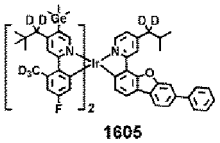

1600

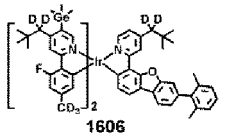

1601

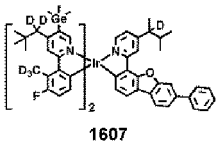

1602

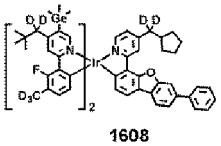

1603

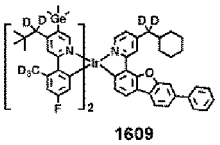

1604

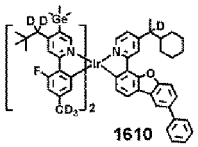

1605

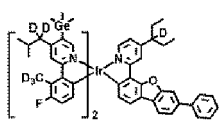

1606

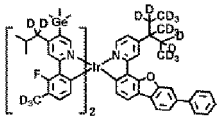

1607

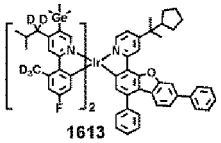

1608

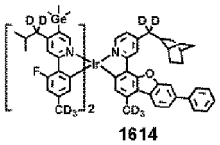

1609

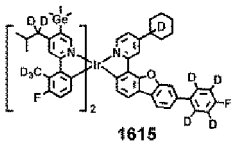

1610

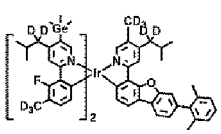

1611

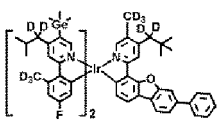

1612

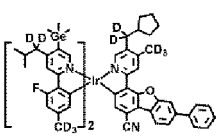

1613

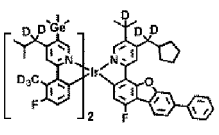

1614

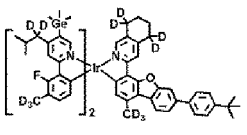

1615


1616

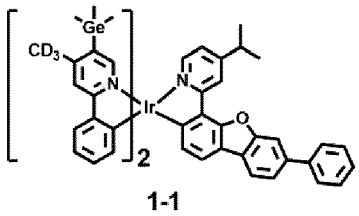

1617


1618

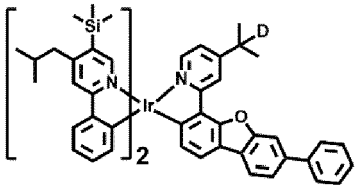

1619


1620

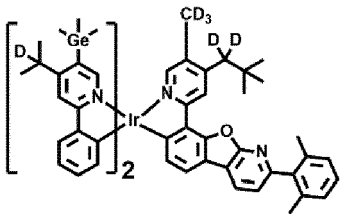
Group C



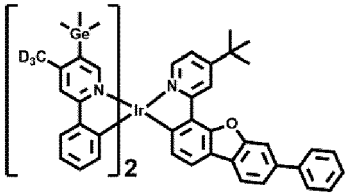
1-1



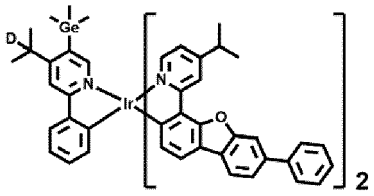
1-2



1-3



1-4



1-5

[0149] In an embodiment, L_{51} in Formula 5 may be a benzene group, a naphthalene group, a phenanthrene group, a dibenzofuran group, a dibenzothiophene group, a naphthobenzofuran group, a naphthobenzothiophene group, a dinaphthofuran group, or a dinaphthothiophene group, each unsubstituted or substituted with at least one R_{10a}, and e51 in Formula 5 may be 1, 2, or 3.

[0150] In one or more embodiments, L_{61} in Formula 5 may be a benzene group, a naphthalene group, a phenanthrene group, a dibenzofuran group, a dibenzothiophene group, a naphthobenzofuran group, a naphthobenzothiophene group, a dinaphthofuran group, a dinaphthothiophene group, a fluorene group, a spirobifluorene group, a benzofluorene group, or a dibenzofluorene group, each unsubstituted or substituted with at least one R_{10a}, and at least one of L_{61}(s) in the number of e61 may be a fluorene group, a spirobifluorene group, a benzofluorene group, or a dibenzofluorene group.

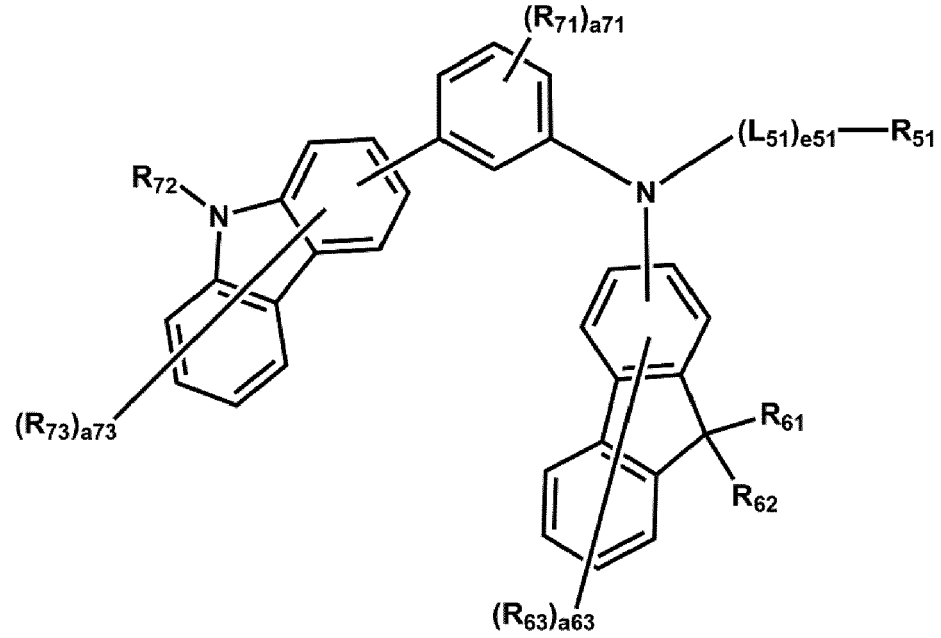
[0151] In this regard, R_{10a} may be:

hydrogen, deuterium, -F, or a cyano group;
a C_1-C_{20} alkyl group unsubstituted or substituted with deuterium, -F, a cyano group, or any combination thereof; or a phenyl group or a biphenyl group, each unsubstituted or substituted with deuterium, -F, a cyano group, a C_1-C_{20} alkyl group, a deuterated C_1-C_{20} alkyl group, a fluorinated C_1-C_{20} alkyl group, a phenyl group, a deuterated phenyl group, a fluorinated phenyl group, a (C_1-C_{20} alkyl)phenyl group, a biphenyl group, a deuterated biphenyl group, a fluorinated biphenyl group, a (C_1-C_{20} alkyl)biphenyl group, or any combination thereof.

[0152] In one or more embodiments, e61 in Formula 5 may be 1.

[0153] In one or more embodiments, the second compound may be a compound represented by Formula 5A:

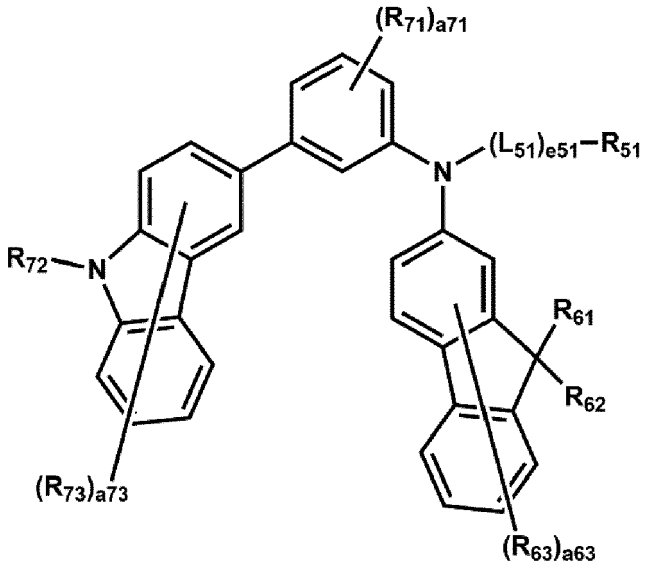
Formula 5A



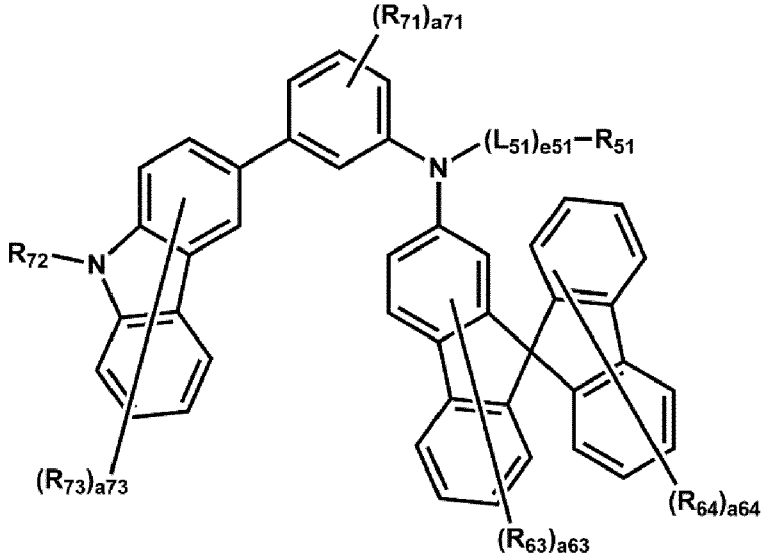
wherein, in Formula 5A,
L_{51}, e51, R_{51}, R_{61}, R_{71} to R_{73}, a71, and a73 are respectively the same as those described herein,
R_{62} and R_{63} are each the same as described in connection with R_{10a}, and
a63 may be an integer from 0 to 7.

[0154] In one or more embodiments, the second compound may be a compound represented by Formula 5-1 or 5-2:

Formula 5-1



Formula 5-2

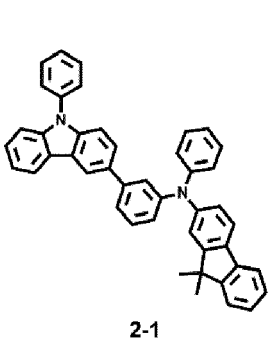


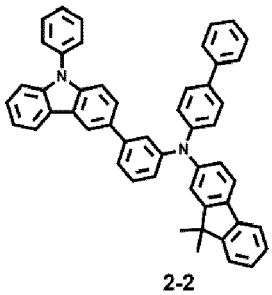
wherein, in Formulae 5-1 and 5-2,
L_{51}, e51, R_{51}, R_{61}, R_{71} to R_{73}, a71, and a73 are respectively the same as those described herein,
R_{62} to R_{64} are each the same as described in connection with R_{10a},
a63 may be an integer from 0 to 7, and
a64 may be an integer from 0 to 8.

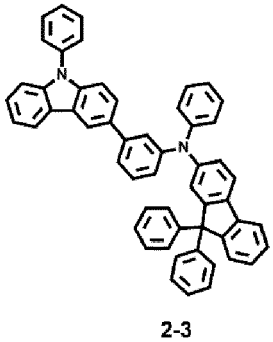
[0155] In one or more embodiments, a dipole moment of the second compound may be in a range of about 1.0 debye to about 5.0 debye, about 1.0 debye to about 4.5 debye, about 1.0 debye to about 4.0 debye, about 1.0 debye to about 3.5 debye, about 1.0 debye to about 3.0 debye, about 1.0 debye to about 2.5 debye, about 1.5 debye to about 5.0 debye, about 1.5 debye to about 4.5 debye, about 1.5 debye to about 4.0 debye, about 1.5 debye to about 3.5 debye, about 1.5 debye to about 3.0 debye, about 1.5 debye to about 2.5 debye, about 2.0 debye to about 5.0 debye, about 2.0 debye to about 4.5 debye, about 2.0 debye to about 4.0 debye, about 2.0 debye to about 3.5 debye, about 2.0 debye to about 3.0 debye, or about 2.0 debye to about 2.5 debye. When the dipole moment of the second compound is within the range described above, the hardness of a buffer layer may be improved, thereby improving the hole transport ability of the buffer layer, and thus, the luminescence efficiency and lifespan of an organic light-emitting device using the buffer layer may be improved.

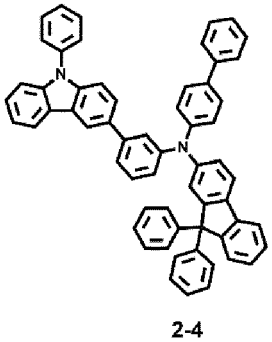
[0156] The "dipole moment" as used herein may be evaluated based on density functional theory (DFT).

[0157] In one or more embodiments, the second compound represented by Formula 5 may be one of Compounds 2-1 to 2-4:


2-1


2-2


2-3


2-4

[0158] In the light-emitting device including the emission layer and the buffer layer as described herein, wherein the emission layer and the buffer layer include the first compound represented by Formula 1 and the second compound represented by Formula 5, respectively, and the buffer layer is in direct contact with the emission layer, holes may be smoothly transported from the buffer layer to the emission layer, and thus, the driving voltage of the light-emitting device

may be reduced, and the charge balance with respect to injection of holes and electrons, i.e., the hole-electron charge balance, in the light-emitting device may be improved. Accordingly, the stability of the light-emitting device may be improved, and thus, the luminescence efficiency and lifespan of the light-emitting device may be improved at the same time.

[0159] The emission layer of the light-emitting device may further include, in addition to the first compound, a host that is different from the first compound. That is, the first compound may act as a dopant or an emitter in the emission layer.

[0160] The host may be a hole-transporting compound, an electron-transporting compound, a bipolar compound, or any combination thereof. The hole-transporting compound, the electron-transporting compound, and the bipolar compound may be different from each other.

[0161] For example, the host may include the hole-transporting compound.

[0162] In one or more embodiments, the host may include the hole-transporting compound and the electron-transporting compound.

[0163] The hole-transporting compound may not include an electron-transporting group.

[0164] The "electron-transporting group" as used herein may be, for example, a π-electron deficient nitrogen-containing cyclic group, a cyano group, a phosphine oxide group, a sulfoxide group, or the like.

[0165] The "π-electron deficient nitrogen-containing cyclic group" as used herein may be a C_1-C_{60} heterocyclic group which has, as a ring-forming moiety, at least one *-N=*' moiety. Examples of the π-electron deficient nitrogen-containing cyclic group may include a triazine group, an imidazole group, and the like.

[0166] For example, the hole-transporting compound may include a carbazole group.

[0167] The electron-transporting compound may include at least one electron-transporting group.

[0168] For example, the electron-transporting compound may include a triazine group.

[0169] In an embodiment, the electron-transporting compound may include a triazine group and a carbazole group.

[0170] In one or more embodiments, the electron-transporting compound may include a triazine group, a carbazole group, and a dibenzofuran group.

[0171] In one or more embodiments, the electron-transporting compound may include a triazine group, a carbazole group, and a dibenzothiophene group.

[0172] In one or more embodiments, the electron-transporting compound may include a triazine group and an indolocarbazole group.

[0173] An amount (for example, a weight) of the host may be greater than an amount (for example, a weight) of the first compound.

[0174] In an embodiment, the emission layer may further include a host, and the host in the emission layer may not include the same compound as the second compound included in the buffer layer.

[0175] In one or more embodiments, the emission layer may further include a host, the host may include the hole-transporting compound, and an absolute value of a highest occupied molecular orbital (HOMO) energy level of the second compound included in the buffer layer may be smaller than an absolute value of a HOMO energy level of the hole-transporting compound included in the host.

