(19) **United States**
(12) **Patent Application Publication**
LI

(10) **Pub. No.: US 2024/0047250 A1**
(43) **Pub. Date: Feb. 8, 2024**

(54) **CARRIER PLATE AND TRANSFERRING DEVICE**

(71) Applicant: **BOE Technology Group Co., Ltd.**, Beijing (CN)

(72) Inventor: **Haixu LI**, Beijing (CN)

(21) Appl. No.: **17/760,982**

(22) PCT Filed: **May 17, 2021**

(86) PCT No.: **PCT/CN2021/094195**
§ 371 (c)(1),
(2) Date: **Mar. 16, 2022**

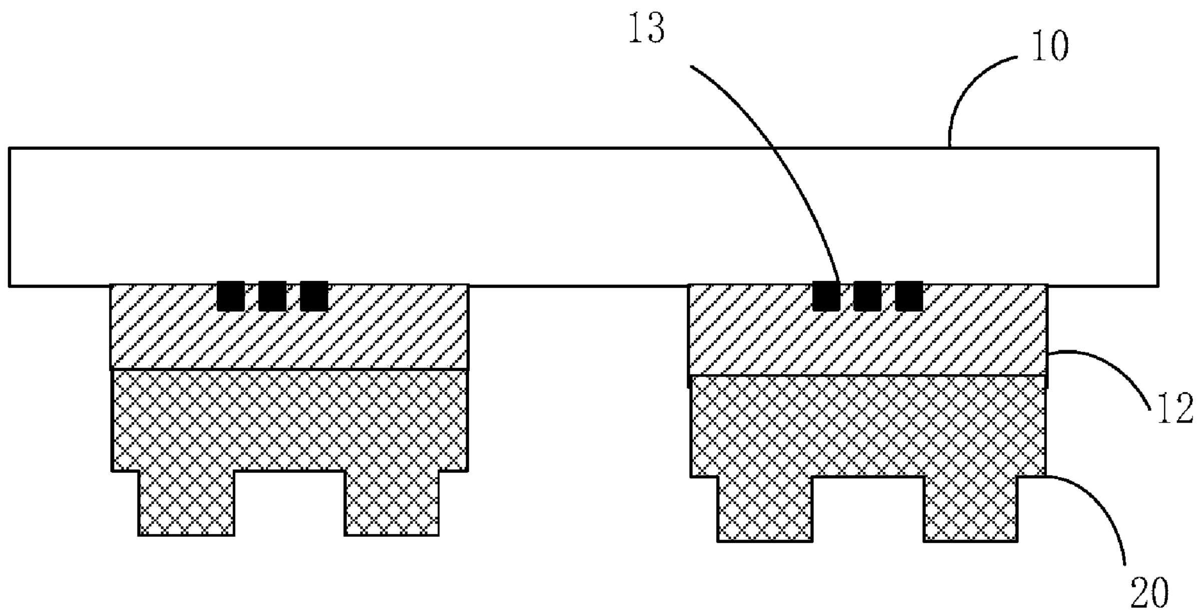
Publication Classification

(51) **Int. Cl.**
H01L 21/673 (2006.01)
H01L 33/00 (2006.01)

(52) **U.S. Cl.**
CPC ***H01L 21/67336*** (2013.01); ***H01L 33/00*** (2013.01)

(57) **ABSTRACT**

The embodiments of the present application provide a carrier plate and a transferring device. The carrier plate particularly includes a transporting base plate, a dissociation regulating feature and a dissociable-adhesive layer that are sequentially arranged, the dissociation regulating feature is configured to regulate a dissociation accuracy of the dissociable-adhesive layer, and the dissociable-adhesive layer is configured to be connected to a plurality of light-emitting-diode chips. The carrier plate can increase the yield and the dissociation accuracy of the light-emitting-diode chips, which can increase the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips.



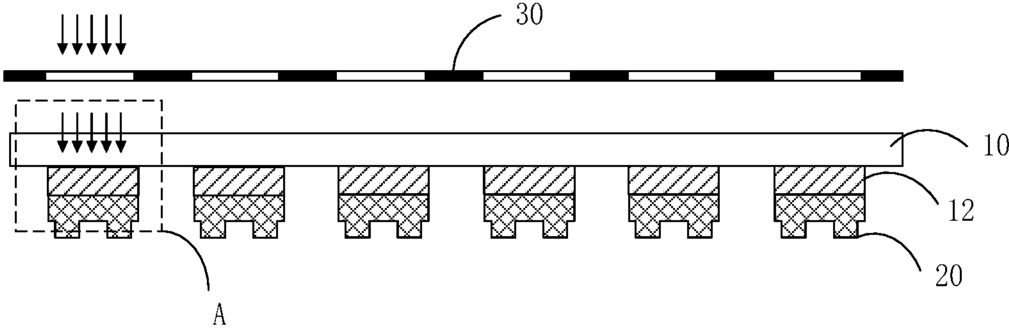


FIG. 1

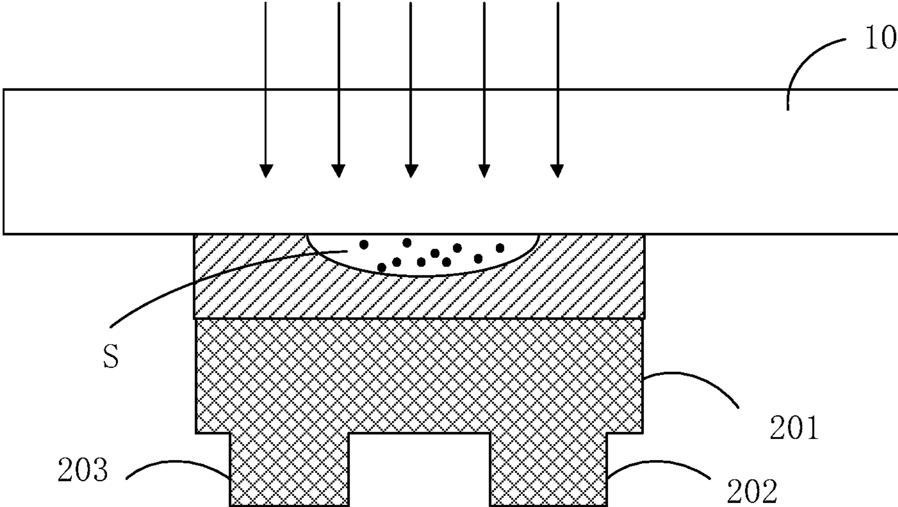


FIG. 2

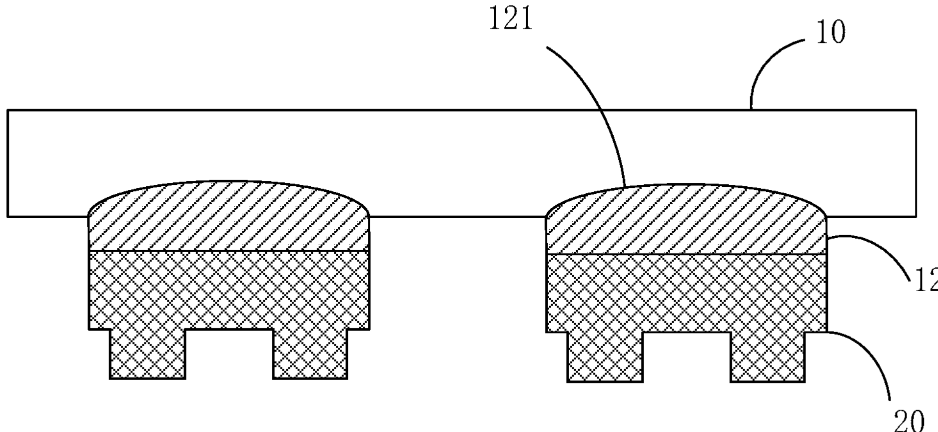


FIG. 3

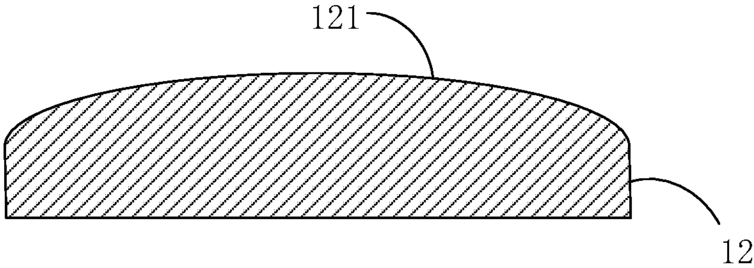


FIG. 4

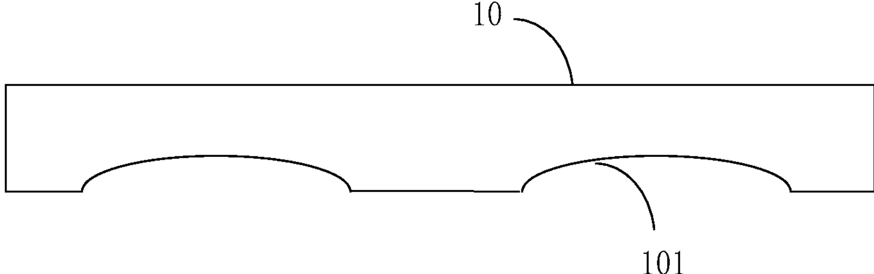


FIG. 5

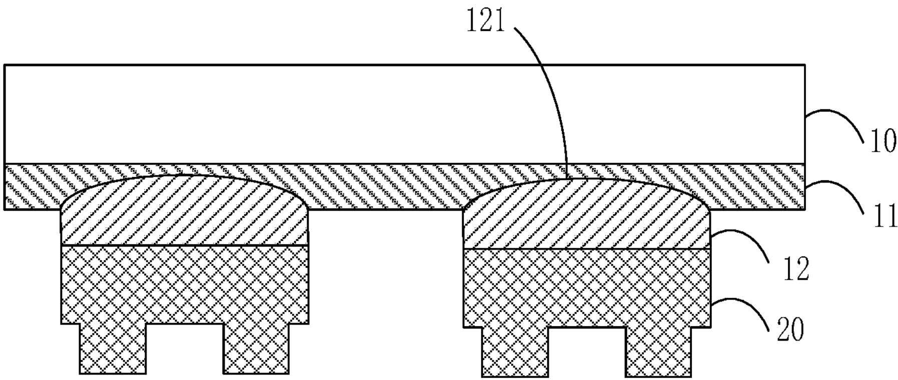


FIG. 6

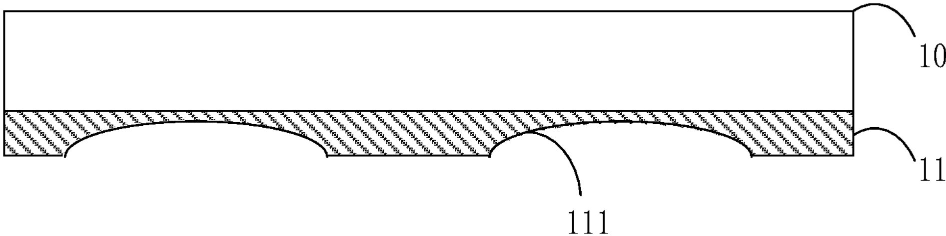


FIG. 7

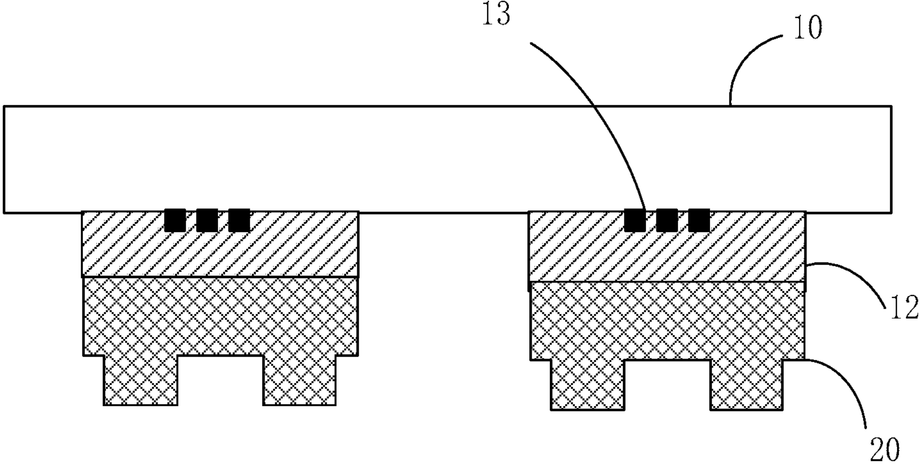


FIG. 8

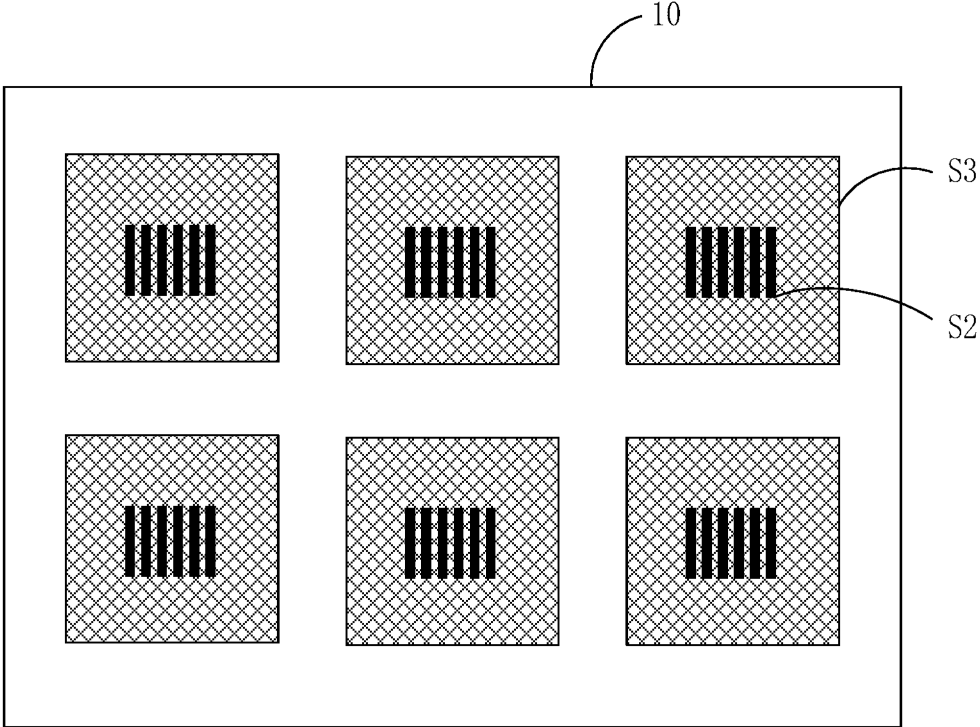


FIG. 9

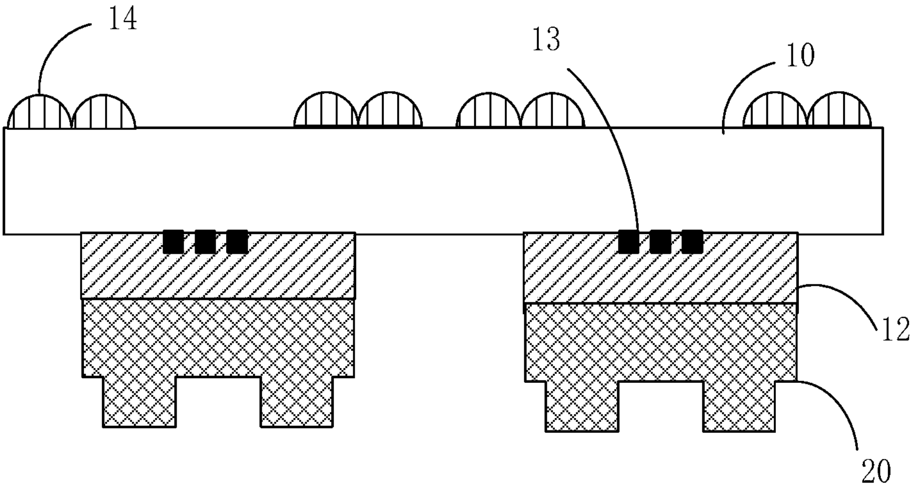


FIG. 10

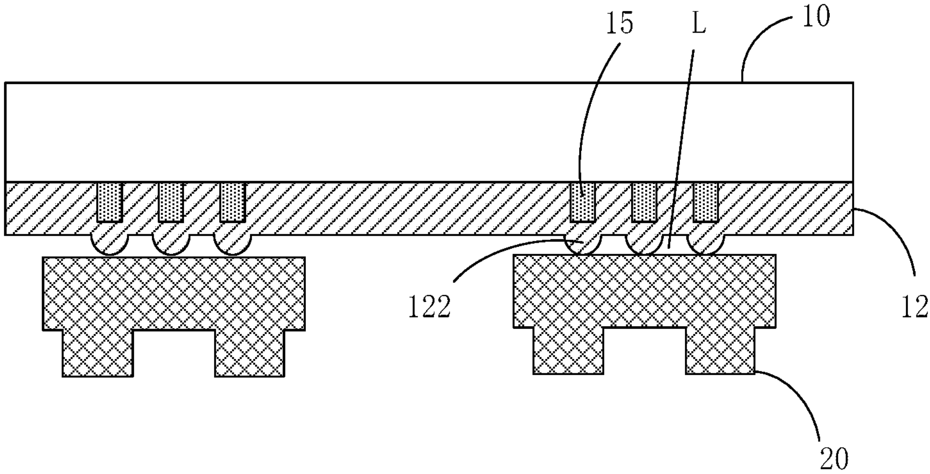


FIG. 11

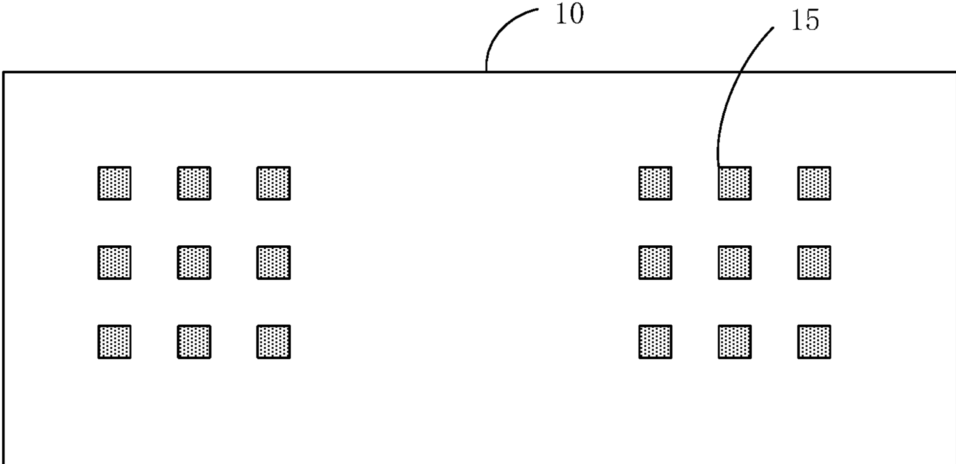


FIG. 12