[0176] In one or more embodiments, the emission layer may further include a host, the host may include the hole-transporting compound, and a difference between an absolute value of a HOMO energy level of the second compound included in the buffer layer and an absolute value of a HOMO energy level of the hole-transporting compound included in the host may be 0.25 eV or less, for example, in a range of about 0 eV to about 0.25 eV, about 0 eV to about 0.23 eV, about 0 eV to about 0.20 eV, about 0.05 eV to about 0.25 eV, about 0.05 eV to about 0.23 eV, about 0.05 eV to about 0.20 eV, about 0.1 eV to about 0.25 eV, about 0.1 eV to about 0.23 eV, or about 0.1 eV to about 0.20 eV. When the difference between the absolute values of the HOMO energy levels of the second compound in the buffer layer and the hole-transporting compound in the host is within the range described above, a hole-trap phenomenon may be relatively reduced, and thus, the luminescence efficiency and lifespan of the light-emitting device may be improved.

[0177] In one or more embodiments, the emission layer may emit green light.

[0178] In one or more embodiments, the emission layer may emit green light having a maximum emission wavelength (or emission peak wavelength) in a range of about 500 nm to about 560 nm.

[0179] In one or more embodiments, the light-emitting device may further include a hole transport layer arranged between the first electrode and the buffer layer, the hole transport layer may be in direct contact with the buffer layer, and the hole transport layer may include a third compound, wherein the third compound may be different from the second compound included in the buffer layer.

[0180] For example, an absolute value of a HOMO energy level of the second compound included in the buffer layer may be greater than an absolute value of a HOMO energy level of the third compound included in the hole transport layer.

[0181] For example, a difference between the absolute value of the HOMO energy level of the second compound and the absolute value of the HOMO energy level of the third compound may be in a range of about 0 eV to about 0.20 eV, about 0 eV to about 0.15 eV, about 0 eV to about 0.10 eV, about 0.05 eV to about 0.20 eV, about 0.05 eV to about 0.15 eV, or about 0.05 eV to about 0.10 eV. When the difference between the absolute values of the HOMO energy levels

of the second compound and the third compound is within the range described above, the hole transport ability of the light-emitting device may be improved.

[0182] In an embodiment, the third compound may be a compound represented by Formula 201 described herein.

[0183] The "HOMO energy level" as used herein may be a negative value that is evaluated based on DFT.

[0184] In one or more embodiments, the buffer layer may not include a p-dopant. The p-dopant is the same as described herein.

[0185] In one or more embodiments, the buffer layer may consist of the second compound as described herein.

[0186] In one or more embodiments, in the light-emitting device, the first electrode may be an anode, the second electrode may be a cathode, and the light-emitting device may further include an electron transport region arranged between the emission layer and the second electrode. The electron transport region may include a hole blocking layer, an electron transport layer, an electron injection layer, or any combination thereof.

[0187] FIG. 1 schematically illustrates a cross-sectional view of an organic light-emitting device 10, which is a light-emitting device according to an embodiment of the present disclosure. Hereinafter, the structure and manufacturing method of the organic light-emitting device 10 according to an embodiment of the present disclosure will be described with reference to FIGURE. The organic light-emitting device 10 may have a structure in which a first electrode 11, a hole transport layer 13, a buffer layer 14, an emission layer 15, an electron transport region 17, and a second electrode 19 are sequentially stacked.

[0188] A substrate may be additionally arranged under the first electrode 11 or above the second electrode 19. For use as the substrate, any substrate that is used in organic light-emitting devices available in the art may be used, and the substrate may be a glass substrate or a transparent plastic substrate, each having excellent mechanical strength, thermal stability, transparency, surface smoothness, ease of handling, and water resistance.

[0189] The first electrode 11 may be, for example, formed by depositing or sputtering a material for forming the first electrode 11 on the substrate. The first electrode 11 may be an anode. The material for forming the first electrode 11 may include materials with a high work function to facilitate hole injection. The first electrode 11 may be a reflective electrode, a semi-transmissive electrode, or a transmissive electrode. The material for forming the first electrode 11 may be indium tin oxide (ITO), indium zinc oxide (IZO), tin oxide (SnO_2), or zinc oxide (ZnO). In one or more embodiments, the material for forming the first electrode 11 may be metal, such as magnesium (Mg), aluminum (Al), silver (Ag), aluminum-lithium (Al-Li), calcium (Ca), magnesium-indium (Mg-In), or magnesium-silver (Mg-Ag).

[0190] The first electrode 11 may have a single-layered structure or a multi-layered structure including a plurality of layers. For example, the first electrode 11 may have a three-layered structure of ITO/Ag/ITO.

[0191] The hole transport layer 13, the buffer layer 14, and the emission layer 15 are sequentially stacked on the first electrode 11.

[0192] Although not shown in FIG. 1, a hole injection layer may be additionally arranged between the first electrode 11 and the hole transport layer 13.

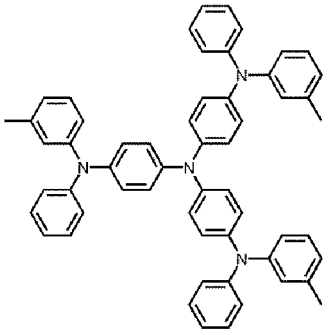
[0193] In FIG. 1, the hole transport layer 13 and the buffer layer 14 may be in direct contact with each other, and the buffer layer 14 and the emission layer 15 may be in direct contact with each other.

[0194] The hole injection layer, the hole transport layer 13, and/or the buffer layer 14 may be formed by using various methods, such as vacuum deposition, spin coating, casting, Langmuir-Blodgett (LB) deposition, and the like.

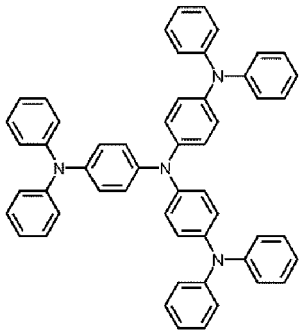
[0195] When the hole injection layer, the hole transport layer 13, and/or the buffer layer 14 are formed by vacuum deposition, the deposition conditions may vary depending on the structure and/or thermal stability of a compound to be deposited. For example, the deposition conditions may include a deposition temperature in a range of about 100 °C to about 500 °C, a vacuum pressure in a range of about 10^{-8} torr to about 10^{-3} torr, and a deposition rate in a range of about 0.01 Å/sec to about 100 Å/sec.

[0196] When the hole injection layer, the hole transport layer 13, and/or the buffer layer 14 are formed by spin coating, the coating conditions may vary depending on the structure and/or thermal stability of a compound to be coated. For example, the coating conditions may include a coating rate in a range of about 2,000 rpm to about 5,000 rpm and a heat treatment temperature in a range of about 80 °C to about 200 °C for removing a solvent after coating.

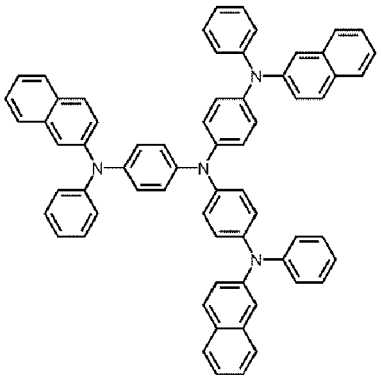
[0197] The hole injection layer and/or the hole transport layer 13 may include m-MTDATA, TDATA, 2-TNATA, NPB, β-NPB, TPD, Spiro-TPD, Spiro-NPB, methylated NPB, TAPC, HMTPD, 4,4',4"-tris(N-carbazolyl)triphenylamine (TCTA), polyaniline/dodecylbenzenesulfonic acid (PANI/DBSA), poly(3,4-ethylenedioxythiophene)/poly(4-styrenesulfonate) (PEDOT/PSS), polyaniline/camphor sulfonic acid (PANI/CSA), polyaniline/poly(4-styrenesulfonate) (PANI/PSS), a compound represented by Formula 201, a compound represented by Formula 202, or any combination thereof:



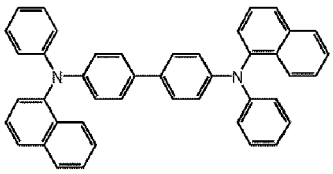
m-MTDATA



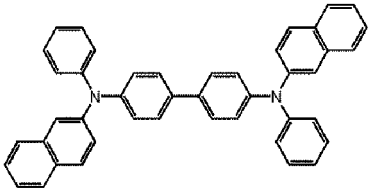
TDATA



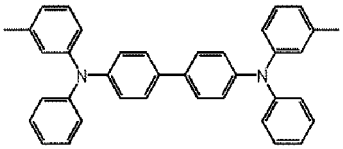
2-TNATA



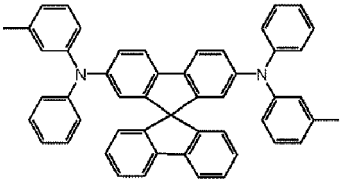
NPB



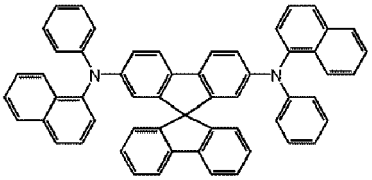
β-NPB



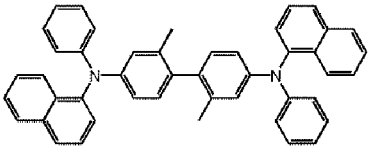
TPD



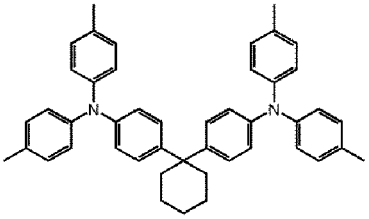
Spiro-TPD



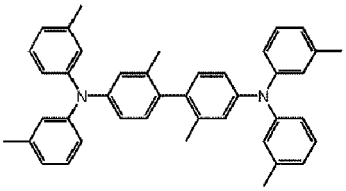
Spiro-NPB



methylated NPB

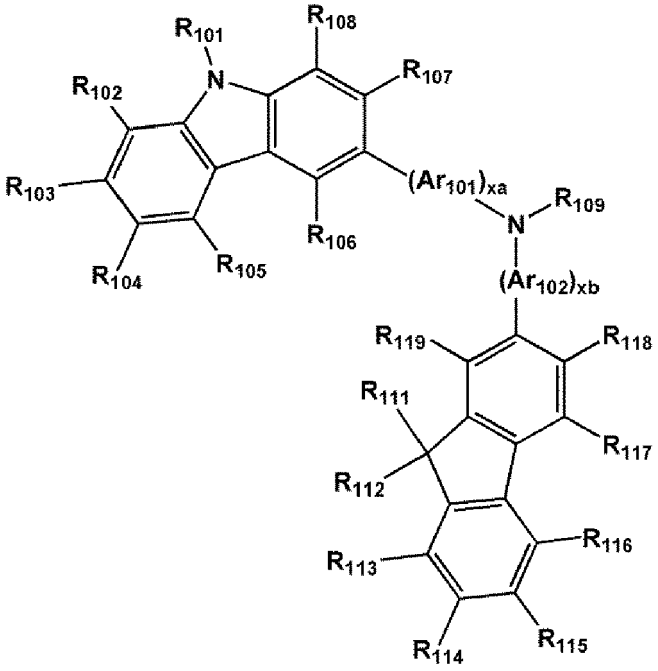


TAPC

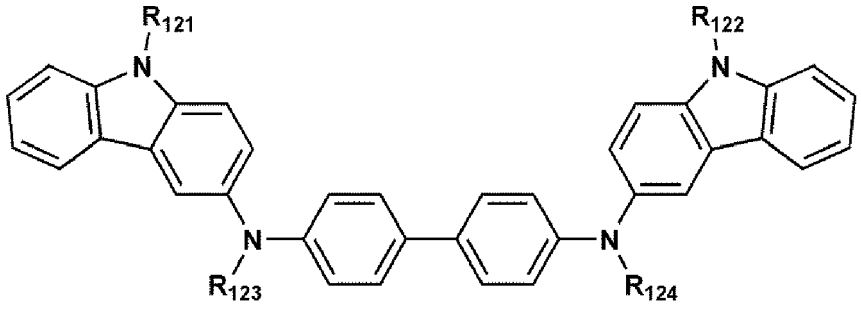


HMTPD

Formula 201



Formula 202



[0198] Ar_{101} and Ar_{102} in Formula 201 may each independently be a phenylene group, a pentalenylene group, an indenylene group, a naphthylene group, an azulenylene group, a heptalenylene group, an acenaphthylene group, a fluorenylene group, a phenalenylene group, a phenanthrenylene group, an anthracenylene group, a fluoranthenylene group, a triphenylenylene group, a pyrenylene group, a chrysenylene group, a naphthacenylene group, a picenylene group, a perylenylene group, or a pentacenylene group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, a C_3-C_{10} cycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_1-C_{10} heterocycloalkyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, or any combination thereof.

[0199] xa and xb in Formula 201 may each independently be an integer from 0 to 5, or 0, 1, or 2. For example, xa may be 1 and xb may be 0.

[0200] R_{101} to R_{108}, R_{111} to R_{119}, and R_{121} to R_{124} in Formulae 201 and 202 may each independently be:

hydrogen, deuterium, -F, -Cl, -Br, -I, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{10} alkyl group (for example, a methyl group, an ethyl group, a propyl group, a butyl group, a pentyl group, a hexyl group, etc.), or a C_1-C_{10} alkoxy group (for example, a methoxy group, an ethoxy group, a propoxy group, a butoxy group, a pentoxy group, etc.);

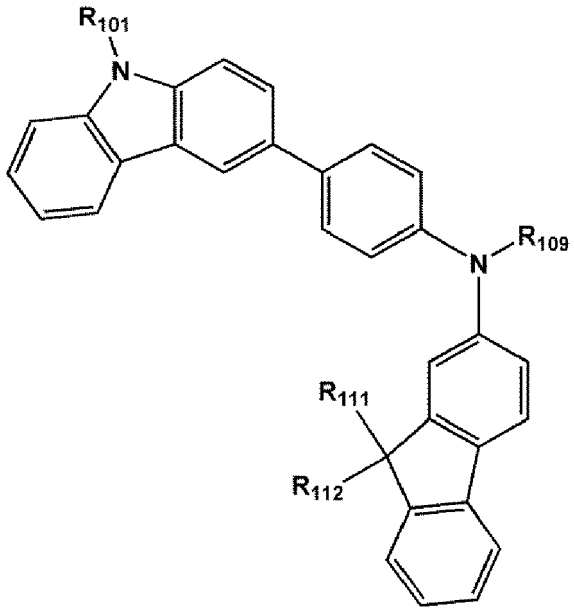
a C_1-C_{10} alkyl group or a C_1-C_{10} alkoxy group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, or any combination thereof; or

a phenyl group, a naphthyl group, an anthracenyl group, a fluorenyl group, or a pyrenyl group, each unsubstituted or substituted with deuterium, - F, -Cl, -Br, -I, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{10} alkyl group, a C_1-C_{10} alkoxy group, or any combination thereof.

[0201] R_{109} in Formula 201 may be a phenyl group, a naphthyl group, an anthracenyl group, or a pyridinyl group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{20} alkyl group, a C_1-C_{20} alkoxy group, a phenyl group, a naphthyl group, an anthracenyl group, a pyridinyl group, or any combination thereof.

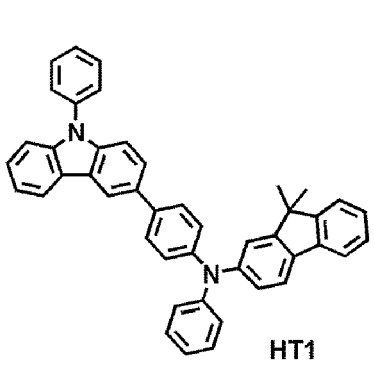
[0202] In an embodiment, the compound represented by Formula 201 may be represented by Formula 201A:

Formula 201A

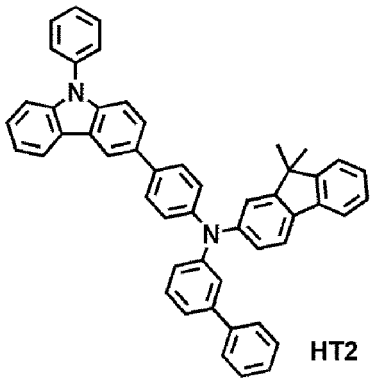


wherein, in Formula 201A, R_{101}, R_{111}, R_{112}, and R_{109} are respectively the same as those described herein.

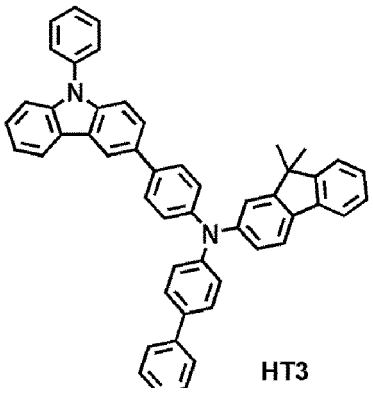
[0203] For example, the hole injection layer and/or the hole transport layer 13 may include one of Compounds HT1 to HT20 or any combination thereof:



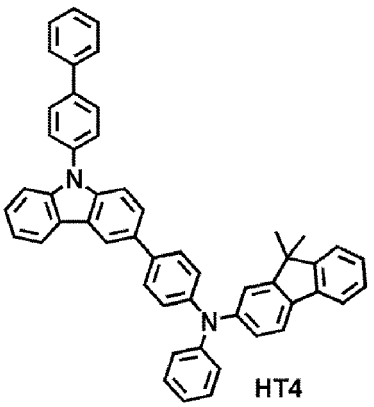
HT1



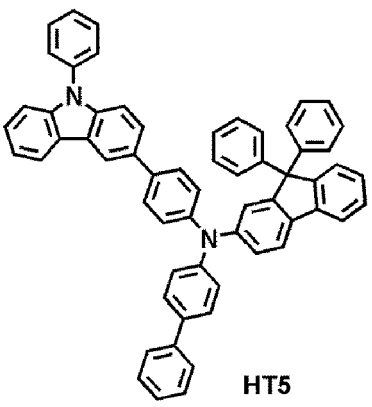
HT2



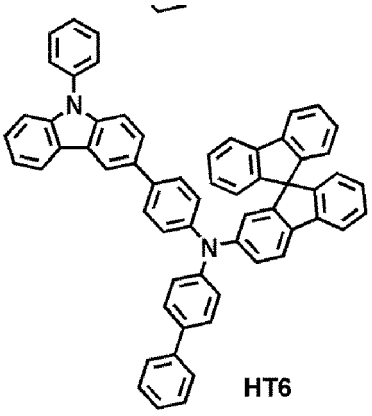
HT3



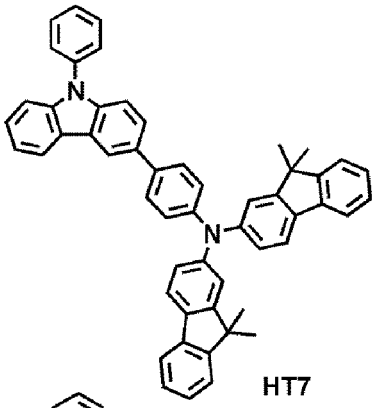
HT4



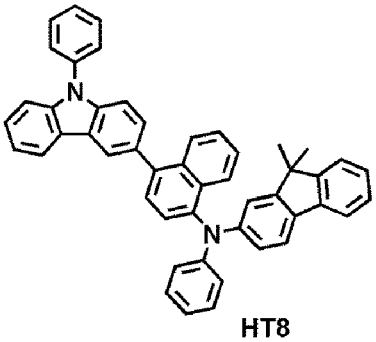
HT5



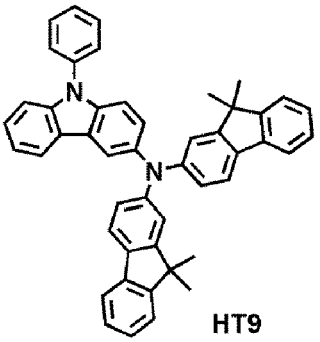
HT6



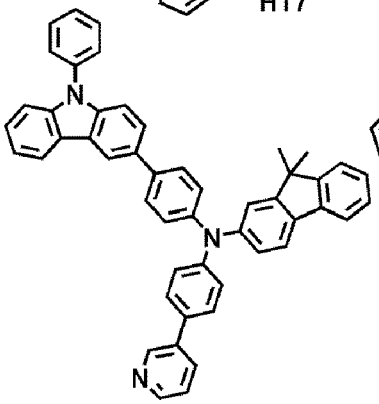
HT7



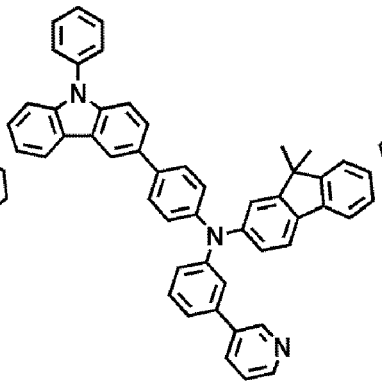
HT8



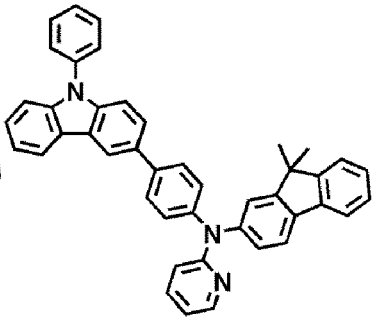
HT9



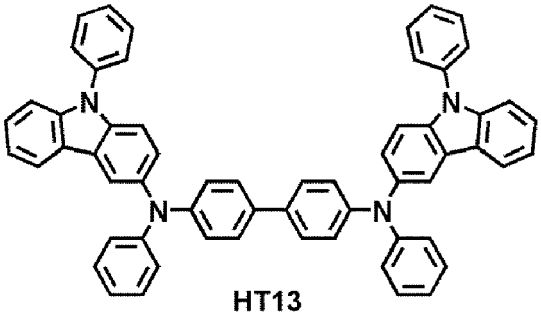
HT10



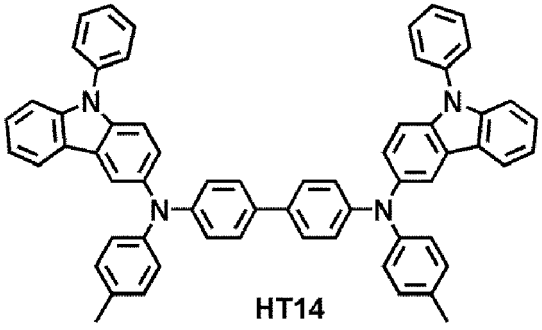
HT11



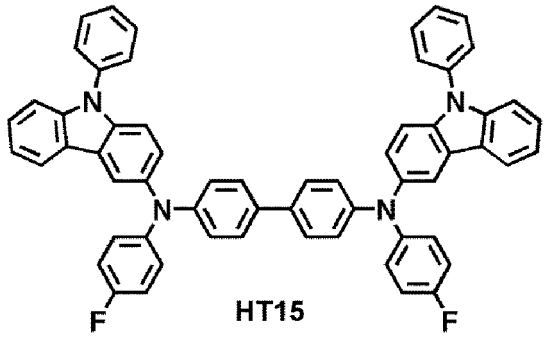
HT12



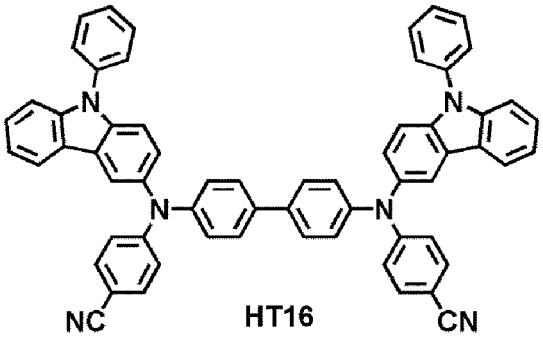
HT13



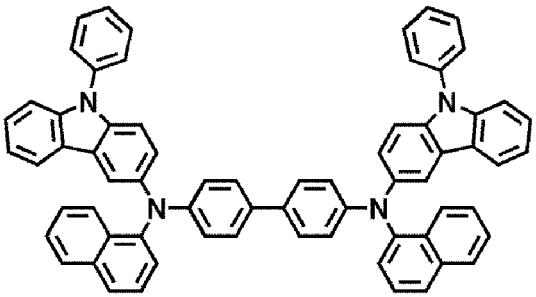
HT14



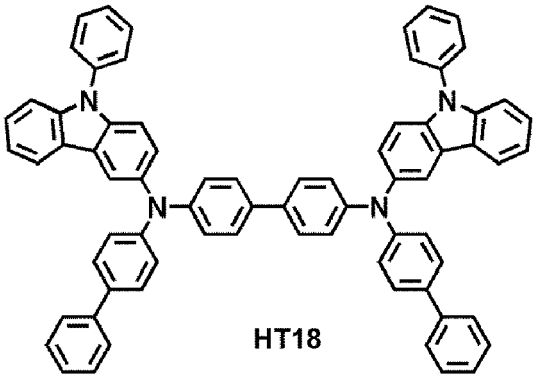
HT15



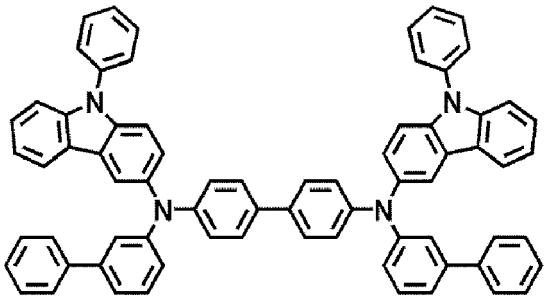
HT16



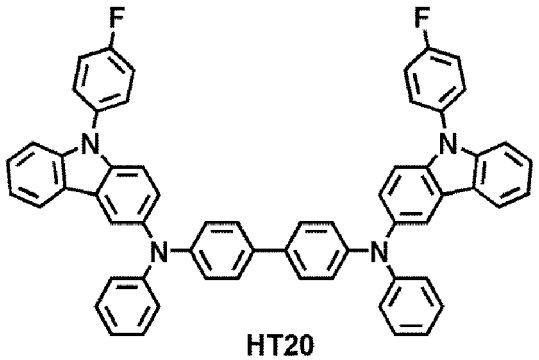
HT17



HT18



HT19

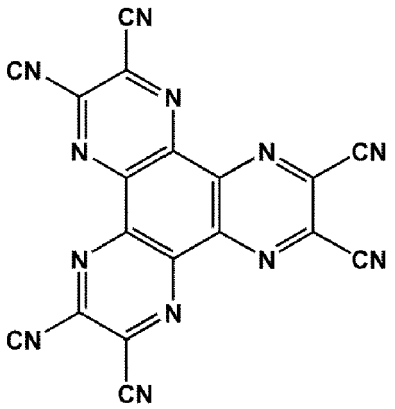


HT20

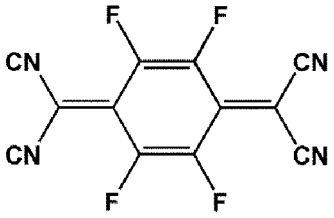
[0204] A thickness of the hole injection layer and a thickness of the hole transport layer 13 may each be in a range of about 100 Å to about 10,000 Å, for example, about 100 Å to about 2,000 Å. When the thicknesses of the hole injection layer and the hole transport layer 13 are each in the range described above, satisfactory hole transporting characteristics may be obtained without a substantial increase in driving voltage.

[0205] At least one of the hole injection layer and the hole transport layer 13 may further include, in addition to the materials described above, a charge-generation material for improving conductive properties. The charge-generation material may be homogeneously or non-homogeneously dispersed in the hole transport region.

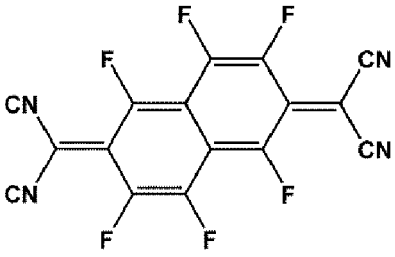
[0206] The charge-generation material may be, for example, a p-dopant. The p-dopant may be a quinone derivative, a metal oxide, a cyano group-containing compound, or any combination thereof. For example, the p-dopant may be: a quinone derivative such as tetracyanoquinonedimethane (TCNQ), 2,3,5,6-tetrafluoro-tetracyano-1,4-benzoquinonedimethane (F4-TCNQ), or F6-TCNNQ; metal oxide, such as tungsten oxide and molybdenum oxide; a cyano group-containing compound, such as Compound HT-D1; or any combination thereof:



HT-D1



F4-TCNQ



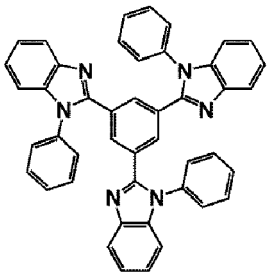
F6-TCNNQ

[0207] The buffer layer 14 may include the second compound represented by Formula 5 as described herein.

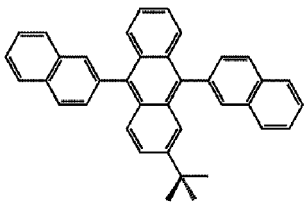
[0208] A thickness of the buffer layer 14 may be in a range of about 100 Å to about 5,000 Å, for example, about 100 Å to about 1,500 Å. When the thickness of the buffer layer 14 is within the range described above, satisfactory hole transporting characteristics may be obtained without a substantial increase in driving voltage.

[0209] The emission layer 15 may include a host and a dopant, and the dopant may include the first compound represented by Formula 1 as described herein.

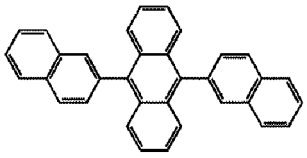
[0210] The host may include, for example, TPBi, TBADN, ADN (also referred to as "DNA"), CBP, CDBP, TCP, mCP, Compound H50, Compound H51, Compound H52, Compound H-H1, Compound H-E43, or any combination thereof:



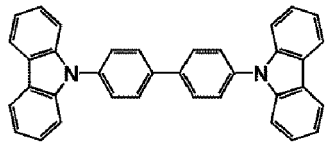
TPBi



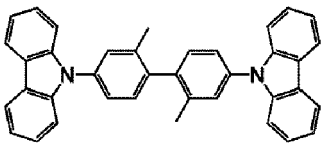
TBADN



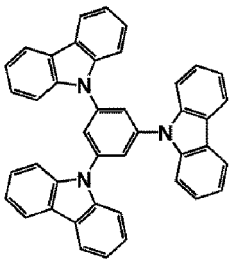
ADN



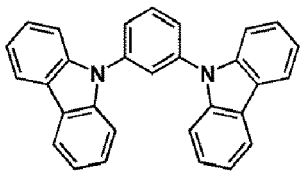
CBP



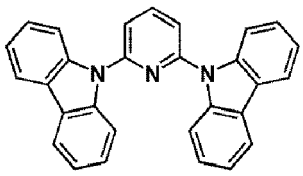
CDBP



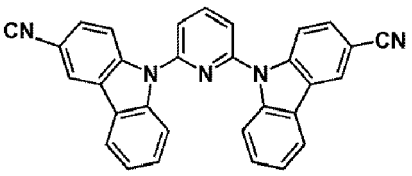
TCP



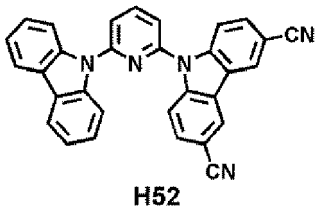
mCP



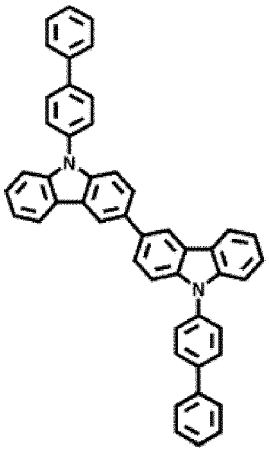
H50



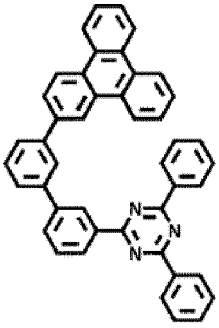
H51



H52



H-H1



H-E43

[0211] When the emission layer 15 includes a host and a dopant, an amount of the dopant may be in a range of about 0.01 part by weight to about 15 parts by weight based on 100 parts by weight of the host.