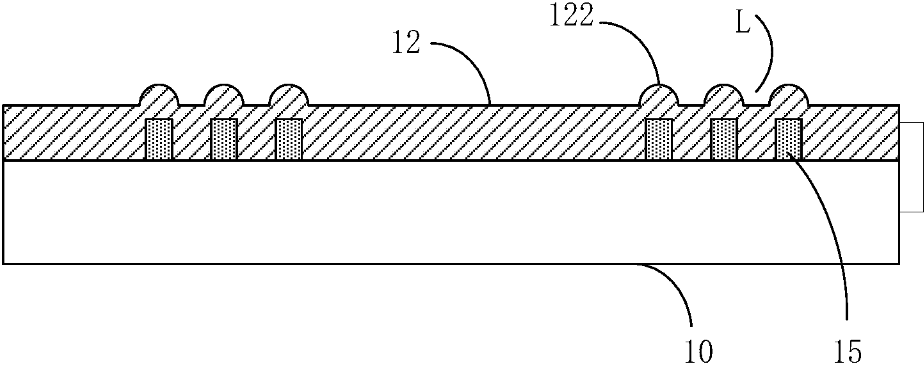


FIG. 13

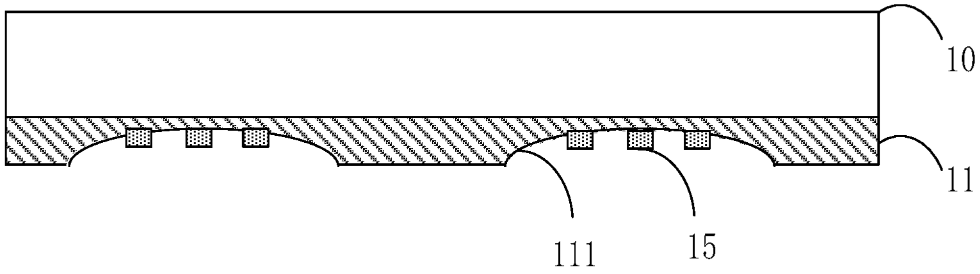


FIG. 14

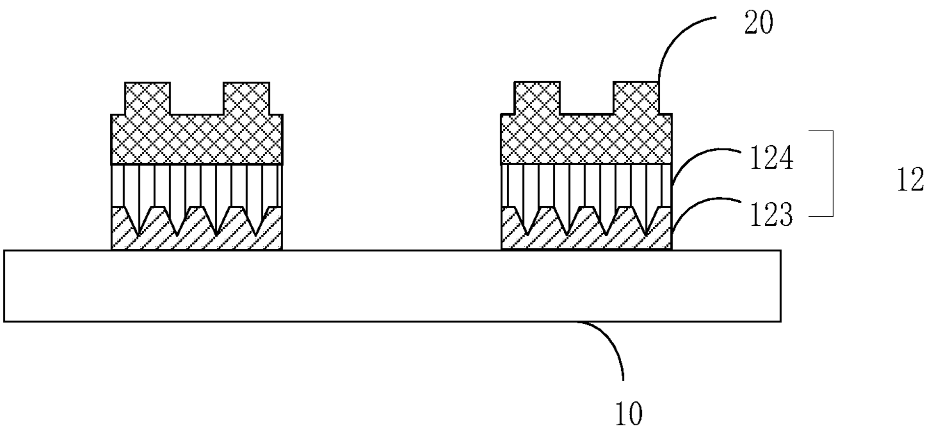


FIG. 15

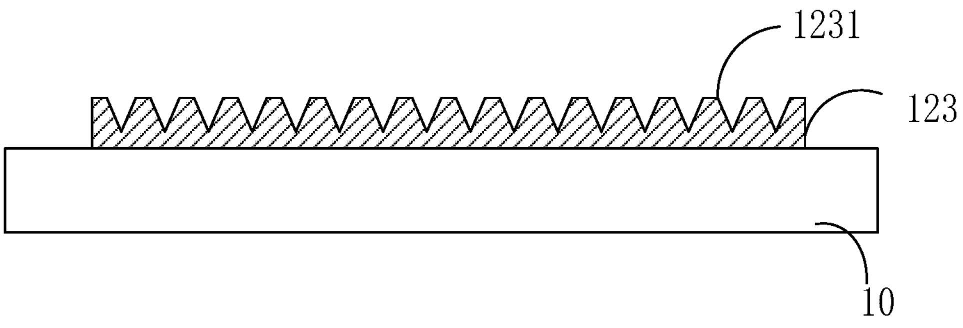


FIG. 16

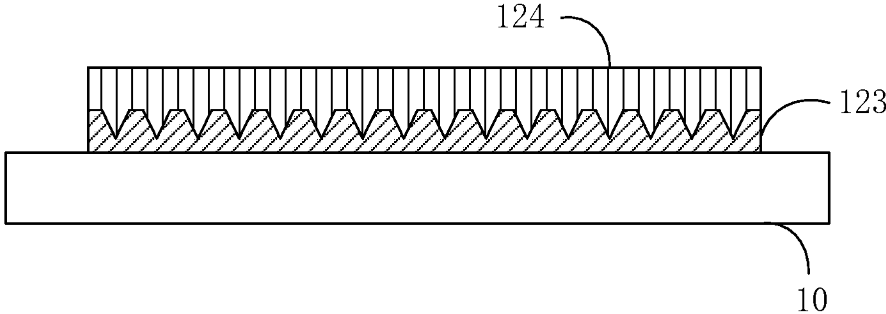


FIG. 17

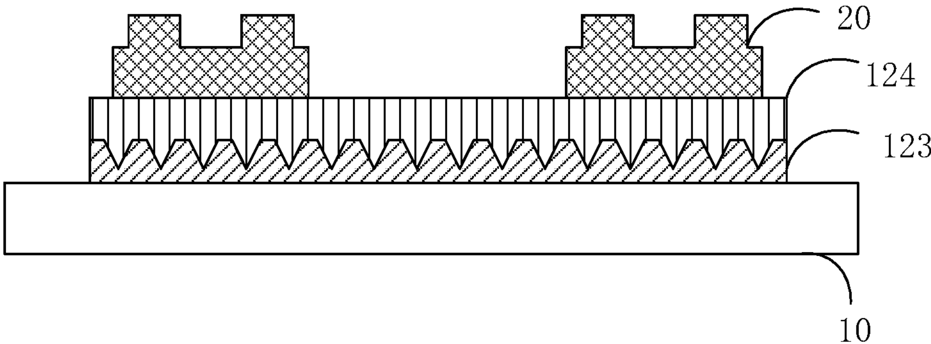


FIG. 18

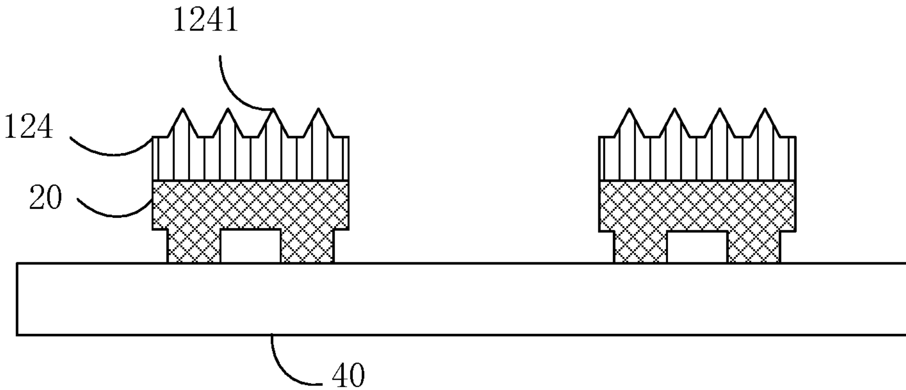


FIG. 19

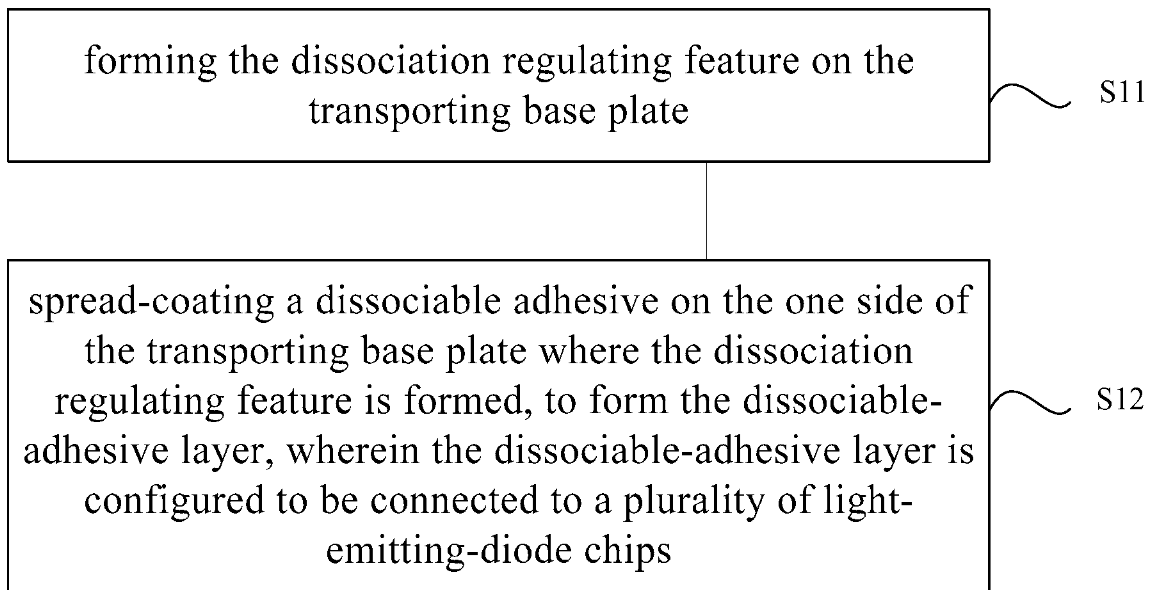


FIG. 20

CARRIER PLATE AND TRANSFERRING DEVICE

TECHNICAL FIELD

[0001] The present application relates to the technical field of displaying, and particularly relates to a carrier plate and a transferring device.