[0212] A thickness of the emission layer 15 may be in a range of about 100 Å to about 1,000 Å, for example, about 200 Å to about 1,000 Å. When the thickness of the emission layer 15 is within the range described above, excellent light-emission characteristics may be obtained without a substantial increase in driving voltage.

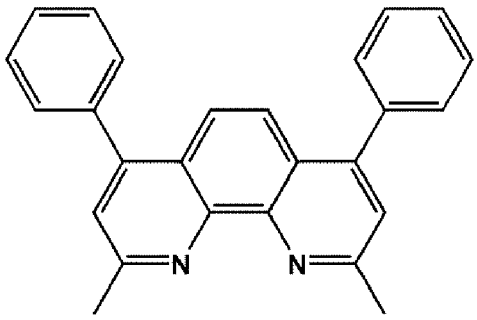
[0213] Next, the electron transport region 17 may be arranged on the emission layer 15.

[0214] The electron transport region 17 may include a hole blocking layer, an electron transport layer, an electron injection layer, or any combination thereof.

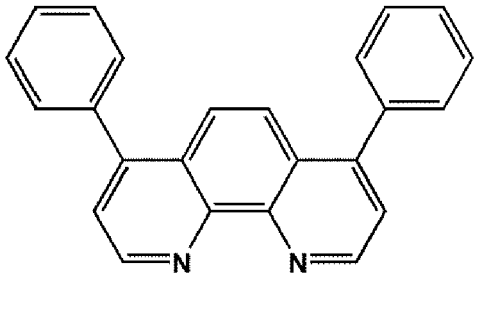
[0215] For example, the electron transport region 17 may have a hole blocking layer/electron transport layer/electron injection layer structure or an electron transport layer/electron injection layer structure. The electron transport layer may have a single-layered structure or a multi-layered structure including two or more different materials.

[0216] Conditions for forming the hole blocking layer, the electron transport layer, and the electron injection layer which constitute the electron transport region 17 may be the same as the conditions for forming the hole injection layer.

[0217] When the electron transport region 17 includes a hole blocking layer, the hole blocking layer may include, for example, BCP, Bphen, BAlq, or any combination thereof:



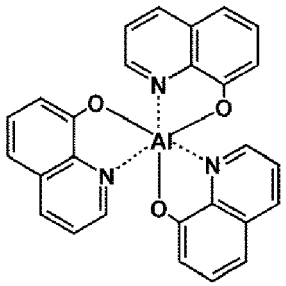
BCP



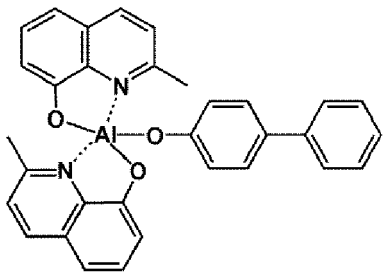
Bphen

[0218] A thickness of the hole blocking layer may be in a range of about 20 Å to about 1,000 Å, for example, about 30 Å to about 600 Å. When the thickness of the hole blocking layer is within the range described above, excellent hole blocking characteristics may be obtained without a substantial increase in driving voltage.

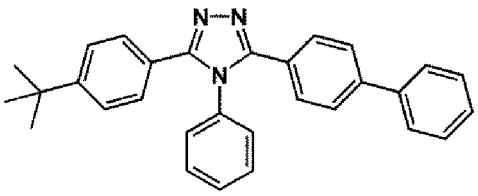
[0219] The electron transport layer may include BCP, Bphen, TPBi, Alq_3, BAlq, TAZ, NTAZ, or any combination thereof:



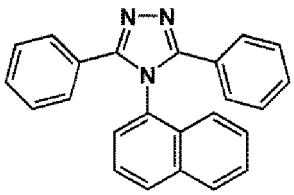
Alq_3



BAlq

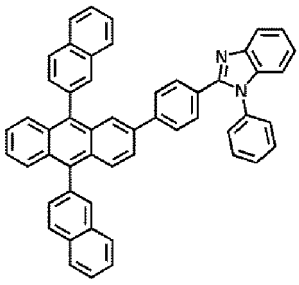


TAZ

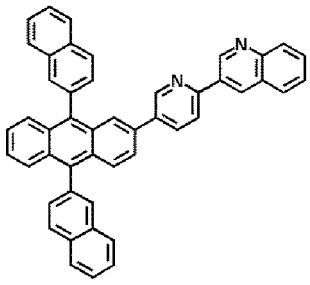


NTAZ

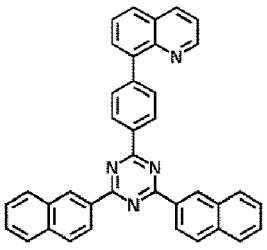
[0220] In one or more embodiments, the electron transport layer may include one of Compounds ET1 to ET25 or any combination thereof:



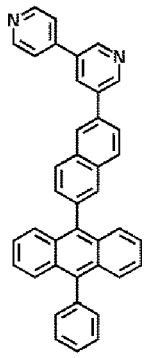
ET1



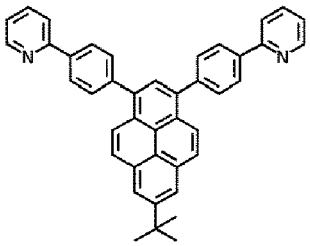
ET2



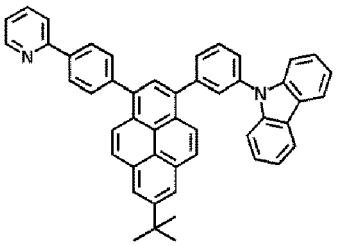
ET3



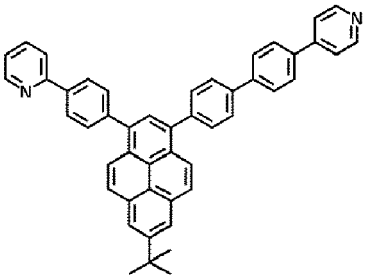
ET4



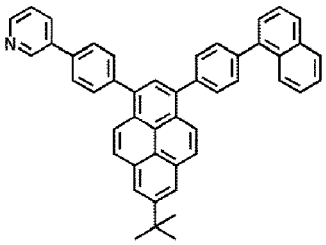
ET5



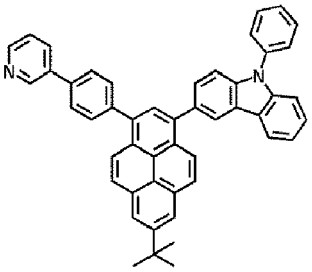
ET6



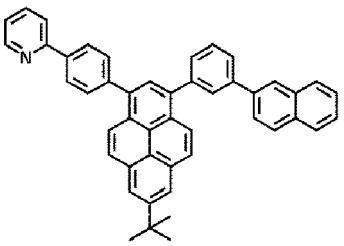
ET7



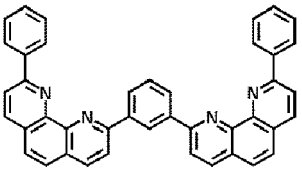
ET8



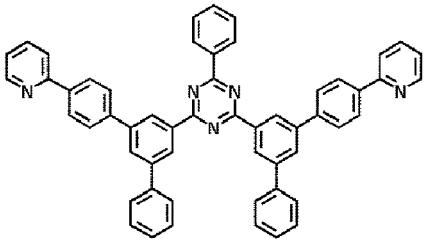
ET9



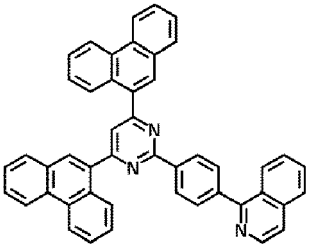
ET10



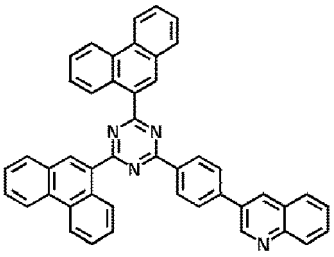
ET11



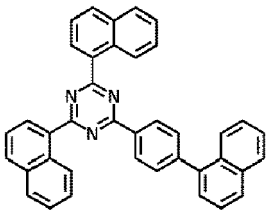
ET12



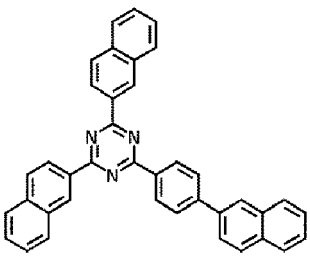
ET13



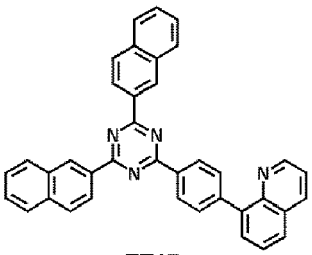
ET14



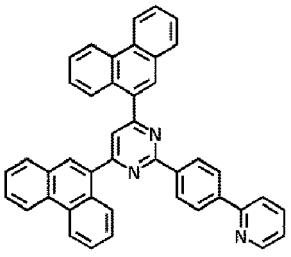
ET15



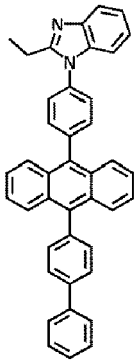
ET16



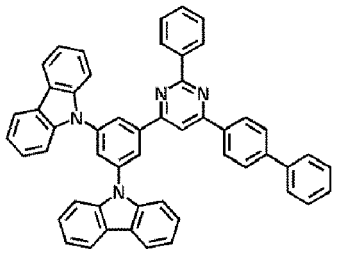
ET17



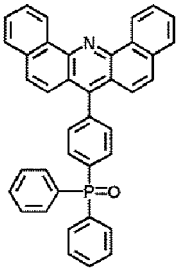
ET18



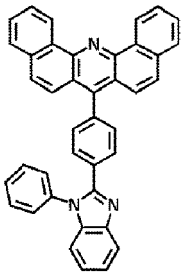
ET19



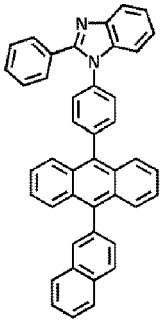
ET20



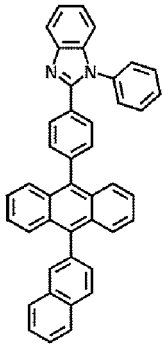
ET21



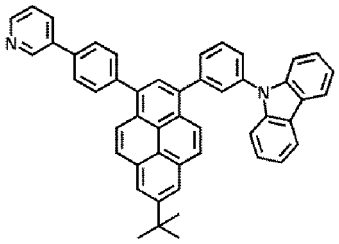
ET22



ET23



ET24

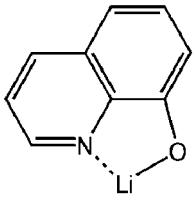


ET25

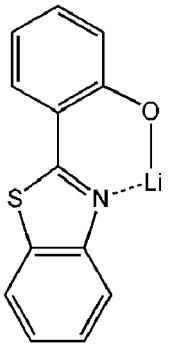
[0221] A thickness of the electron transport layer may be in a range of about 100 Å to about 1,000 Å, for example, about 150 Å to about 500 Å. When the thickness of the electron transport layer is within the range described above, satisfactory electron transporting characteristics may be obtained without a substantial increase in driving voltage.

[0222] The electron transport layer may include, in addition to the materials described above, a metal-containing material.

[0223] The metal-containing material may include a Li complex. The Li complex may include, for example, Compound ET-D1 or ET-D2:



ET-D1



ET-D2

[0224] The electron transport region 17 may include an electron injection layer that facilitates electron injection from the second electrode 19.

[0225] The electron injection layer may include LiF, NaCl, CsF, Li_2O, BaO, or any combination thereof.

[0226] A thickness of the electron injection layer may be in a range of about 1 Å to about 100 Å, for example, about 3 Å to about 90 Å. When the thickness of the electron injection layer is within the range described above, satisfactory electron injection characteristics may be obtained without a substantial increase in driving voltage.

[0227] The second electrode 19 may be arranged on the electron transport region 17. The second electrode 19 may be a cathode. A material for forming the second electrode 19 may be metal, an alloy, an electrically conductive compound,

or a combination thereof, which have a relatively low work function. Examples of the material for forming the second electrode 19 may include lithium (Li), magnesium (Mg), aluminum (Al), aluminum-lithium (Al-Li), calcium (Ca), magnesium-indium (Mg-In), and magnesium-silver (Mg-Ag). In one or more embodiments, to manufacture a top-emission type light-emitting device, a transmissive electrode formed using ITO or IZO may be used as the second electrode 19.

[0228] Hereinbefore, the organic light-emitting device 10 has been described with reference to FIGURE, but embodiments of the present disclosure are not limited thereto.

[0229] According to another aspect, the light-emitting device as described herein may be included in an electronic apparatus. Thus, an electronic apparatus including the light-emitting device is provided. The electronic apparatus may include, for example, a display, an illumination, a sensor, and the like.

[0230] The term "C_1-C_{60} alkyl group" as used herein refers to a linear or branched saturated aliphatic hydrocarbons monovalent group having 1 to 60 carbon atoms, and the term "C_1-C_{60} alkylene group" as used here refers to a divalent group having the same structure as the C_1-C_{60} alkyl group.

[0231] Examples of the C_1-C_{60} alkyl group, the C_1-C_{20} alkyl group, and/or the C_1-C_{10} alkyl group may include a methyl group, an ethyl group, an n-propyl group, an isopropyl group, an n-butyl group, a sec-butyl group, an isobutyl group, a tert-butyl group, an n-pentyl group, a tert-pentyl group, a neopentyl group, an isopentyl group, a sec-pentyl group, a 3-pentyl group, a sec-isopentyl group, an n-hexyl group, an isohexyl group, a sec-hexyl group, a tert-hexyl group, an n-heptyl group, an isoheptyl group, a sec-heptyl group, a tert-heptyl group, an n-octyl group, an isooctyl group, a sec-octyl group, a tert-octyl group, an n-nonyl group, an isononyl group, a sec-nonyl group, a tert-nonyl group, an n-decyl group, an isodecyl group, a sec-decyl group, or a tert-decyl group, each unsubstituted or substituted with a methyl group, an ethyl group, an n-propyl group, an isopropyl group, an n-butyl group, a sec-butyl group, an isobutyl group, a tert-butyl group, an n-pentyl group, a tert-pentyl group, a neopentyl group, an isopentyl group, a sec-pentyl group, a 3-pentyl group, a sec-isopentyl group, an n-hexyl group, an isohexyl group, a sec-hexyl group, a tert-hexyl group, an n-heptyl group, an isoheptyl group, a sec-heptyl group, a tert-heptyl group, an n-octyl group, an isooctyl group, a sec-octyl group, a tert-octyl group, an n-nonyl group, an isononyl group, a sec-nonyl group, a tert-nonyl group, an n-decyl group, an isodecyl group, a sec-decyl group, a tert-decyl group, or any combination thereof. For example, Formula 9-33 is a branched C_6 alkyl group, and an example thereof is a tert-butyl group that is substituted with two methyl groups.

[0232] The term "C_1-C_{60} alkoxy group" as used herein refers to a monovalent group represented by $-OA_{101}$ (wherein A_{101} is the C_1-C_{60} alkyl group), and examples thereof include a methoxy group, an ethoxy group, a propoxy group, a butoxy group, and a pentoxy group.