BACKGROUND

[0002] With the development of the technique of displaying, the light-emitting-diode displaying technique, as a novel displaying technique, has gradually become one of the research hotspots. The light-emitting-diode displaying technique utilizes an array formed by light emitting diodes (LED) to display. As compared with other displaying techniques, the light-emitting-diode displaying technique has the advantages of a higher luminous intensity, a higher response speed, a lower power consumption, a lower voltage demand, lighter equipment, a longer service life, a higher impact resistance, and a better anti-interference performance, and so on. Moreover, micro-sized light emitting diodes (Micro-LED) having a smaller size can better achieve a high-resolution of the products, for example, smartphones or virtual display screens of a 4K or even a 8K resolution.

[0003] In the production process of a light-emitting-diode base plate, a carrier plate is usually required to be used to realize the mass transfer of the light-emitting-diode chips. After the dissociable-adhesive layer in the carrier plate is excited, and before the dissociable-adhesive layer is entirely dissociated, gas is firstly generated inside the dissociable-adhesive layer to form a microcavity, which very easily causes position deviation of the light-emitting-diode chips in the process of falling, it seriously reduces the yield of the transfer of the light-emitting-diode chips, and it also reduces the dissociation accuracy of the light-emitting-diode chips.

SUMMARY

[0004] In the first aspect, an embodiment of the present disclosure discloses a carrier plate, wherein the carrier plate comprises: a transporting base plate, a dissociation regulating feature and a dissociable-adhesive layer that are sequentially arranged, the dissociation regulating feature is configured to regulate a dissociation accuracy of the dissociable-adhesive layer, and the dissociable-adhesive layer is configured to be connected to a plurality of light-emitting-diode chips.

[0005] Optionally, the dissociation regulating feature comprises a plurality of regulating micro-features, and each of the regulating micro-features corresponds to one of the light-emitting-diode chips;

[0006] an orthographic projection of the regulating micro-feature on the transporting base plate is a first projection, and an orthographic projection of the light-emitting-diode chip on the transporting base plate is a second projection; and

[0007] the first projection of each of the regulating micro-features and the second projection of the light-emitting-diode chip corresponding thereto at least partially overlap, and an area of the first projection is less than or equal to an area of the second projection.

[0008] Optionally, the regulating micro-feature comprises: an arc-shaped protrusion provided on one side of the dissociable-adhesive layer that is closer to the transporting base plate.

[0009] Optionally, the transporting base plate is provided with a first arc-shaped slot at a position facing the arc-shaped protrusion, a shape of the first arc-shaped slot and a shape of the arc-shaped protrusion match, and the arc-shaped protrusion is embedded in the first arc-shaped slot.

[0010] Optionally, the carrier plate further comprises: a medium layer, the medium layer is provided between the transporting base plate and the dissociable-adhesive layer, the medium layer is provided with a second arc-shaped slot at a position facing the arc-shaped protrusion, a shape of the second arc-shaped slot and a shape of the arc-shaped protrusion match, and the arc-shaped protrusion is embedded in the second arc-shaped slot.

[0011] Optionally, a thickness of the medium layer is greater than a depth of the second arc-shaped slot.

[0012] Optionally, a thickness of the dissociable-adhesive layer is greater than a depth of the arc-shaped protrusion.

[0013] Optionally, the regulating micro-feature comprises a grating, and an orthographic projection of the grating on the transporting base plate and a center region of the orthographic projection of the light-emitting-diode chip on the transporting base plate at least partially overlap.

[0014] Optionally, both of a slit width and a passband width of the grating are greater than a wavelength of a dissociating light; and

[0015] a height of the grating is 1000-3000A, and both of the slit width and the passband width of the grating are 500-1400A.

[0016] Optionally, an orthographic projection of the grating on the transporting base plate is a third projection, and an orthographic projection of the light-emitting-diode chip on the transporting base plate is a second projection, wherein an area of the third projection is 5%-10% of the area of the second projection.

[0017] Optionally, the carrier plate further comprises: a microlens component, and the microlens component is provided on one side of the transporting base plate that is away from the dissociable-adhesive layer; and

[0018] an orthographic projection of the microlens component on the transporting base plate and a peripheral region of the orthographic projection of the light-emitting-diode chip on the transporting base plate at least partially overlap.

[0019] Optionally, the grating is located on one side of the transporting base plate that is closer to the dissociable-adhesive layer.

[0020] Optionally, the regulating micro-feature comprises: a plurality of pre-arranged units, orthographic projections of the plurality of pre-arranged units on the transporting base plate and the orthographic projections of the light-emitting-diode chips on the transporting base plate at least partially overlap, a plurality of protrusions are formed on one side of the dissociable-adhesive layer that is away from the transporting base plate, each of the protrusions corresponds to one of the pre-arranged units, and an exhaust passage is formed between the neighboring instances of the protrusions.

[0021] Optionally, the pre-arranged units are fabricated by using a transparent material.

[0022] Optionally, a height of the pre-arranged units is 15000-20000A, and widths of the pre-arranged units in all directions are greater than or equal to 2.5 μm.

[0023] Optionally, each of the light-emitting-diode chips is provided with a plurality of instances of the pre-arranged units, and two neighboring instances of the pre-arranged units have a distance therebetween.

[0024] Optionally, the dissociable-adhesive layer comprises: a laser dissociation layer and a viscous-adhesive-material layer, the laser dissociation layer is located on one side of the transporting base plate that is closer to the light-emitting-diode chips, and the viscous-adhesive-material layer is located between the laser dissociation layer and the light-emitting-diode chips; and

[0025] the viscous-adhesive-material layer is provided with a first micro-feature on side that is closer to the laser dissociation layer, the laser dissociation layer is provided with a second micro-feature on side that is closer to the viscous-adhesive-material layer, a shape of the second micro-feature and a shape of the first micro-feature are complementary, and the second micro-feature and the first micro-feature are embedded into each other.

[0026] Optionally, a thickness of the laser dissociation layer is 1-3 μm, and a thickness of the viscous-adhesive-material layer is 1-10 μm.

[0027] Optionally, the first micro-feature is a nanometer micro-feature, and the first micro-feature is selected from at least one of a circular-cone-shaped micro-feature and a rhombic micro-feature.

[0028] Optionally, the first micro-feature is of a cone, a height of the cone is 0.2-1p m, a diameter of a bottom of the cone is 100-500 nm, and an included angle between a conical side and the bottom of the cone is 15-60°.

[0029] Optionally, a refractive index of the viscous-adhesive-material layer is greater than or equal to 1.5, and a light transmissivity of the viscous-adhesive-material layer is greater than or equal to 97%.

[0030] In the second aspect, an embodiment of the present disclosure further discloses a transferring device, wherein the transferring device comprises: a plurality of light-emitting-diode chips and the carrier plate according to any one of the above items; and

[0031] the plurality of light-emitting-diode chips are connected to the dissociable-adhesive layer of the carrier plate.

[0032] In the embodiments of the present application, by providing the dissociation regulating feature between the dissociable-adhesive layer and the transporting base plate, in the process of the mass transfer of the light-emitting-diode chips, the dissociation regulating feature can regulate the dissociation accuracy of the dissociable-adhesive layer. Accordingly, position deviation of the light-emitting-diode chips in the process of falling can be prevented, to increase the yield and the dissociation accuracy of the light-emitting-diode chips, which can increase the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips.

[0033] The above description is merely a summary of the technical solutions of the present disclosure. In order to more clearly know the elements of the present disclosure to enable the implementation according to the contents of the description, and in order to make the above and other purposes, features and advantages of the present disclosure more apparent and understandable, the particular embodiments of the present disclosure are provided below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] In order to more clearly illustrate the technical solutions of the embodiments of the present disclosure or the prior art, the figures that are required to describe the embodiments or the prior art will be briefly introduced below. Apparently, the figures that are described below are embodiments of the present disclosure, and a person skilled in the art can obtain other figures according to these figures without paying creative work.

[0035] FIG. **1** schematically shows a schematic diagram of the transfer of light-emitting-diode chips by using a conventional carrier plate;

[0036] FIG. **2** schematically shows a schematic diagram of the detailed structure of the position A in FIG. **1**;

[0037] FIG. **3** schematically shows a schematic structural diagram of the carrier plate according to an embodiment of the present application;

[0038] FIG. **4** schematically shows a schematic structural diagram of the dissociable-adhesive layer according to an embodiment of the present application;

[0039] FIG. **5** schematically shows a schematic structural diagram of the transporting base plate in the carrier plate shown in FIG. **3**;

[0040] FIG. **6** schematically shows a schematic structural diagram of the carrier plate according to another embodiment of the present application;

[0041] FIG. **7** schematically shows a schematic structural diagram of the carrier plate shown in FIG. **6** when the dissociable-adhesive layer has been removed;

[0042] FIG. **8** schematically shows a schematic structural diagram of the carrier plate according to another embodiment of the present application;

[0043] FIG. **9** schematically shows a schematic structural top diagram of the carrier plate shown in FIG. **8**;

[0044] FIG. **10** schematically shows a schematic structural diagram of the carrier plate according to yet another embodiment of the present application;

[0045] FIG. **11** schematically shows a schematic structural diagram of the carrier plate according to yet another embodiment of the present application;

[0046] FIG. **12** schematically shows a first processing-state diagram of the carrier plate shown in FIG. **11**;

[0047] FIG. **13** schematically shows a second processing-state diagram of the carrier plate shown in FIG. **11**;

[0048] FIG. **14** schematically shows a schematic structural diagram of the carrier plate according to another embodiment of the present application;

[0049] FIG. **15** schematically shows a schematic structural diagram of the carrier plate according to still another embodiment of the present application;

[0050] FIG. **16** schematically shows a first particular schematic processing diagram of the carrier plate shown in FIG. **15**;

[0051] FIG. **17** schematically shows a second particular schematic processing diagram of the carrier plate shown in FIG. **15**;

[0052] FIG. **18** schematically shows a third particular schematic processing diagram of the carrier plate shown in FIG. **15**;

[0053] FIG. **19** schematically shows a fourth particular schematic processing diagram of the carrier plate shown in FIG. **15**; and

[0054] FIG. **20** schematically shows a flow chart of the steps of the method for processing a carrier plate according to an embodiment of the present application.

[0055] Description of the reference numbers: **10**-transporting base plate, **101**-first arc-shaped slot, **11**-medium layer, **111**-second arc-shaped slot, **12**-dissociable-adhesive layer, **121**-arc-shaped protrusion, **122**-protrusion, **123**-laser dissociation layer, **1231**-second micro-feature, **124**-viscous-adhesive-material layer, **1241**-first micro-feature, **13**-grating, **14**-microlens component, **15**-pre-arranged units, **20**-light-emitting-diode chips, **201**-luminescent layer, **202**-first electrode, **203**-second electrode, **30**-mask, S-microcavity, S2-second projection, S3-third projection, L-exhaust passage.

DETAILED DESCRIPTION

[0056] In order to make the objects, the technical solutions and the advantages of the embodiments of the present disclosure clearer, the technical solutions of the embodiments of the present disclosure will be clearly and completely described below with reference to the drawings of the embodiments of the present disclosure. Apparently, the described embodiments are merely certain embodiments of the present disclosure, rather than all of the embodiments. All of the other embodiments that a person skilled in the art obtains on the basis of the embodiments of the present disclosure without paying creative work fall within the protection scope of the present disclosure.

[0057] The features defined by the terms "first" and "second" in the description and the claims of the present application may explicitly or implicitly comprise one or more of the features. In the description of the present disclosure, unless stated otherwise, the meaning of "plurality of" is "two or more". Furthermore, the "and/or" in the description and the claims indicates at least one of the linked objects, and the character "/" generally indicates that the linked objects are of the relation of "or".

[0058] In the description of the present disclosure, it should be understood that the terms that indicate orientation or position relations, such as "central", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "anticlockwise", "axial", "radial" and "circumferential", are based on the orientation or position relations shown in the drawings, and are merely for conveniently describing the present disclosure and simplifying the description, rather than indicating or implying that the device or element must have the specific orientation and be constructed and operated according to the specific orientation. Therefore, they should not be construed as a limitation on the present disclosure.

[0059] In the description of the present disclosure, it should be noted that, unless explicitly defined or limited otherwise, the terms "mount", "connect" and "link" should be interpreted broadly. For example, it may be fixed connection, detachable connection, or integral connection; it may be mechanical connection or electrical connection; and it may be direct connection or indirect connection by an intermediate medium, and may be the internal communication between two elements. For a person skilled in the art, the particular meanings of the above terms in the present disclosure may be comprehended according to particular situations.

[0060] Referring to FIG. **1**, a schematic diagram of the transfer of light-emitting-diode chips by using a conventional carrier plate is shown. Referring to FIG. **2**, a schematic diagram of the detailed structure of the position A in FIG. **1** is shown. Particularly, the carrier plate may comprise a transporting base plate **10** and a dissociable-adhesive layer **12**, and the dissociable-adhesive layer **12** may be configured to be connected to a plurality of light-emitting-diode chips **20**.

[0061] As shown in FIG. **1**, a dissociating light (as shown by the arrow in FIG. **1**) may irradiate the dissociable-adhesive layer **12** via a mask. The dissociable-adhesive layer **12**, under the irradiation of the dissociating light, can be gasified and dissociated, whereby the light-emitting-diode chips **20** is separated from the transporting base plate **10**, and the light-emitting-diode chips **20** may fall and transfer to a driving substrate of the displaying device, to realize the mass transfer of the light-emitting-diode chips **20**.

[0062] As shown in FIG. **2**, when the dissociating light is irradiating the dissociable-adhesive layer **12**, because the intensity of the energy of the dissociating light at the center region of dissociable-adhesive layer **12** is greater than the intensity at the peripheral region, the center region of the dissociable-adhesive layer **12** is firstly dissociated to form a microcavity S, and the gas generated by the gasification of the dissociable-adhesive layer **12** exists inside the microcavity **12**. After the dissociable-adhesive layer **12** has been entirely dissociated, because of the uncertainty caused by the impact of the gas inside the microcavity S, the light-emitting-diode chips **20** will have deviations in the postures and the positions of the falling, whereby a position deviation of the light-emitting-diode chips **20** in the process of falling is very easily caused, it seriously reduces the yield of the transfer of the light-emitting-diode chips **20**, it also reduces the dissociation accuracy of the light-emitting-diode chips **20**.

[0063] As shown in FIG. **2**, the light-emitting-diode chip **20** may comprise a luminescent layer **201** with a sandwich structure, and a first electrode **202** and a second electrode **203** that are provided on the same side of the luminescent layer **201**. The luminescent layer **201** may be a semiconductor-film layer, and the semiconductor-film layer may be fabricated by using materials such as P—GaN, MQW and N—GaN. The first electrode **202** may be a positive electrode. The second electrode **203** may be a negative electrode. In the process of the transferring, the side of the light-emitting-diode chip **20** that is not provided with the electrodes may face the dissociable-adhesive layer **12**, and the side of the light-emitting-diode chip **20** that is provided with the electrodes may face the driving substrate. After the light-emitting-diode chip **20** has fallen, the first electrode **202** and the second electrode **203** may be fixedly connected to a bonding pad on the driving substrate.

[0064] Referring to FIG. **3**, a schematic structural diagram of the carrier plate according to an embodiment of the present application is shown. As shown in FIG. **3**, the carrier plate may particularly comprise: a transporting base plate **10**, a dissociation regulating feature and a dissociable-adhesive layer **12** that are sequentially arranged, the dissociation regulating feature may be configured to regulate the dissociation accuracy of the dissociable-adhesive layer **12**,

and the dissociable-adhesive layer **12** may be configured to be connected to a plurality of light-emitting-diode chips **20**.

[0065] Particularly, the dissociable-adhesive layer **12** of the carrier plate may be configured to be connected to a plurality of light-emitting-diode chips **20**, and the plurality of light-emitting-diode chips **20** may be distributed on the carrier plate in an array. The light-emitting-diode chips **20** may be light-emitting-diode chips that emit the same color or different colors, which is not limited in the embodiments of the present application.

[0066] Particularly, the dissociable-adhesive layer **12** may be a laser-dissociable adhesive, it dissociates the dissociable-adhesive layer **12** in the corresponding area by irradiating a laser to some area of the transporting base plate **10**, whereby the light-emitting-diode chips **20** in that area are fallen, and transfer to the driving substrate. Alternatively, the dissociable-adhesive layer **12** may also be a pyrolyzed adhesive, and, in this case, it dissociates the dissociable-adhesive layer **12** in the corresponding area by heating some area of the transporting base plate **10**, whereby the light-emitting-diode chips **20** in that area is fallen, and transfer to the driving substrate.

[0067] For example, when it is required to transfer the light-emitting-diode chips **20** on the transporting base plate **10** to the driving substrate, the transporting base plate **10** may, based on the direction of gravity, be provided above the driving substrate, that is, the transporting base plate **10** and the driving substrate are sequentially arranged in the direction of gravity, whereby the light-emitting-diode chips **20** on the transporting base plate **10** that are required to be transferred can be transferred to the driving substrate by using gravity in cooperation with the dissociable-adhesive layer **12**.

[0068] In the embodiments of the present application, because of the dissociation regulating feature between the dissociable-adhesive layer **12** and the transporting base plate **10**, in the process of the mass transfer of the light-emitting-diode chips **20**, the dissociation regulating feature can regulate the dissociation accuracy of the dissociable-adhesive layer **12**. Accordingly, a position deviation of the light-emitting-diode chips **20** in the process of falling can be prevented, it increases the yield and the dissociation accuracy of the light-emitting-diode chips **20**, whereby it can increase the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips **20**.

[0069] In some alternative embodiments of the present application, the dissociation regulating feature may comprise a plurality of regulating micro-features, and each of the regulating micro-features corresponds to one of the light-emitting-diode chips **20**. The orthographic projection of the regulating micro-feature on the transporting base plate **10** is a first projection, and the orthographic projection of the light-emitting-diode chip **20** on the transporting base plate **10** is a second projection. The first projection of each of the regulating micro-features and the second projection of the light-emitting-diode chip **20** correspondingly to the first projection are thereto at least partially overlapped, and the area of the first projection is less than or equal to the area of the second projection.