[0233] The term "C_2-C_{60} alkenyl group" as used herein refers to a hydrocarbon group formed by substituting at least one carbon-carbon double bond in the middle or at the terminus of the C_2-C_{60} alkyl group, and examples thereof include an ethenyl group, a propenyl group, and a butenyl group. The term "C_2-C_{60} alkenylene group" as used herein refers to a divalent group having the same structure as the C_2-C_{60} alkenyl group.

[0234] The term "C_2-C_{60} alkynyl group" as used herein refers to a hydrocarbon group formed by substituting at least one carbon-carbon triple bond in the middle or at the terminus of the C_2-C_{60} alkyl group, and examples thereof include an ethynyl group and a propynyl group. The term "C_2-C_{60} alkynylene group" as used herein refers to a divalent group having the same structure as the C_2-C_{60} alkynyl group.

[0235] The term "C_3-C_{10} cycloalkyl group" as used herein refers to a monovalent saturated hydrocarbon cyclic group having 3 to 10 carbon atoms, and the term "C_3-C_{10} cycloalkylene group" as used herein refers to a divalent group having the same structure as the C_3-C_{10} cycloalkyl group.

[0236] Examples of the C_3-C_{10} cycloalkyl group may include a cyclopropyl group, a cyclobutyl group, a cyclopentyl, cyclohexyl group, a cycloheptyl group, a cyclooctyl group, an adamantanyl group, a norbornanyl group (or a bicyclo[2.2.1] heptyl group), a bicyclo[1.1.1]pentyl group, a bicyclo[2.1.1]hexyl group, and a bicyclo[2.2.2]octyl group.

[0237] The term "C_1-C_{10} heterocycloalkyl group" as used herein refers to a monovalent saturated cyclic group that includes at least one heteroatom selected from N, O, P, Si, S, Se, Ge, and B as a ring-forming atom and 1 to 10 carbon atoms, and the term "C_1-C_{10} heterocycloalkylene group" as used herein refers to a divalent group having the same structure as the C_1-C_{10} heterocycloalkyl group.

[0238] Examples of the C_1-C_{10} heterocycloalkyl group may include a silolanyl group, a silinanyl group, tetrahydrofuranyl group, a tetrahydro-2H-pyranyl group, and a tetrahydrothiophenyl group.

[0239] The term "C_3-C_{10} cycloalkenyl group" as used herein refers to a monovalent cyclic group that includes 3 to 10 carbon atoms and at least one carbon-carbon double bond in the ring thereof and has no aromaticity, and examples thereof include a cyclopentenyl group, a cyclohexenyl group, and a cycloheptenyl group. The term "C_3-C_{10} cycloalkenylene group" as used herein refers to a divalent group having the same structure as the C_3-C_{10} cycloalkenyl group.

[0240] The term "C_2-C_{10} heterocycloalkenyl group" as used herein refers to a monovalent cyclic group that includes at least one heteroatom selected from N, O, P, Si, S, Se, Ge, and B as a ring-forming atom, 1 to 10 carbon atoms, and at least one carbon-carbon double bond in the ring thereof. Examples of the C_2-C_{10} heterocycloalkenyl group include a 2,3-dihydrofuranyl group and a 2,3-dihydrothiophenyl group. The term "C_2-C_{10} heterocycloalkenylene group" as used herein refers to a divalent group having the same structure as the C_2-C_{10} heterocycloalkenyl group.

[0241] The term "C_6-C_{60} aryl group" as used herein refers to a monovalent group that includes a carbocyclic aromatic system having 6 to 60 carbon atoms, and the term "C_6-C_{60} arylene group" as used herein refers to a divalent group that includes a carbocyclic aromatic system having 6 to 60 carbon atoms. Examples of the C_6-C_{60} aryl group include a phenyl group, a naphthyl group, an anthracenyl group, a phenanthrenyl group, a pyrenyl group, and a chrysenyl group. When the C_6-C_{60} aryl group and the C_6-C_{60} arylene group each include two or more rings, the two or more rings may be fused to each other.

[0242] The term "C_7-C_{60} alkylaryl group" as used herein refers to a C_6-C_{60} aryl group substituted with at least one C_1-C_{60} alkyl group.

[0243] The term "C_1-C_{60} heteroaryl group" as used herein refers to a monovalent group that includes a cyclic aromatic system having at least one heteroatom selected from N, O, P, Si, S, Se, Ge, and B as a ring-forming atom and 1 to 60 carbon atoms, and the term "C_1-C_{60} heteroarylene group" as used herein refers to a divalent group that includes a cyclic aromatic system having at least one heteroatom selected from N, O, P, Si, S, Se, Ge, and B as a ring-forming atom and 1 to 60 carbon atoms. Examples of the C_1-C_{60} heteroaryl group include a pyridinyl group, a pyrimidinyl group, a pyrazinyl group, a pyridazinyl group, a triazinyl group, a quinolinyl group, and an isoquinolinyl group. When the C_6-C_{60} heteroaryl group and the C_6-C_{60} heteroarylene group each include two or more rings, the two or more rings may be fused to each other.

[0244] The C_2-C_{60} alkylheteroaryl group used herein refers to a C_1-C_{60} heteroaryl group substituted with at least one C_1-C_{60} alkyl group.

[0245] The term "C_6-C_{60} aryloxy group" as used herein indicates -OA_{102} (wherein A_{102} is the C_6-C_{60} aryl group), the term "C_6-C_{60} arylthio group" as used herein indicates - SA_{103} (wherein A_{103} is the C_6-C_{60} aryl group), and the term "C_1-C_{60} alkylthio group" as used herein indicates -SA_{104} (wherein A_{104} is the C_1-C_{60} alkyl group).

[0246] The term "monovalent non-aromatic condensed polycyclic group" as used herein refers to a monovalent group (for example, having 8 to 60 carbon atoms) having two or more rings condensed to each other, only carbon atoms as ring-forming atoms, and no aromaticity in its entire molecular structure. Examples of the monovalent non-aromatic condensed polycyclic group include a fluorenyl group. The term "divalent non-aromatic condensed polycyclic group" as used herein refers to a divalent group having the same structure as the monovalent non-aromatic condensed polycyclic group.

[0247] The term "monovalent non-aromatic condensed heteropolycyclic group" as used herein refers to a monovalent group (for example, having 1 to 60 carbon atoms) having two or more rings condensed to each other, a heteroatom selected from N, O, P, Si, S, Se, Ge, and B, other than carbon atoms, as a ring-forming atom, and no aromaticity in its entire molecular structure. Examples of the monovalent non-aromatic condensed heteropolycyclic group include a carbazolyl group. The term "divalent non-aromatic condensed heteropolycyclic group" as used herein refers to a divalent group having the same structure as the monovalent non-aromatic condensed heteropolycyclic group.

[0248] The term "C_5-C_{30} carbocyclic group" as used herein refers to a saturated or unsaturated cyclic group having, as a ring-forming atom, 5 to 30 carbon atoms only. The C_5-C_{30} carbocyclic group may be a monocyclic group or a polycyclic group. Examples of the "C_5-C_{30} carbocyclic group (unsubstituted or substituted with at least one R_{10a} (or at least one Z_0))" as used herein may include an adamantane group, a norbornene group, a bicyclo[1.1.1]pentane group, a bicyclo[2.1.1]hexane group, a bicyclo[2.2.1]heptane(norbornane) group, a bicyclo[2.2.2]octane group, a cyclopentane group, a cyclohexane group, a cyclohexene group, a benzene group, a naphthalene group, an anthracene group, a phenanthrene group, a triphenylene group, a pyrene group, a chrysene group, a 1,2,3,4-tetrahydronaphthalene group, a cyclopentadiene group, and a fluorene group (each unsubstituted or substituted with at least one R_{10a} (or at least one Z_0)).

[0249] The term "C_1-C_{30} heterocyclic group" as used herein refers to a saturated or unsaturated cyclic group having, as a ring-forming atom, at least one heteroatom selected from N, O, P, Si, S, Se, Ge, and B other than 1 to 30 carbon atoms. The C_1-C_{30} heterocyclic group may be a monocyclic group or a polycyclic group. Examples of the "C_1-C_{30} heterocyclic group (unsubstituted or substituted with at least one R_{10a} (or at least one Z_0))" as used herein may include a thiophene group, a furan group, a pyrrole group, a silole group, a borole group, a phosphole group, a selenophene group, a germole group, a benzothiophene group, a benzofuran group, an indole group, a benzosilole group, a benzoborole group, a benzophosphole group, a benzoselenophene group, a benzogermole group, a dibenzothiophene group, a dibenzofuran group, a carbazole group, a dibenzosilole group, a dibenzoborole group, a dibenzophosphole group, a dibenzoselenophene group, a dibenzogermole group, a dibenzothiophene 5-oxide group, a 9H-fluoren-9-one group, a dibenzothiophene 5,5-dioxide group, an azabenzothiophene group, an azabenzofuran group, an azaindole group, an azaindene group, an azabenzosilole group, an azabenzoborole group, an azabenzophosphole group, an azabenzoselenophene group, an azabenzogermole group, an azadibenzothiophene group, an azadibenzofuran group, an azacarbazole group, an azafluorene group, an azadibenzosilole group, an azadibenzoborole group, an azadibenzophosphole group, an azadibenzoselenophene group, an azadibenzogermole group, an azadibenzothiophene 5-oxide group, an aza-9H-fluoren-9-one group, an azadibenzothiophene 5,5-dioxide group, a pyridine group, a pyrimidine group, a pyrazine group, a pyridazine group, a triazine group, a quinoline group, an isoquinoline group, a quinoxaline group, a

quinazoline group, a phenanthroline group, a pyrazole group, an imidazole group, a triazole group, an oxazole group, an isoxazole group, a thiazole group, an isothiazole group, an oxadiazole group, a thiadiazole group, a benzopyrazole group, a benzimidazole group, a benzoxazole group, a benzothiazole group, a benzoxadiazole group, a benzothiadiazole group, a 5,6,7,8-tetrahydroisoquinoline group, and a 5,6,7,8-tetrahydroquinoline group (each unsubstituted or substituted with at least one R_{10a} (or at least one Z_0)).

[0250] Examples of the "C_5-C_{30} carbocyclic group" and "C_1-C_{30} heterocyclic group" as used herein include i) a first ring, ii) a second ring, iii) a condensed ring in which two or more first rings are condensed with each other, iv) a condensed ring in which two or more second rings are condensed with each other, or v) a condensed ring in which at least one first ring is condensed with at least one second ring,

the first ring may be a cyclopentane group, a cyclopentene group, a furan group, a thiophene group, a pyrrole group, a silole group, a borole group, a phosphole group, a germole group, a selenophene group, an oxazole group, an isoxazole group, an oxadiazole group, an oxatriazole group, a thiazole group, an isothiazole group, a thiadiazole group, a thiatriazole group, a pyrazole group, an imidazole group, a triazole group, a tetrazole group, an azasilole group, a diazasilole group, or a triazasilole group, and

the second ring may be an adamantane group, a norbornane group, a norbornene group, a cyclohexane group, a cyclohexene group, a benzene group, a pyridine group, a pyrimidine group, a pyrazine group, a pyridazine group, or a triazine group.

[0251] The terms "fluorinated C_1-C_{60} alkyl group (or a fluorinated C_1-C_{20} alkyl group or the like)", "fluorinated C_3-C_{10} cycloalkyl group", "fluorinated C_1-C_{10} heterocycloalkyl group," and "fluorinated phenyl group" respectively indicate a C_1-C_{60} alkyl group (or a C_1-C_{20} alkyl group or the like), a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, and a phenyl group, each substituted with at least one fluoro group (-F). For example, the term "fluorinated C_1 alkyl group (that is, a fluorinated methyl group)" includes -CF_3, -CF_2H, and -CFH_2. The "fluorinated C_1-C_{60} alkyl group (or a fluorinated C_1-C_{20} alkyl group or the like)", "the fluorinated C_3-C_{10} cycloalkyl group", "the fluorinated C_1-C_{10} heterocycloalkyl group", or "the fluorinated a phenyl group" may be i) a fully fluorinated C_1-C_{60} alkyl group (or a fully fluorinated C_1-C_{20} alkyl group or the like), a fully fluorinated C_3-C_{10} cycloalkyl group, a fully fluorinated C_1-C_{10} heterocycloalkyl group, or a fully fluorinated phenyl group, wherein, in each group, all hydrogen included therein is substituted with a fluoro group, or ii) a partially fluorinated C_1-C_{60} alkyl group (or a partially fluorinated C_1-C_{20} alkyl group or the like), a partially fluorinated C_3-C_{10} cycloalkyl group, a partially fluorinated C_1-C_{10} heterocycloalkyl group, or a partially fluorinated phenyl group, wherein, in each group, all hydrogen included therein is not substituted with a fluoro group.

[0252] The terms "deuterated C_1-C_{60} alkyl group (or a deuterated C_1-C_{20} alkyl group or the like)", "deuterated C_3-C_{10} cycloalkyl group", "deuterated C_1-C_{10} heterocycloalkyl group," and "deuterated phenyl group" respectively indicate a C_1-C_{60} alkyl group (or a C_1-C_{20} alkyl group or the like), a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, and a phenyl group, each substituted with at least one deuterium. For example, the "deuterated C_1 alkyl group (that is, the deuterated methyl group)" may include - CD_3, -CD_2H, and -CDH_2, and examples of the "deuterated C_3-C_{10} cycloalkyl group" are, for example, Formula 10-501 and the like. The "deuterated C_1-C_{60} alkyl group (or the deuterated C_1-C_{20} alkyl group or the like)", "the deuterated C_3-C_{10} cycloalkyl group", "the deuterated C_1-C_{10} heterocycloalkyl group", or "the deuterated phenyl group" may be i) a fully deuterated C_1-C_{60} alkyl group (or a fully deuterated C_1-C_{20} alkyl group or the like), a fully deuterated C_3-C_{10} cycloalkyl group, a fully deuterated C_1-C_{10} heterocycloalkyl group, or a fully deuterated phenyl group, in which, in each group, all hydrogen included therein is substituted with deuterium, or ii) a partially deuterated C_1-C_{60} alkyl group (or a partially deuterated C_1-C_{20} alkyl group or the like), a partially deuterated C_3-C_{10} cycloalkyl group, a partially deuterated C_1-C_{10} heterocycloalkyl group, or a partially deuterated phenyl group, in which, in each group, all hydrogen included therein is not substituted with deuterium.

[0253] The term "(C_1-C_{20} alkyl) 'X' group" as used herein refers to a 'X' group that is substituted with at least one C_1-C_{20} alkyl group. For example, the term "(C_1-C_{20} alkyl)C_3-C_{10} cycloalkyl group" as used herein refers to a C_3-C_{10} cycloalkyl group substituted with at least one C_1-C_{20} alkyl group, and the term "(C_1-C_{20} alkyl)phenyl group" as used herein refers to a phenyl group substituted with at least one C_1-C_{20} alkyl group. An example of a (C_1 alkyl) phenyl group is a toluyl group.

[0254] As used herein, the number of carbons in each group that is substituted (e.g., C_1-C_{60}) excludes the number of carbons in the substituent. For example, a C_1-C_{60} alkyl group can be substituted with a C_1-C_{60} alkyl group. The total number of carbons included in the C_1-C_{60} alkyl group substituted with the C_1-C_{60} alkyl group is not limited to 60 carbons. In addition, more than one C_1-C_{60} alkyl substituent may be present on the C_1-C_{60} alkyl group. This definition is not limited to the C_1-C_{60} alkyl group and applies to all substituted groups that recite a carbon range.