[0070] Particularly, the regulating micro-feature may be a pattern and a micro-feature, and may also be a grating, a microlens, a pre-provided feature and so on. The micro-feature can optimize the interface morphology of the dissociable-adhesive layer **12**. Accordingly, the dissociable-adhesive layer **12** can automatically exhaust gas by the periphery in the process of dissociation. By providing a regulating micro-feature correspondingly to each of the light-emitting-diode chips **20**, the problem of deviation of the light-emitting-diode chips **20** caused by unsmooth gas exhaustion can be effectively solved.

[0071] As an example, the regulating micro-feature may be provided at the center region of the light-emitting-diode chip **20**, whereby the first projection and the center region of the second projection are overlapped. Alternatively, the regulating micro-feature may also be provided at the peripheral region of the light-emitting-diode chip **20**, whereby the first projection and the peripheral region of the second projection are overlapped. Alternatively, the regulating micro-feature may also be provided at the entire outer-surface region of the entire light-emitting-diode chip **20**, whereby the first projection and the second projection are completely overlapped. The particular position of the regulating micro-feature relative to the light-emitting-diode chip **20** is not limited in the present application.

[0072] As shown in FIG. **3**, the regulating micro-feature may particularly comprise: an arc-shaped protrusion **121** provided on the one side of the dissociable-adhesive layer **12** that is closer to the transporting base plate **10**.

[0073] Referring to FIG. **4**, a schematic structural diagram of the dissociable-adhesive layer according to an embodiment of the present application is shown. As shown in FIG. **4**, because the dissociable-adhesive layer **12** is provided with the arc-shaped protrusion **121** on the side that is closer to the transporting base plate **10**, the thickness of the center region of the dissociable-adhesive layer **12** is greater than the thickness of the peripheral region, and, in order to reach the same degree of dissociation, the energy of the dissociating light required by the center region of the dissociable-adhesive layer **12** is more than the energy of the dissociating light required by the peripheral region. Moreover, when the dissociating light is irradiating the arc-shaped protrusion **121**, the energy of the dissociating light irradiating the arc-shaped protrusion **121** generally progressively decreases from the center region to the peripheral region. Accordingly, by providing the arc-shaped protrusion **121** on the dissociable-adhesive layer **12**, the progressive decreasing of the thickness of the dissociable-adhesive layer **12** from the center region to the peripheral region can be realized, which is adapted for the energy distribution of the dissociating light. As a result, the center region and the peripheral region of the dissociable-adhesive layer **12** can realize dissociation with the equal degrees, to prevent the microcavity and the gas generated by the earlier dissociation of the center region of the dissociable-adhesive layer **12**, whereby it can prevent gas impact and position deviation of the light-emitting-diode chips **20** in the process of falling, and it increases the yield and the dissociation accuracy of the light-emitting-diode chips **20**, thereby increasing the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips **20**.

[0074] It should be noted that, in practical applications, the radian of the arc-shaped protrusion **121** may be set according to the energy distribution of the dissociating light. The radian of the arc-shaped protrusion is not particularly limited in the embodiments of the present application.

[0075] Referring to FIG. **5**, a schematic structural diagram of the transporting base plate in the carrier plate shown in

FIG. **3** is shown. As shown in FIG. **5**, the transporting base plate **10** is provided with a first arc-shaped slot **101** at the position facing the arc-shaped protrusion **121**, the shape of the first arc-shaped slot **101** and the shape of the arc-shaped protrusion **121** are matched, and the arc-shaped protrusion **121** is embedded in the first arc-shaped slot **101**.

[0076] In an embodiment of the present application, the first arc-shaped slot **101** may be firstly formed on the transporting base plate **10**, and then a dissociable adhesive may be spread-coated onto the one side where the first arc-shaped slot **101** is formed, whereby the dissociable adhesive can flow into the first arc-shaped slot **101**. Accordingly, the arc-shaped protrusion **121** can be formed on the finally formed dissociable-adhesive layer **12**. By directly forming the first arc-shaped slot **101** on the transporting base plate **10**, the carrier plate can have a simple structure and a low height.

[0077] Particularly, the shape matching between the first arc-shaped slot **101** and the arc-shaped protrusion **121** may particularly include: that the shapes of the first arc-shaped slot **101** and the arc-shaped protrusion **121** are the same, or that the first arc-shaped slot **101** is slightly larger than the arc-shaped protrusion **121**, to facilitate to form the arc-shaped protrusion **121** inside the first arc-shaped slot **101**.

[0078] Referring to FIG. **6**, a schematic structural diagram of the carrier plate according to another embodiment of the present application is shown. Referring to FIG. **7**, a schematic structural diagram of the carrier plate shown in FIG. **6** when the dissociable-adhesive layer has been removed is shown. As shown in FIG. **6**, the carrier plate may further comprise: a medium layer **11**, the medium layer **11** is provided between the transporting base plate **10** and the dissociable-adhesive layer **12**, the medium layer **11** is provided with a second arc-shaped slot **111** at the position facing the arc-shaped protrusion **121**, the shape of the second arc-shaped slot **111** and the shape of the arc-shaped protrusion **121** match, and the arc-shaped protrusion **121** is embedded in the second arc-shaped slot **111**.

[0079] In particular applications, because the transporting base plate **10** is usually fabricated by glass, the processes for directly processing the transporting base plate **10** to form the arc-shaped slot are usually complicated and have a high cost. In order to reduce the process complexity and reduce the cost, before forming the dissociable-adhesive layer **12**, the process may comprise firstly forming a medium layer **11** on the transporting base plate **10**, then forming the second arc-shaped slot **111** on the medium layer **11**, which has a simpler process, and finally spread-coating the dissociable adhesive onto the medium layer **11**, to form the dissociable-adhesive layer **12** having the arc-shaped protrusion **121**. That can avoid the operation of directly processing an arc-shaped slot on the transporting base plate **10** of a glass material.

[0080] Optionally, the material of the medium layer **11** may be at least one of silicon oxide and silicon nitride. In practical applications, by using silicon oxide or silicon nitride as the material of the medium layer **11** can facilitate the process of lithography on the medium layer **11**. Particularly, a depression having a certain radian is formed by lithography process, that is the second arc-shaped slot **111**, correspondingly at the position where the light-emitting-diode chip **20** is required to be connected, and then spread-coating the dissociable adhesive onto the one side of the medium layer **111** where the second arc-shaped slot **111** is formed, whereby the dissociable adhesive can flow into the second arc-shaped slot **111**. Accordingly, the arc-shaped protrusion **121** can be formed on the finally formed dissociable-adhesive layer **12**. The second arc-shaped slot **111** on the medium layer **11** is formed by lithography the processing, processing of the second arc-shaped slot **111** can be simpler and have a lower cost.

[0081] Particularly, the shape matching between the second arc-shaped slot **111** and the arc-shaped protrusion **121** may particularly include: that the shapes of the second arc-shaped slot **111** and the arc-shaped protrusion **121** are the same, or that the second arc-shaped slot **111** is slightly larger than the arc-shaped protrusion **121**, to form the arc-shaped protrusion **121** inside the second arc-shaped slot **111** facilitatly.

[0082] Optionally, the thickness of the medium layer **11** may be greater than the depth of the second arc-shaped slot **111**, to form an intact second arc-shaped slot **111** on the medium layer **11** facilitatly. Etching off the entire medium layer **11** and exposing the transporting base plate **10** can be prevented in the process of lithography, it improves the regularity and the intactness of the second arc-shaped slot **111** on the medium layer **11**, thereby facilitating to obtain an intact arc-shaped protrusion **121** of a regular shape.

[0083] It should be noted that the depth of the second arc-shaped slot **111** may particularly be the depth corresponding to the deepest position of the depression of the second arc-shaped slot **111**.

[0084] As an example, when the depth of the second arc-shaped slot **111** is greater than or equal to 1000A, the thickness of the medium layer **11** may be 5000-10000A. The depth of the second arc-shaped slot **111** is greater than or equal to 1000A, and is less than the thickness of the medium layer **11**.

[0085] In some alternative embodiments of the present application, the thickness of the dissociable-adhesive layer **12** is greater than the depth of the arc-shaped protrusion **121**, to realize a reliable adhesion of the light-emitting-diode chips **21** to the transporting base plate **10**.

[0086] It should be noted that the depth of the arc-shaped protrusion **121** may particularly be the depth corresponding to the highest position of the protrusion of the arc-shaped protrusion **121**.

[0087] Particularly, the thickness of the dissociable-adhesive layer **12** may be determined according to practical effects. For example, the thickness of the dissociable-adhesive layer **12** may be 1-5 μm, and, correspondingly, the thickness of the medium layer **11** may be greater than 3000A, and the depth of the arc-shaped protrusion **121** may be 500-2500A.

[0088] Referring to FIG. **8**, a schematic structural diagram of the carrier plate according to another embodiment of the present application is shown. As shown in FIG. **8**, the regulating micro-feature may comprise a grating **13**, and the orthographic projection of the grating **13** on the transporting base plate **10** and the center region of the orthographic projection of the light-emitting-diode chip **20** on the transporting base plate **10** are at least partially overlapped.

[0089] Particularly, the center region of the orthographic projection of the light-emitting-diode chip **20** on the transporting base plate **10** may be: the area covered by a circle that is drawn with the orthographic projection of the center of the light-emitting-diode chip **20** as the center and a preset distance as the radius, wherein the preset distance may be

10%-50% of the distance from the center of the light-emitting-diode chip **20** to the edge. Alternatively, the center region may also be the area adjacent to the orthographic projection of the center of the light-emitting-diode chip **20**. In the orthographic projection of the light-emitting-diode chip **20** on the transporting base plate **10**, the area outside the center region may be the peripheral region.

[0090] In practical applications, the grating **13** may be located on the one side of the transporting base plate **10** that is closer to the dissociable-adhesive layer **12**. When the dissociating light enters from the side of the transporting base plate **10**, a diffraction may happen at the grating **13**, to reduce the energy of the dissociating light. In an embodiment of the present application, by providing the grating **13** at the center region of the dissociable-adhesive layer **12**, the orthographic projection of the grating **13** on the transporting base plate **10** and the center region of the orthographic projection of the light-emitting-diode chip **20** on the transporting base plate **10** can be at least partially overlapped. Because of the function of diffraction of the grating **13**, the energy of the dissociating light irradiating the center region of the dissociable-adhesive layer **12** can be reduced, which can enable the light rays irradiating the center region and the peripheral region of the dissociable-adhesive layer **12**. As a result, the center region and the peripheral region of the dissociable-adhesive layer **12** can realize dissociation with the equal degrees, it prevents the microcavity and the gas generated by the earlier dissociation of the center region of the dissociable-adhesive layer **12**, whereby it can prevent gas impact and position deviation of the light-emitting-diode chips **20** in the process of falling, and it also can increase the yield and the dissociation accuracy of the light-emitting-diode chips **20**, thereby increasing the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips **20**.

[0091] In an embodiment of the present application, both of the slit width and the passband width of the grating **13** are greater than the wavelength of a dissociating light, whereby the dissociating light can have a better diffraction at the grating **13**. For example, when the wavelength of the dissociating light is 266-355 nm, the slit width and the passband width of the grating **13** may be 500-1400A.

[0092] As an example, the height of the grating **13** may be 1000-3000A. Because the height of the grating **13** is lower, when the dissociable adhesive continues to be spread-coated onto the grating **13**, it is difficult to obviously protrude on the surface of the dissociable-adhesive layer **12**, and the surface of the dissociable-adhesive layer **12** is relatively even, which can realize the reliability of the connection of the light-emitting-diode chips.

[0093] Referring to FIG. **9**, a schematic structural top diagram of the carrier plate shown in FIG. **8** is shown. As shown in FIG. **9**, the orthographic projection of the grating **13** on the transporting base plate **10** is a third projection S**3**, and the orthographic projection of the light-emitting-diode chip **20** on the transporting base plate **10** is a second projection S**2**. As shown in FIG. **9**, the third projection S**3** and the center region of the second projection S**2** may be overlapped.

[0094] In particular applications, when the uniformity of the dissociating light is 5%, the area of the third projection S**3** is 5%-10% of the area of the second projection S**2**, the uniformity of the irradiation by the dissociating light onto the dissociable-adhesive layer **20** is improved, it enables the center region and the peripheral region of the dissociable-adhesive layer **12** to be dissociated synchronously. As an example, in order to balance the uniformity of the dissociating light and the surface smoothness of the dissociable-adhesive layer **12**, the area of the third projection S**3** may be not greater than 7% of the area of the second projection S**2**.

[0095] Referring to FIG. **10**, a schematic structural diagram of the carrier plate according to yet another embodiment of the present application is shown. As shown in FIG. **10**, based on the carrier plate shown in FIG. **8**, the carrier plate shown in FIG. **10** may comprise: a microlens component **14**, and the microlens component **14** is provided on the one side of the transporting base plate **10** that is away from the dissociable-adhesive layer **12**. The microlens component **14** may be used to perform energy convergence, and regulate the uniformity of the dissociating light entering the transporting base plate **10**, which can enable the center region and the peripheral region of the dissociable-adhesive layer **12** to be dissociated synchronously.

[0096] In practical applications, the microlens component **14** may be, according to actual situations, provided at a region where the dissociating light is weaker. In an alternative embodiment of the present application, the orthographic projection of the microlens component **14** on the transporting base plate **10** and the peripheral region of the orthographic projection of the light-emitting-diode chip **20** on the transporting base plate **10** are at least partially overlapped. In other words, the microlens component **14** may be provided at a position corresponding to the peripheral region of the light-emitting-diode chip **20**.

[0097] In practical applications, because the regions of the weakly dissociated light are concentrated at the position corresponding to the peripheral region of the light-emitting-diode chip **20**, by providing the microlens component **14** at the position corresponding to the peripheral region of the light-emitting-diode chip **20**, the microlens component **14** can be used to perform energy convergence to the dissociating light at the peripheral region of the light-emitting-diode chip **20**.

[0098] It should be noted that the arrangement area of the microlens component **14** may be determined according to actual situations of the dissociating light, and the arrangement area of the microlens component **14** is not particularly limited in the embodiments of the present application. The material of the microlens component **14** is a conventional lens material, such as a light transmitting resin or a glass. The curvature radius of the microlens component **14** is determined according to the actual effect of light focusing, and is not limited in the embodiments of the present application.

[0099] Referring to FIG. **11**, a schematic structural diagram of the carrier plate according to yet another embodiment of the present application is shown. As shown in FIG. **11**, the regulating micro-feature may comprise: a plurality of pre-arranged units **15**, the orthographic projections of the plurality of pre-arranged units **15** on the transporting base plate **10** and the orthographic projection of the light-emitting-diode chips **20** on the transporting base plate **10** are at least partially overlapped, a plurality of protrusions **122** are formed on the one side of the dissociable-adhesive layer **12** that is away from the transporting base plate **10**, each of the protrusions **122** corresponds to one of the pre-arranged units **15**, and an exhaust passage L is formed between the neighboring protrusions **122**. Accordingly, the gas generated by

the dissociation and gasification of the dissociable-adhesive layer **12** can be discharged from the exhaust passage L, which can enable the light-emitting-diode chips **20** to prevent being impacted by the gas in the process of falling, and prevent position deviation of the light-emitting-diode chips **20** in the process of falling, and increase the yield and the dissociation accuracy of the light-emitting-diode chips **20**, thereby increasing the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips **20**.

[0100] Referring to FIG. **12**, a first processing-state diagram of the carrier plate shown in FIG. **11** is shown. As shown in FIG. **12**, in particular applications, in the process of processing the carrier plate, firstly, a plurality of pre-arranged units **15** that are distributed in an array may be provided correspondingly at the positions of the transporting base plate **10** where the light-emitting-diode chips **20** are required to be connected.

[0101] It should be noted that, in practical applications, the transporting base plate **10** and the pre-arranged units **15** may be designed to be an integral structure, and the transporting base plate **10** and the pre-arranged units **15** may also be designed to be a separate structure. The connection mode between the transporting base plate **10** and the pre-arranged units **15** is not limited in the embodiments of the present application.

[0102] Referring to FIG. **13**, a second processing-state diagram of the carrier plate shown in FIG. **11** is shown. As shown in FIG. **13**, after the plurality of pre-arranged units **15** have been provided on the transporting base plate **10**, the dissociable adhesive may be spread-coated on the one side of the transporting base plate **10** where the pre-arranged units **15** are provided to form the dissociable-adhesive layer **12**.

[0103] Particularly, because of the blocking function of the pre-arranged units **15**, the pre-arranged units **15** prevent the dissociable adhesive from flowing, and, moreover, because of a certain viscosity of the dissociable adhesive, it is difficult to level the positions of the pre-arranged units **15** by the fluidity of the dissociable adhesive. Accordingly, the protrusions **122** are formed at the positions corresponding to the pre-arranged units **15**, whereby an exhaust passage L is formed between the neighboring protrusions **122**. In the dissociation processing of the dissociable-adhesive layer **12**, the gas generated by the dissociation and gasification of the dissociable-adhesive layer **12** can be discharged from the exhaust passage L, whereby it can enable the light-emitting-diode chips **20** to prevent being impacted by the gas in the process of falling, and it can also prevent position deviation of the light-emitting-diode chips **20** in the process of falling, and increase the yield and the dissociation accuracy of the light-emitting-diode chips **20**.

[0104] In an embodiment of the present application, the pre-arranged units **15** may be fabricated by using a transparent material, which can enable the dissociating light to transmit the pre-arranged units **15** and irradiate the dissociable-adhesive layer **12**, to prevent influence by the pre-arranged units **15** on the intensity of the dissociating light. As an example, the transparent material may be selected from at least one of silicon oxide and silicon nitride. The transparent material is not particularly limited in the embodiments of the present application.

[0105] As an example, the height of the pre-arranged units **15** may be 15000-20000A, whereby the pre-arranged units **15** can perform an effective blocking to the dissociable adhesive, to form the regular protrusions **122** on the surface of the dissociable-adhesive layer **12**.

[0106] Certainly, in practical applications, the height of the pre-arranged units **15** is required to be determined according to the actual thickness of the dissociable-adhesive layer **12**, wherein if the thickness of the dissociable-adhesive layer **12** is higher, the height of the pre-arranged units **15** is correspondingly higher. Generally, in order to realize a good effect of blocking, the difference between the height of the pre-arranged units **15** and the height of the dissociable-adhesive layer **12** should be less than or equal to 1p m.

[0107] As an example, the widths of the pre-arranged units **15** in all directions should be greater than or equal to 2.5 μm, whereby the pre-arranged units **15** have a good processability.

[0108] As an example, the cross-sectional shape of the pre-arranged units **15** may include but is not limited to circle, rectangle or another polygon. The particular shape of the pre-arranged units **15** is not limited in the embodiments of the present application. When the cross-sectional shape of the pre-arranged units **15** is a circle, the diameter of the circle should be greater than or equal to 2.5 μm. When the cross-sectional shape of the pre-arranged units **15** is a rectangle, the shortest side length of the rectangle should be greater than or equal to 2.5 μm.