[0255] The terms "an azaindole group, an azabenzoborole group, an azabenzophosphole group, an azaindene group, an azabenzosilole group, an azabenzogermole group, an azabenzothiophene group, an azabenzoselenophene group, an azabenzofuran group, an azacarbazole group, an azadibenzoborole group, an azadibenzophosphole group, an azafluorene group, an azadibenzosilole group, an azadibenzogermole group, an azadibenzothiophene group, an aza-

dibenzoselenophene group, an azadibenzofuran group, an azadibenzothiophene 5-oxide group, an aza-9H-fluoren-9-one group, and an azadibenzothiophene 5,5-dioxide group" respectively refer to heterocyclic groups having the same backbones as "an indole group, a benzoborole group, a benzophosphole group, an indene group, a benzosilole group, a benzogermole group, a benzothiophene group, a benzoselenophene group, a benzofuran group, a carbazole group, a dibenzoborole group, a dibenzophosphole group, a fluorene group, a dibenzosilole group, a dibenzogermole group, a dibenzothiophene group, a dibenzoselenophene group, a dibenzofuran group, a dibenzothiophene 5-oxide group, a 9H-fluoren-9-one group, and a dibenzothiophene 5,5-dioxide group," in which, in each group, at least one carbon selected from ring-forming carbons is substituted with nitrogen.

[0256] At least one substituent of the substituted C_5-C_{30} carbocyclic group, the substituted C_1-C_{30} heterocyclic group, the substituted C_1-C_{60} alkyl group, the substituted C_2-C_{60} alkenyl group, the substituted C_2-C_{60} alkynyl group, the substituted C_1-C_{60} alkoxy group, the substituted C_1-C_{60} alkylthio group, the substituted C_3-C_{10} cycloalkyl group, the substituted C_1-C_{10} heterocycloalkyl group, the substituted C_3-C_{10} cycloalkenyl group, the substituted C_2-C_{10} heterocycloalkenyl group, the substituted C_6-C_{60} aryl group, the substituted C_7-C_{60} alkylaryl group, the substituted C_6-C_{60} aryloxy group, the substituted C_6-C_{60} arylthio group, the substituted C_1-C_{60} heteroaryl group, the substituted C_2-C_{60} alkylheteroaryl group, the substituted monovalent non-aromatic condensed polycyclic group, and the substituted monovalent non-aromatic condensed heteropolycyclic group may each independently be:

deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid or a salt thereof, a sulfonic acid or a salt thereof, a phosphoric acid or a salt thereof, a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, or a C_1-C_{60} alkylthio group;

a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, or a C_1-C_{60} alkylthio group, each substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_7-C_{60} alkylaryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a C_2-C_{60} alkylheteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, $-N(Q_{11})(Q_{12})$, $-Si(Q_{13})(Q_{14})(Q_{16})$, $-B(Q_{16})(Q_{17})$, $-P(=O)(Q_{16})(Q_{19})$, $-P(Q_{18})(Q_{19})$, or any combination thereof;

a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_7-C_{60} alkylaryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a C_2-C_{60} alkylheteroaryl group, a monovalent non-aromatic condensed polycyclic group, or a monovalent non-aromatic condensed heteropolycyclic group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, a C_1-C_{60} alkylthio group, a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_7-C_{60} alkylaryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a C_2-C_{60} alkylheteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, $-N(Q_{21})(Q_{22})$, $-Si(Q_{23})(Q_{24})(Q_{25})$, $-B(Q_{26})(Q_{27})$, $-P(=O)(Q_{28})(Q_{29})$, $-P(Q_{28})(Q_{29})$, or any combination thereof;

$-N(Q_{31})(Q_{32})$, $-Si(Q_{33})(Q_{34})(Q_{35})$, $-B(Q_{36})(Q_{37})$, $-P(=O)(Q_{36})(Q_{39})$, or $-P(Q_{38})(Q_{39})$; or

any combination thereof.

[0257] Q_1 to Q_9, Q_{11} to Q_{19}, Q_{21} to Q_{29}, and Q_{31} to Q_{39} as used herein may each independently be: hydrogen; deuterium; -F; -Cl; -Br; -I; a hydroxyl group; a cyano group; a nitro group; an amidino group; a hydrazine group; a hydrazone group; a carboxylic acid group or a salt thereof; a sulfonic acid group or a salt thereof; a phosphoric acid group or a salt thereof; a C_1-C_{60} alkyl group unsubstituted or substituted with deuterium, a C_1-C_{60} alkyl group, a C_6-C_{60} aryl group, or any combination thereof; a C_2-C_{60} alkenyl group; a C_2-C_{60} alkynyl group; a C_1-C_{60} alkoxy group; a C_1-C_{60} alkylthio group; a C_3-C_{10} cycloalkyl group; a C_1-C_{10} heterocycloalkyl group; a C_3-C_{10} cycloalkenyl group; a C_2-C_{10} heterocycloalkenyl group; a C_6-C_{60} aryl group unsubstituted or substituted with deuterium, a C_1-C_{60} alkyl group, a C_6-C_{60} aryl group, or any combination thereof; a C_6-C_{60} aryloxy group; a C_6-C_{60} arylthio group; a C_1-C_{60} heteroaryl group; a monovalent non-aromatic condensed polycyclic group; or a monovalent non-aromatic condensed heteropolycyclic group.

[0258] For example, Q_1 to Q_9, Q_{11} to Q_{19}, Q_{21} to Q_{29}, and Q_{31} to Q_{39} as used herein may each independently be:

$-CH_3$, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CH_2CH_3$, $-CH_2CD_3$, $-CH_2CD_2H$, $-CH_2CDH_2$, $-CHDCH_3$, $-CHDCD_2H$, $-CHDCDH_2$, $-CHDCD_3$, $-CD_2CD_3$, $-CD_2CD_2H$, or $-CD_2CDH_2$; or

an n-propyl group, an isopropyl group, an n-butyl group, a sec-butyl group, an isobutyl group, a tert-butyl group, an n-pentyl group, a tert-pentyl group, a neopentyl group, an isopentyl group, a sec-pentyl group, a 3-pentyl group, a sec-isopentyl group, a phenyl group, a biphenyl group, or a naphthyl group, each unsubstituted or substituted with deuterium, a C_1-C_{10} alkyl group, a phenyl group, or any combination thereof.

[0259] Hereinafter, an organic light-emitting device according to an embodiment of the present disclosure will be described in detail with reference to Examples. However, the present disclosure is not limited to the following examples.

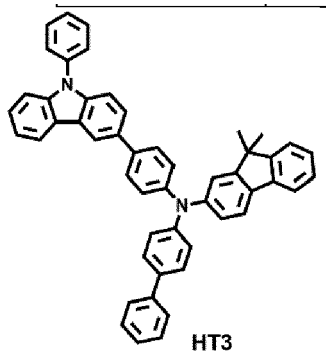
Examples

Evaluation Example 1

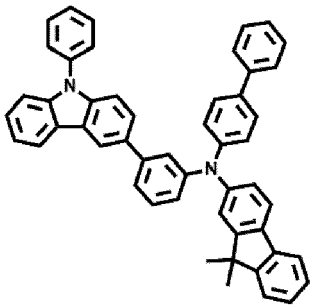
[0260] The HOMO energy level and dipole moment of each of Compounds HT3, 2-2, H-H1, and 2-A were evaluated using the Gaussian 09 program with molecular structure optimization obtained by B3LYP-based DFT. Results thereof are summarized in Table 1.

Table 1

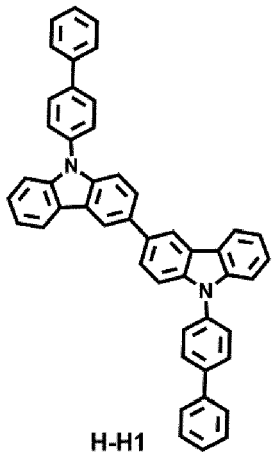
Compound No.	HOMO energy level (eV)	Dipole moment (debye)
HT3	-4.69	2.653
2-2	-4.77	2.14
H-H1	-4.97	0.844
2-A	-4.89	0.637



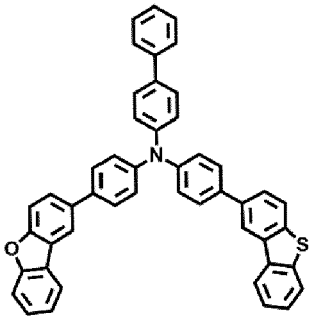
HT3



2-2



H-H1



2-A

Comparative Example A

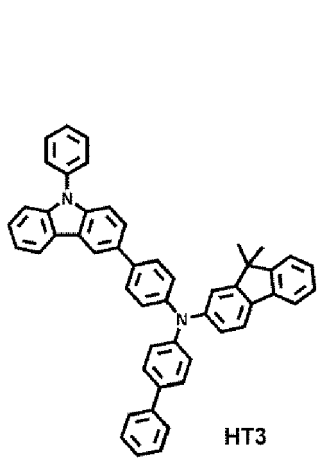
[0261] An ITO(as an anode)-patterned glass substrate was cut to a size of 50 mm x 50 mm x 0.5 mm, sonicated with

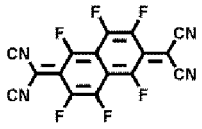
isopropyl alcohol and pure water, each for 5 minutes, and then cleaned by exposure to ultraviolet rays and ozone for 30 minutes. The resultant glass substrate was loaded onto a vacuum deposition apparatus.

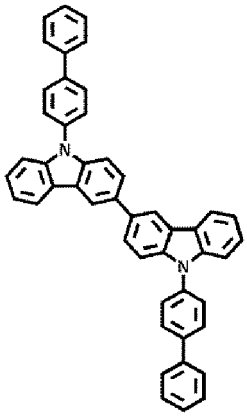
[0262] Compound HT3 and F6-TCNNQ were vacuum-co deposited on the anode at a weight ratio of 98:2 to form a hole injection layer having a thickness of 100 Å, Compound HT3 was vacuum-deposited on the hole injection layer to form a hole transport layer having a thickness of 1,350 Å, and then, Compound 2-2 was deposited on the hole transport layer to form a buffer layer having a thickness of 300 Å.

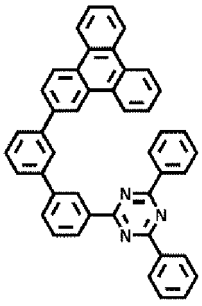
[0263] Next, Compound H-H1, Compound H-E43, and Compound 1-A (dopant) were co-deposited on the buffer layer at a weight ratio of 57:38:5 to form an emission layer having a thickness of 400 Å.

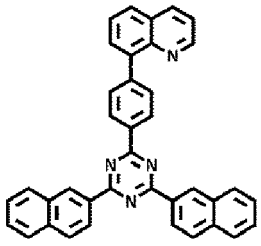
[0264] Then, Compound ET3 and ET-D1 were co-deposited on the emission layer at a volume ratio of 50:50 to form an electron transport layer having a thickness of 350 Å, ET-D1 was vacuum-deposited on the electron transport layer to form an electron injection layer having a thickness of 10 Å, and Al was vacuum-deposited on the electron injection layer to form a cathode having a thickness of 1,000 Å, thereby completing the manufacture of an organic light-emitting device.


HT3


F6-TCNNQ


H-H1


H-E43


ET3


ET-D1

Comparative Examples B to D and Example 1

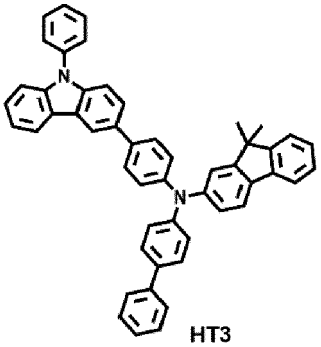
[0265] Organic light-emitting devices were manufactured in the same manner as in Comparative Example A, except that whether or not the buffer layer was formed, the thickness of the hole transport layer, the material for the buffer layer, or the dopant material in the emission layer was changed as shown in Table 2. Compound 1(1) is the same compound as Compound 21 of Group A described herein.

Evaluation Example 2

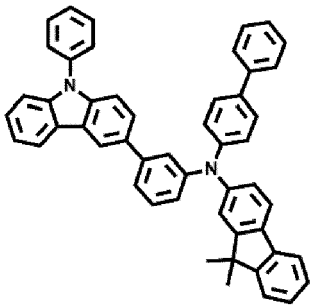
[0266] The maximum value of external quantum efficiency (Max EQE) (%) and lifespan (LT_{97}) (hr) of each of the organic light-emitting devices manufactured according to Comparative Examples A to D and Example 1 were evaluated. Results thereof are summarized in Table 2 as relative values (%). A current-voltage meter (Keithley 2400) and a luminance meter (Minolta Cs-1000A) were used as apparatuses for evaluation, the lifespan (LT_{97}) (at 16,000 nit) was obtained by measuring the amount of time (hr) that elapsed until luminance was reduced to 97 % of the initial luminance of 100 %, and the results were converted into relative values (%).

Table 2

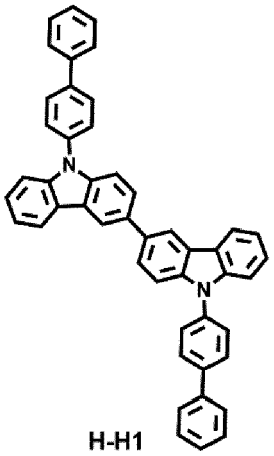
	Material for hole transport layer	Material for buffer layer	Dopant in emission layer	Max EQE (relative value, %)	LT_{97} (relative value, %) (at 16,000 nit)
Comparative Example A	HT3	2-2	1-A	100	100
Comparative Example B	HT3 (wherein the thickness of the hole transport layer was changed to 1,650 Å)	-	1(1)	95	98
Comparative Example C	HT3	H-H1	1(1)	88	85
Comparative Example D	2-2	2-A	1(1)	89	90
Example 1	HT3	2-2	1(1)	103.6	115



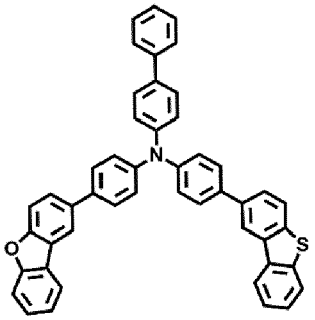
HT3



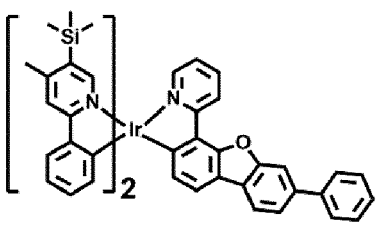
2-2



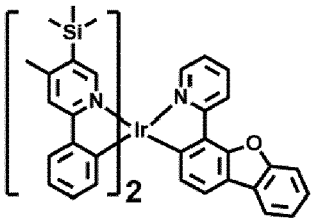
H-H1



2-A



1(1)



1-A

[0267] From Table 2, it was confirmed that the organic light-emitting device of Example 1 had excellent luminescence efficiency (external quantum efficiency) and lifespan characteristics at the same time, as compared with the organic light-emitting devices of Comparative Examples A to D.

Examples 11 to 15

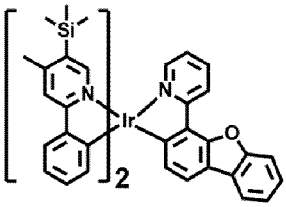
[0268] Organic light-emitting devices were manufactured in the same manner as in Comparative Example A, except that the dopant material in the emission layer was changed as shown in Table 3.

Evaluation Example 3

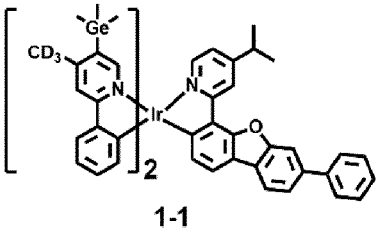
[0269] The maximum value of external quantum efficiency (Max EQE) (%) and lifespan (LT_{97}) (hr) of each of the organic light-emitting devices manufactured according to Examples 11 to 15 were evaluated in the same manner as in Evaluation Example 2. Results thereof are summarized in Table 3 as relative values (%). For comparison, the external quantum efficiency and lifespan data of Comparative Example A are also shown in Table 3.

Table 3

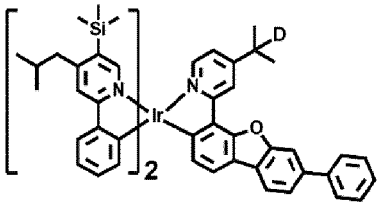
	Material for hole transport layer	Material for buffer layer	Dopant in emission layer	Max EQE (relative value, %)	LT_{97} (relative value, %) (at 16,000 nit)
Comparative Example A	HT3	2-2	1-A	100	100
Example 11	HT3	2-2	1-1	125	137
Example 12	HT3	2-2	1-2	129	179
Example 13	HT3	2-2	1-3	125	153
Example 14	HT3	2-2	1-4	131	155
Example 15	HT3	2-2	1-5	140	187



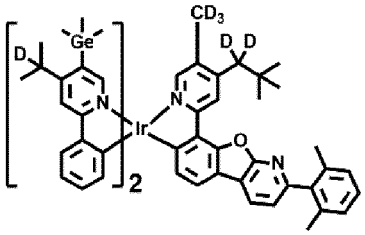
1-A



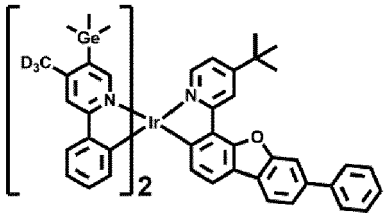
1-1



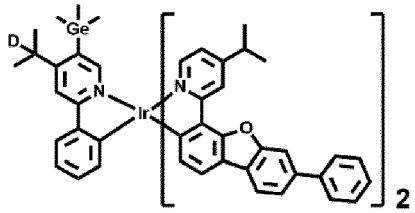
1-2



1-3



1-4



1-5

[0270] From Table 3, it was confirmed that the organic light-emitting devices of Examples 11 to 15 had luminescence efficiency (external quantum efficiency) and lifespan characteristics at the same time, as compared with the organic light-emitting device of Comparative Example A.

[0271] The light-emitting device according to an embodiment of the present disclosure may have excellent luminescence efficiency (external quantum efficiency) and excellent lifespan characteristics at the same time. Accordingly, a high-quality electronic apparatus may be manufactured by using the light-emitting device.

[0272] It should be understood that embodiments described herein should be considered in a descriptive sense only and not for purposes of limitation. Descriptions of features or aspects within each embodiment should typically be considered as available for other similar features or aspects in other embodiments. While one or more embodiments have been described with reference to the figures, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the scope as defined by the following claims.

Claims

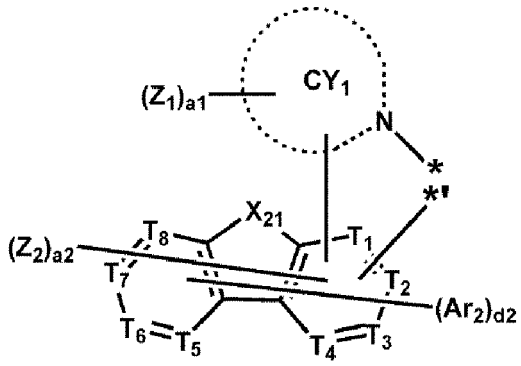
1. A light-emitting device comprising:

a first electrode;
a second electrode;
an emission layer arranged between the first electrode and the second electrode; and
a buffer layer arranged between the first electrode and the emission layer,
wherein the buffer layer is in direct contact with the emission layer,
the emission layer comprises a first compound represented by Formula 1, and
the buffer layer comprises a second compound represented by Formula 5:

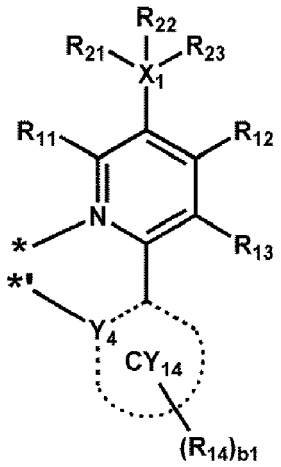
Formula 1 $M(L_1)_{n1}(L_2)_{n2}$

wherein, in Formula 1,
M is a transition metal,
L_1 is a ligand represented by Formula 2A,
L_2 is a ligand represented by Formula 2B,
n1 and n2 are each independently 1 or 2, wherein, when n1 is 2, two of L_1(s) are identical to or different from each other, and when n2 is 2, two of L_2(s) are identical to or different from each other,
the sum of n1 and n2 is 2 or 3, and
L_1 and L_2 are different from each other,

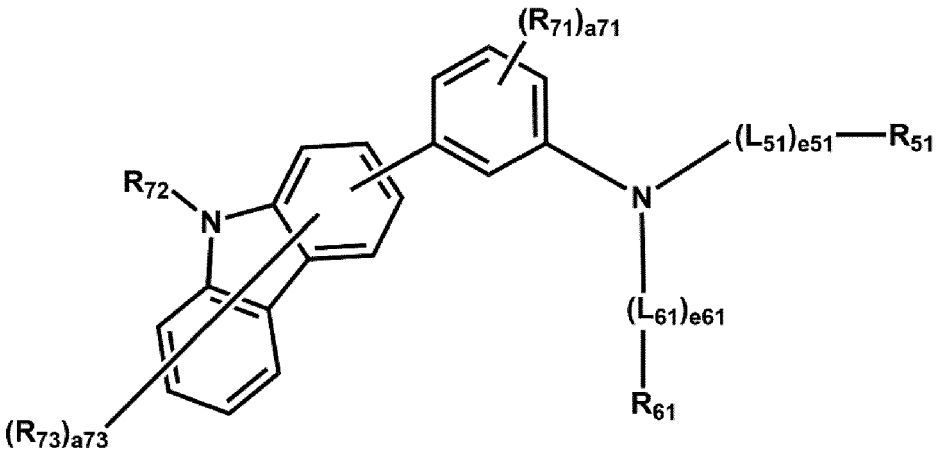
Formula 2A



Formula 2B



Formula 5



in Formulae 2A, 2B, and 5,

Y_4 is C or N,

X_1 is Si or Ge,

X_{21} is O, S, S(=O), N(Z_{29}), C(Z_{29})(Z_{30}), or Si(Z_{29})(Z_{30}),

T_1 to T_4 are each independently C, N, a carbon atom bonded to ring CY_1, or a carbon atom bonded to M in Formula 1, wherein one of T_1 to T_4 is a carbon atom bonded to M in Formula 1, and one of the remaining T_1 to T_4 that is not bonded to M is a carbon atom bonded to ring CY_1,

T_5 to T_8 are each independently C or N,

ring CY_1 and ring CY_{14} are each independently a C_5-C_{30} carbocyclic group or a C_1-C_{30} heterocyclic group,

Ar_2 is ring CY_2 unsubstituted or substituted with at least one Z_0, wherein ring CY_2 is an unsaturated C_5-C_{30} carbocyclic group or an unsaturated C_1-C_{30} heterocyclic group,

L_{51} and L_{61} are each independently a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a},

R_{21} to R_{23} are each independently a C_1-C_{60} alkyl group or a C_6-C_{60} aryl group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{20} alkyl group, a C_3-C_{10} cycloalkyl group, a phenyl group, or any combination thereof,

Z_0, Z_1, Z_2, Z_{29}, Z_{30}, R_{11} to R_{14}, R_{61}, R_{61}, and R_{71} to R_{73} are each independently hydrogen, deuterium, -F, -Cl, -Br, -I, $-SF_5$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a

phosphoric acid group or a salt thereof, a substituted or unsubstituted C_1-C_{60} alkyl group, a substituted or unsubstituted C_2-C_{60} alkenyl group, a substituted or unsubstituted C_2-C_{60} alkynyl group, a substituted or unsubstituted C_1-C_{60} alkoxy group, a substituted or unsubstituted C_1-C_{60} alkylthio group, a substituted or unsubstituted C_3-C_{10} cycloalkyl group, a substituted or unsubstituted C_1-C_{10} heterocycloalkyl group, a substituted or unsubstituted C_3-C_{10} cycloalkenyl group, a substituted or unsubstituted C_2-C_{10} heterocycloalkenyl group, a substituted or unsubstituted C_6-C_{60} aryl group, a substituted or unsubstituted C_6-C_{60} aryloxy group, a substituted or unsubstituted C_6-C_{60} arylthio group, a substituted or unsubstituted C_1-C_{60} heteroaryl group, a substituted or unsubstituted monovalent non-aromatic condensed polycyclic group, a substituted or unsubstituted monovalent non-aromatic condensed heteropolycyclic group, $-N(Q_1)(Q_2)$, $-Si(Q_3)(Q_4)(Q_5)$, $-Ge(Q_3)(Q_4)(Q_5)$, $-B(Q_6)(Q_7)$, $-P(=O)(Q_8)(Q_9)$, or $-P(Q_8)(Q_9)$,

d2, e51, and e61 are each independently an integer from 1 to 6, wherein, when d2 is 2 or more, two or more of Ar_2(s) are identical to or different from each other, when e51 is 2 or more, two or more of L_{51}(s) are identical to or different from each other, and when e61 is 2 or more, two or more of L_{61}(s) are identical to or different from each other,

a1 and b1 are each independently an integer from 0 to 20, wherein, when a1 is 2 or more, two or more of Z_1(s) are identical to or different from each other, and when b1 is 2 or more, two or more of R_{14}(s) are identical to or different from each other,

a2 is an integer from 0 to 5, wherein, when a2 is 2 or more, two or more of Z_2(s) are identical to or different from each other,

a73 is an integer from 0 to 7, wherein, when a73 is 2 or more, two or more of R_{73}(s) are identical to or different from each other,

a71 is an integer from 0 to 4, wherein, when a71 is 2 or more, two or more of R_{71}(s) are identical to or different from each other,

each of: i) two or more of R_{21} to R_{23}; ii) two or more of a plurality of Z_1(s); iii) two or more of a plurality of Z_2(s); iv) R_{12} and R_{13}; v) two or more of a plurality of R_{14}(s); and vi) two or more of Z_0, Z_1, Z_2, Z_{29}, Z_{30}, and R_{11} to R_{14} are optionally linked together to form a C_5-C_{30} carbocyclic group unsubstituted or substituted with at least one R_{10a} or a C_1-C_{30} heterocyclic group unsubstituted or substituted with at least one R_{10a},

R_{10a} is the same as described in connection with R_{14},

* and *' in Formulae 2A and 2B each indicate a binding site to M in Formula 1,

at least one substituent of the substituted C_1-C_{60} alkyl group, the substituted C_2-C_{60} alkenyl group, the substituted C_2-C_{60} alkynyl group, the substituted C_1-C_{60} alkoxy group, the substituted C_1-C_{60} alkylthio group, the substituted C_3-C_{10} cycloalkyl group, the substituted C_1-C_{10} heterocycloalkyl group, the substituted C_3-C_{10} cycloalkenyl group, the substituted C_2-C_{10} heterocycloalkenyl group, the substituted C_6-C_{60} aryl group, the substituted C_6-C_{60} aryloxy group, the substituted C_6-C_{60} arylthio group, the substituted C_1-C_{60} heteroaryl group, the substituted monovalent non-aromatic condensed polycyclic group, and the substituted monovalent non-aromatic condensed heteropolycyclic group is:

deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, or a C_1-C_{60} alkylthio group;

a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, or a C_1-C_{60} alkylthio group, each substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, $-N(Q_{11})(Q_{12})$, $-Si(Q_{13})(Q_{14})(Q_{16})$, $-Ge(Q_{13})(Q_{14})(Q_{16})$, $-B(Q_{16})(Q_{17})$, $-P(=O)(Q_{16})(Q_{19})$, $-P(Q_{16})(Q_{19})$, or any combination thereof;

a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, or a monovalent non-aromatic condensed heteropolycyclic group, each unsubstituted or substituted with deuterium, -F, -Cl, -Br, -I, $-CD_3$, $-CD_2H$, $-CDH_2$, $-CF_3$, $-CF_2H$, $-CFH_2$, a hydroxyl group, a cyano group, a nitro group, an amino group, an amidino group, a hydrazine group, a hydrazone group, a carboxylic acid group or a salt thereof, a sulfonic acid group or a salt thereof, a phosphoric acid group or a salt thereof, a C_1-C_{60} alkyl group, a C_2-C_{60} alkenyl

group, a C_2-C_{60} alkynyl group, a C_1-C_{60} alkoxy group, a C_1-C_{60} alkylthio group, a C_3-C_{10} cycloalkyl group, a C_1-C_{10} heterocycloalkyl group, a C_3-C_{10} cycloalkenyl group, a C_2-C_{10} heterocycloalkenyl group, a C_6-C_{60} aryl group, a C_6-C_{60} aryloxy group, a C_6-C_{60} arylthio group, a C_1-C_{60} heteroaryl group, a monovalent non-aromatic condensed polycyclic group, a monovalent non-aromatic condensed heteropolycyclic group, -$N(Q_{21})(Q_{22})$, -$Si(Q_{23})(Q_{24})(Q_{25})$, -$Ge(Q_{23})(Q_{24})(Q_{25})$, -$B(Q_{26})(Q_{27})$, -$P(=O)(Q_{28})(Q_{29})$, -$P(Q_{28})(Q_{29})$, or any combination thereof;

-$N(Q_{31})(Q_{32})$, -$Si(Q_{33})(Q_{34})(Q_{35})$, -$Ge(Q_{33})(Q_{34})(Q_{35})$, -$B(Q_{36})(Q_{37})$, -$P(=O)(Q_{36})(Q_{39})$, or -$P(Q_{36})(Q_{39})$; or any combination thereof, and

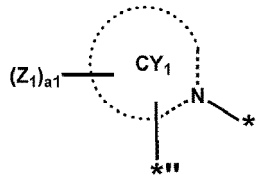
Q_1 to Q_9, Q_{11} to Q_{19}, Q_{21} to Q_{29}, and Q_{31} to Q_{39} are each independently: hydrogen; deuterium; -F; -Cl; -Br; -I; a hydroxyl group; a cyano group; a nitro group; an amino group; an amidino group; a hydrazine group; a hydrazone group; a carboxylic acid group or a salt thereof; a sulfonic acid group or a salt thereof; a phosphoric acid group or a salt thereof; a C_1-C_{60} alkyl group unsubstituted or substituted with deuterium, a C_1-C_{60} alkyl group, a C_6-C_{60} aryl group, or any combination thereof; a C_2-C_{60} alkenyl group; a C_2-C_{60} alkynyl group; a C_1-C_{60} alkoxy group; a C_1-C_{60} alkylthio group; a C_3-C_{10} cycloalkyl group; a C_1-C_{10} heterocycloalkyl group; a C_3-C_{10} cycloalkenyl group; a C_2-C_{10} heterocycloalkenyl group; a C_6-C_{60} aryl group unsubstituted or substituted with deuterium, a C_1-C_{60} alkyl group, a C_6-C_{60} aryl group, or any combination thereof; a C_6-C_{60} aryloxy group; a C_6-C_{60} arylthio group; a C_1-C_{60} heteroaryl group; a monovalent non-aromatic condensed polycyclic group; or
a monovalent non-aromatic condensed heteropolycyclic group.

2. The light-emitting device of claim 1, wherein M in Formula 1 is Ir, and i) n1 is 1 and n2 is 2; or ii) n1 is 2 and n2 is 1.

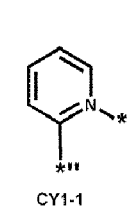
3. The light-emitting device of claims 1 or 2, wherein X_{21} in Formula 2A is O or S; and/or
wherein ring CY_2 is a benzene group, a naphthalene group, an anthracene group, a phenanthrene group, a triphenylene group, a pyrene group, a chrysene group, a cyclopentadiene group, a 1,2,3,4-tetrahydronaphthalene group, a thiophene group, a furan group, a borole group, a phosphole group, a silole group, a germole group, a selenophene group, an indole group, a benzoborole group, a benzophosphole group, an indene group, a benzosilole group, a benzogermole group, a benzothiophene group, a benzoselenophene group, a benzofuran group, a carbazole group, a dibenzoborole group, a dibenzophosphole group, a fluorene group, a dibenzosilole group, a dibenzogermole group, a dibenzothiophene group, a dibenzoselenophene group, a dibenzofuran group, a dibenzothiophene 5-oxide group, a 9H-fluoren-9-one group, a dibenzothiophene 5,5-dioxide group, an azaindole group, an azabenzoborole group, an azabenzophosphole group, an azaindene group, an azabenzosilole group, an azabenzogermole group, an azabenzothiophene group, an azabenzoselenophene group, an azabenzofuran group, an azacarbazole group, an azadibenzoborole group, an azadibenzophosphole group, an azafluorene group, an azadibenzosilole group, an azadibenzogermole group, an azadibenzothiophene group, an azadibenzoselenophene group, an azadibenzofuran group, an azadibenzothiophene 5-oxide group, an aza-9H-fluoren-9-one group, an azadibenzothiophene 5,5-dioxide group, a pyridine group, a pyrimidine group, a pyrazine group, a pyridazine group, a triazine group, a quinoline group, an isoquinoline group, a quinoxaline group, a quinazoline group, a phenanthroline group, a pyrrole group, a pyrazole group, an imidazole group, a triazole group, an oxazole group, an isoxazole group, a thiazole group, an isothiazole group, an oxadiazole group, a thiadiazole group, a benzopyrazole group, a benzimidazole group, a benzoxazole group, a benzothiazole group, a benzoxadiazole group, a benzothiadiazole group, a 5,6,7,8-tetrahydroisoquinoline group, or a 5,6,7,8-tetrahydroquinoline group.

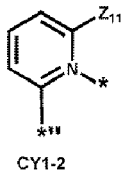
4. The light-emitting device of any of claims 1-3, wherein Z_1 in Formula 2A is not a group represented by -$Si(Q_3)(Q_4)(Q_5)$; and/or
wherein the first compound comprises at least one deuterium atom, at least one fluoro group (-F), at least one cyano group (-CN), or any combination thereof.

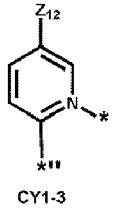
5. The light-emitting device of any of claims 1-4, wherein a group represented by

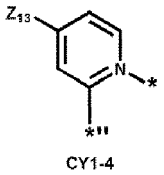


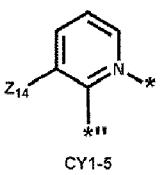
in Formula 2A is a group represented by one of Formulae CY1-1 to CY1-28:

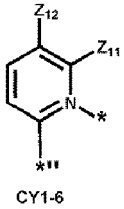

CY1-1

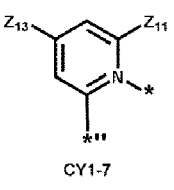

CY1-2

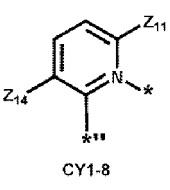

CY1-3

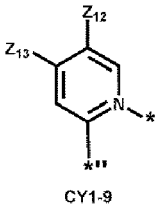

CY1-4

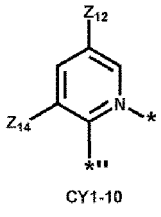

CY1-5

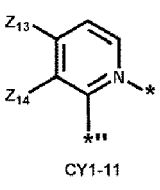

CY1-6

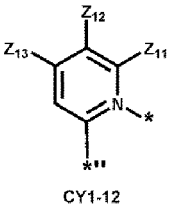

CY1-7

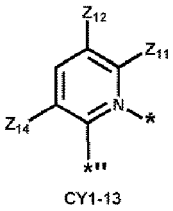

CY1-8

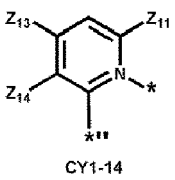

CY1-9

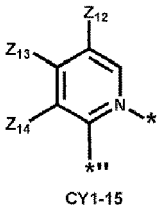

CY1-10

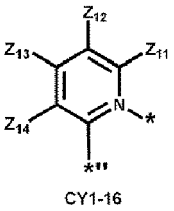

CY1-11

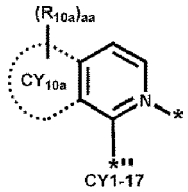

CY1-12

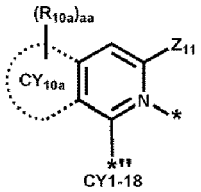

CY1-13

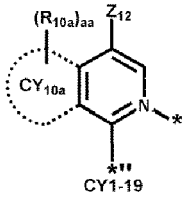

CY1-14

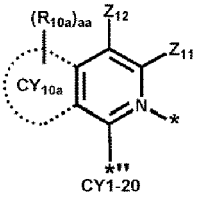

CY1-15

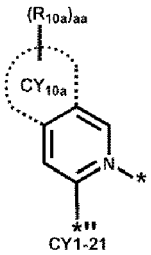

CY1-16

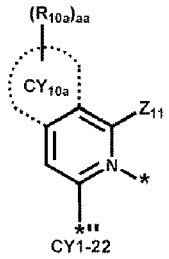

CY1-17

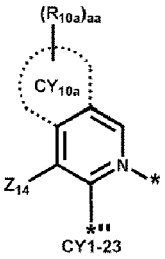

CY1-18

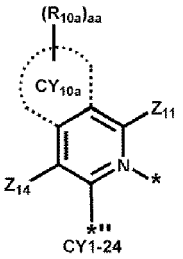

CY1-19

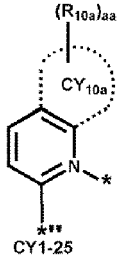

CY1-20

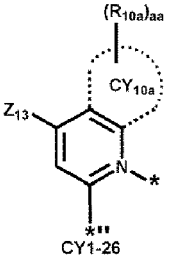

CY1-21

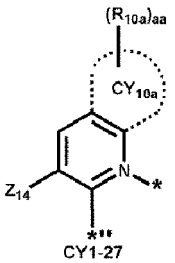

CY1-22

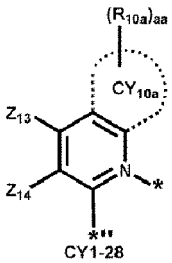

CY1-23


CY1-24


CY1-25


CY1-26


CY1-27


CY1-28

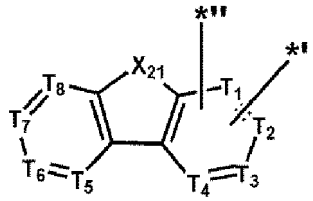
wherein, in Formulae CY1-1 to CY1-28,

Z_{11} to Z_{14} are each the same as described in connection with Z_1 , wherein Z_{11} to Z_{14} are each not hydrogen,

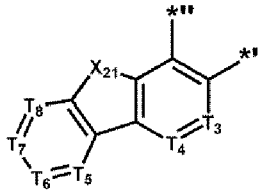
ring CY_{10a} is a C_5-C_{30} carbocyclic group or a C_1-C_{30} heterocyclic group,

aa is an integer from 0 to 10,

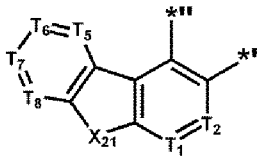
* indicates a binding site to M in Formula 1, and
*" indicates a binding site to one of T_1 to T_4 in Formula 2A; and/or
wherein a group represented by



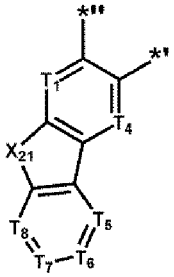
in Formula 2A is a group represented by one of Formulae CY2-1 to CY2-6:



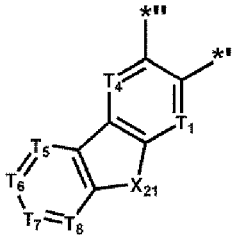
CY2-1



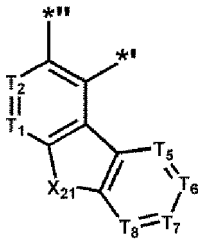
CY2-2



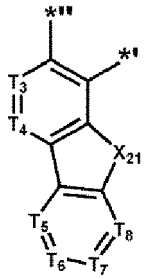
CY2-3



CY2-4



CY2-5



CY2-6

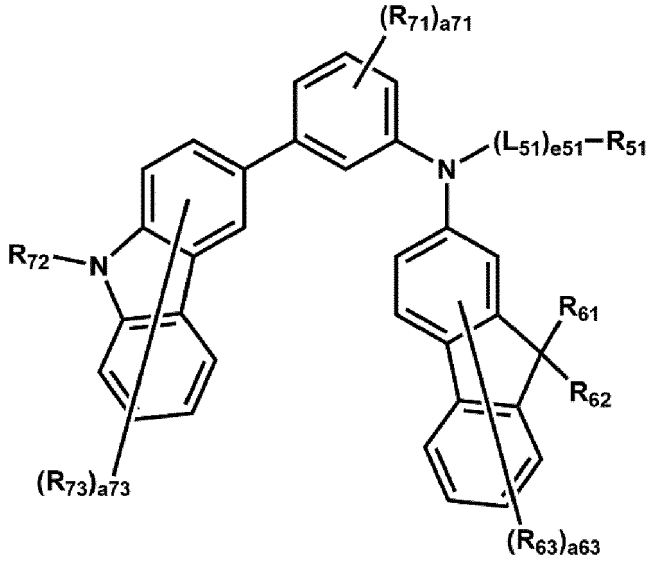
wherein, in Formulae CY2-1 to CY2-6,
T_1 to T_8 are each independently C or N,
*" indicates a binding site to ring CY_1 in Formula 2A, and
*' indicates a binding site to M in Formula 1.

6. The light-emitting device of any of claims 1-5, wherein L_{51} in Formula 5 is a benzene group, a naphthalene group, a phenanthrene group, a dibenzofuran group, a dibenzothiophene group, a naphthobenzofuran group, a naphthobenzothiophene group, a dinaphthofuran group, or a dinaphthothiophene group, each unsubstituted or substituted with at least one R_{10a}, and
e51 in Formula 5 is 1, 2, or 3.

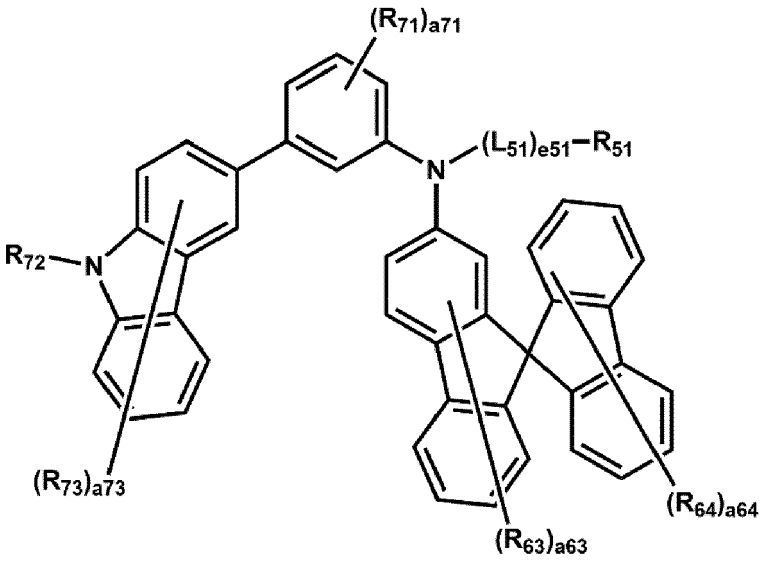
7. The light-emitting device of any of claims 1-6, wherein L_{61} in Formula 5 is a benzene group, a naphthalene group, a phenanthrene group, a dibenzofuran group, a dibenzothiophene group, a naphthobenzofuran group, a naphthobenzothiophene group, a dinaphthofuran group, a dinaphthothiophene group, a fluorene group, a spirobifluorene group, a benzofluorene group, or a dibenzofluorene group, each unsubstituted or substituted with at least one R_{10a}, and at least one of $L_{61(s)}$ in the number of e61 is a fluorene group, a spirobifluorene group, a benzofluorene group, or a dibenzofluorene group; and/or

wherein the second compound is a compound represented by Formula 5-1 or 5-2:

Formula 5-1



Formula 5-2



wherein, in Formulae 5-1 and 5-2,
R_{62} to R_{64} are each the same as R_{10a},
a63 is an integer from 0 to 7, and
a64 is an integer from 0 to 8.

8. The light-emitting device of any of claims 1-7, wherein a dipole moment of the second compound is in a range of 1.0 debye to 5.0 debye.

9. The light-emitting device of any of claims 1-8, wherein the emission layer further comprises a host, and the host in the emission layer does not comprise a same compound as the second compound comprised in the buffer layer.

10. The light-emitting device of any of claims 1-9, wherein the emission layer further comprises a host,

the host comprises a hole-transporting compound, and

an absolute value of a highest occupied molecular orbital (HOMO) energy level of the second compound comprised in the buffer layer is smaller than an absolute value of a HOMO energy level of the hole-transporting compound comprised in the host.

11. The light-emitting device of any of claims 1-10, wherein the emission layer further comprises a host,

the host comprises a hole-transporting compound, and
a difference between an absolute value of a HOMO energy level of the second compound comprised in the buffer layer and an absolute value of a HOMO energy level of the hole-transporting compound comprised in the host is 0.25 eV or less.

12. The light-emitting device of any of claims 1-11, further comprising a hole transport layer arranged between the first electrode and the buffer layer,

wherein the hole transport layer is in direct contact with the buffer layer,
the hole transport layer comprises a third compound, and
the third compound is different from the second compound comprised in the buffer layer;
preferably wherein an absolute value of a HOMO energy level of the second compound comprised in the buffer layer is greater than an absolute value of a HOMO energy level of the third compound comprised in the hole transport layer.

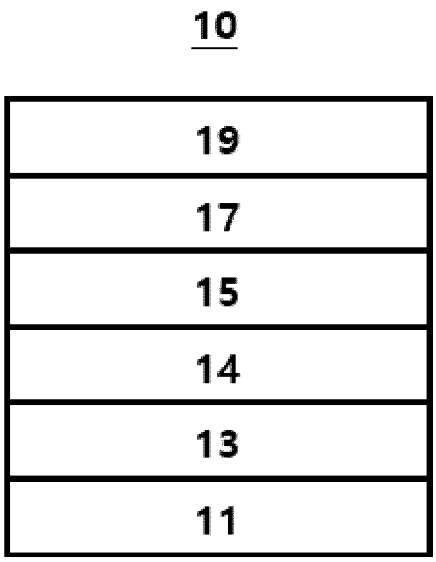
13. The light-emitting device of any of claims 1-12, wherein the buffer layer does not comprise a p-dopant.

14. The light-emitting device of any of claims 1-13, wherein the first electrode is an anode,

the second electrode is a cathode, and
the light-emitting device further comprises an electron transport region arranged between the emission layer and the second electrode.

15. An electronic apparatus comprising the light-emitting device of any of claims 1-14.

FIGURE



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 15 7910

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 113 698 434 A (SAMSUNG ELECTRONICS CO LTD) 26 November 2021 (2021-11-26) * paragraph [0599] - paragraph [0732]; claims 1-20; table 2 *	1-15	INV. H10K85/60 H10K85/30
A,P	& US 2023/011568 A1 (HWANG KYUYOUNG [KR] ET AL) 12 January 2023 (2023-01-12) * paragraph [0405] - paragraph [0481]; claims 1-20; table 2 *	1-15	
A	EP 3 912 983 A1 (SAMSUNG ELECTRONICS CO LTD [KR]) 24 November 2021 (2021-11-24) * paragraph [0192] - paragraph [0246]; claims 1-15; table 2 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

H10K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 July 2023	Konrádsson, Ásgeir

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 15 7910

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

07-07-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 113698434 A	26-11-2021	CN 113698434 A	26-11-2021
		US 2023011568 A1	12-01-2023
EP 3912983 A1	24-11-2021	EP 3912983 A1	24-11-2021
		JP 2021183604 A	02-12-2021
		KR 20210144587 A	30-11-2021

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82