[0109] In some alternative embodiments of the present application, each of the light-emitting-diode chips **20** is provided with a plurality of pre-arranged units **15**, and two neighboring pre-arranged units **15** have a distance therebetween. That can facilitate to form a plurality of mutually independent exhaust passages L between the light-emitting-diode chips **20** and the dissociable-adhesive layer **12**, to further improve the stability of the gas exhaustion.

[0110] Referring to FIG. **14**, a schematic structural diagram of the carrier plate according to another embodiment of the present application is shown. As shown in FIG. **14**, the carrier plate may comprise: the medium layer **11**, the medium layer **11** is provided with a second arc-shaped slot **111** at the position facing the arc-shaped protrusion **121**, and pre-arranged units **15** are provided on the one side of the second arc-shaped slot **111** that is away from the transporting base plate **10**. That can enable the arc-shaped protrusion **121** to be formed on the finally formed dissociable-adhesive layer **12**, and a plurality of mutually independent exhaust passages L is formed between the light-emitting-diode chips **20** and the dissociable-adhesive layer **12** facilitatly, to further improve the stability of the gas exhaustion, whereby it can prevent position deviation of the light-emitting-diode chips **20** in the process of falling, and it also can increase the yield and the dissociation accuracy of the light-emitting-diode chips **20**, thereby increasing the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips **20**.

[0111] In practical applications, the material of the pre-arranged units **15** may be a photoresist, and the pre-arranged units **15** inside the second arc-shaped slot **111** may be fabricated by using a mask.

[0112] Referring to FIG. **15**, a schematic structural diagram of the carrier plate according to still another embodiment of the present application is shown. As shown in FIG. **15**, the dissociable-adhesive layer **12** may comprise: a laser dissociation layer **123** and a viscous-adhesive-material layer **124**, the laser dissociation layer **123** is located on the one

side of the transporting base plate **10** that is closer to the light-emitting-diode chips **20**, and the viscous-adhesive-material layer **124** is located between the laser dissociation layer **123** and the light-emitting-diode chips **20**. The viscous-adhesive-material layer **124** is provided with a first micro-feature **1241** on the side that is closer to the laser dissociation layer **123**, the laser dissociation layer **123** is provided with a second micro-feature **1231** on the side that is closer to the viscous-adhesive-material layer **124**, the shape of the second micro-feature **1231** and the shape of the first micro-feature **1241** are complementary, and the second micro-feature **1231** and the first micro-feature **1241** are embedded into each other.

[0113] In an embodiment of the present application, when the dissociating light is irradiating the dissociable-adhesive layer **12**, under the irradiation of the dissociating light, the laser dissociation layer **123** can be gasified and dissociated, and the viscous-adhesive-material layer **124** can fall together with the light-emitting-diode chips **20**. Because the viscous-adhesive-material layer **124** is provided with the first micro-feature **1241** on the side that is closer to the laser dissociation layer **123**, the first micro-feature **1241** can be used to serve as a light extracting member, and it is not required to remove the viscous-adhesive-material layer **124** on the light-emitting-diode chips **20**, which avoids the operation of removing residual adhesive from the light-emitting-diode chips **20**, and further increases the efficiency of the mass transfer of the light-emitting-diode chips **20**.

[0114] It should be noted that, in the carrier plate shown in FIG. **15**, in order to simplify the illustration, the regulating micro-feature provided between the dissociable-adhesive layer **12** and the transporting base plate **10** is not illustrated. However, in practical applications, in the carrier plate shown in FIG. **15**, the regulating micro-feature may be provided between the dissociable-adhesive layer **12** and the transporting base plate **10**. The regulating micro-feature may include but is not limited to any one of the arc-shaped protrusion, the grating and the pre-arranged units according to the above-described embodiments, which is not limited in the embodiments of the present application.

[0115] Optionally, the first micro-feature **1241** may be a nanometer micro-feature, whereby the first micro-feature **1241** can serve as a nanometer microlens, to realize a good effect of light extraction.

[0116] As an example, the first micro-feature **1241** may be selected from at least one of a circular-cone-shaped micro-feature and a rhombic micro-feature. The shape of the first micro-feature **1241** is not particularly limited in the embodiments of the present application.

[0117] In an alternative embodiment of the present application, when the first micro-feature **1241** is a cone, the height of the cone is 0.2-1 μm, the diameter of the bottom of the cone is 100-500 nm, and the included angle between the side face and the bottom of the cone is 15-60°, to enable the first micro-feature **1241** to realize a good effect of light extraction.

[0118] As an example, the thickness of the laser dissociation layer **123** is 1-3 μm, whereby the laser dissociation layer **123** cannot only realize a good effect of adhesion, but also has a high dissociation efficiency. The thickness of the viscous-adhesive-material layer **124** is 1-10 μm, whereby the viscous-adhesive-material layer **124** cannot only be reliably connected to the light-emitting-diode chips **20**, but can also realize a good effect of light extraction.

[0119] In an embodiment of the present application, the refractive index of the viscous-adhesive-material layer **124** is greater than or equal to 1.5, and the light transmissivity of the viscous-adhesive-material layer **124** is greater than or equal to 97%, whereby the viscous-adhesive-material layer **124** can have a good light transmission, to realize a good effect of light extraction.

[0120] Referring to FIGS. **16** to **19**, a schematic processing diagrams of the carrier plate shown in FIG. **15** is provided particularly. As shown in FIG. **16**, firstly, a laser-dissociable adhesive may be spread-coated onto the transporting base plate **10**. As an example, a 1-3 μm thick dissociable-adhesive layer may be spread-coated for the corresponding solidification. After the solidification has completed, the surface of the dissociable-adhesive layer may be processed to form the second micro-feature **1231**, to obtain a sawtooth-shaped laser dissociation layer **123**. As an example, the second micro-feature **1231** may be formed at the surface of the laser dissociation layer **123** by processes of nanometer impression or photolithographic etching. The particular process of forming the second micro-feature **1231** is not limited in the embodiments of the present application.

[0121] As shown in FIG. **17**, when the second micro-feature **1231** has been formed on the laser dissociation layer **123**, a viscous material may be spread-coated onto the laser dissociation layer **124**, to form the viscous-adhesive-material layer **124**. Because of the levelling property of the viscous material, after being spread-coated and fixed, the viscous-adhesive-material layer **124** automatically generates the effects of planarization and filling on the side that is closer to the laser dissociation layer **124**, to form the first micro-feature **1241** whose shape is complementary with the second micro-feature **1231**. Furthermore, the second micro-feature **1241** and the first micro-feature **1231** may be embedded into each other.

[0122] As shown in FIG. **18**, after the viscous-adhesive-material layer **124** has been completed, the light-emitting-diode chips **20** may be bound with the viscous-adhesive-material layer **124**, to bind the light-emitting-diode chips **20** onto the transporting base plate **20**. It should be noted that, in the process of the binding of the light-emitting-diode chips **20**, it is required to solidify the viscous-adhesive-material layer **124**. The particular solidifying process may comprise: pressurizing and heating→maintaining for a certain duration (5 min)→high-temperature solidification (230° C.).

[0123] In practical applications, after the structure in FIG. **18** has been formed, a mask may be used to perform ashing treatment to the dissociable-adhesive layer **12**, to obtain the carrier plate shown in FIG. **15**.

[0124] As shown in FIG. **19**, in the process of the transferring of the light-emitting-diode chips **20** to a driving chip **40** by using the carrier plate shown in FIG. **15**, under the irradiation of the dissociating light, the laser dissociation layer **123** can be gasified and dissociated, and the viscous-adhesive-material layer **124** can fall together with the light-emitting-diode chips **20**. Because the viscous-adhesive-material layer **124** is provided with the first micro-feature **1241** on the side that is closer to the laser dissociation layer **123**, the first micro-feature **1241** can be used to serve as a light extracting member, and it is not required to remove the viscous-adhesive-material layer **124** on the light-emitting-diode chips **20**, which avoids the operation of removing residual adhesive from the light-emitting-diode chips **20**,

and further increases the efficiency of the mass transfer of the light-emitting-diode chips **20**.

[0125] In conclusion, the carrier plate according to the embodiments of the present application can have at least the following advantages:

[0126] In the embodiments of the present application, by providing the dissociation regulating feature between the dissociable-adhesive layer and the transporting base plate, in the process of the mass transfer of the light-emitting-diode chips, the dissociation regulating feature can regulate the dissociation accuracy of the dissociable-adhesive layer. Accordingly, position deviation of the light-emitting-diode chips in the process of falling can be prevented, to increase the yield and the dissociation accuracy of the light-emitting-diode chips, which can increase the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips.

[0127] An embodiment of the present application further provides a transferring device, wherein the transferring device may particularly comprise: a plurality of light-emitting-diode chips and the carrier plate stated above. The plurality of light-emitting-diode chips are connected to the dissociable-adhesive layer of the carrier plate, and the transferring device may be used to transfer the plurality of light-emitting-diode chips to a driving chip of a displaying device, to realize the mass transfer of the light-emitting-diode chips.

[0128] It should be noted that the structure of the carrier plate according to the embodiment of the present application is the same as the structure of the carrier plate according to the above-described embodiments, and is not discussed here further.

[0129] In the carrier plate according to the embodiments of the present application, by providing the dissociation regulating feature between the dissociable-adhesive layer and the transporting base plate, in the process of the mass transfer of the light-emitting-diode chips, the dissociation regulating feature can regulate the dissociation accuracy of the dissociable-adhesive layer. Accordingly, position deviation of the light-emitting-diode chips in the process of falling can be prevented, to increase the yield and the dissociation accuracy of the light-emitting-diode chips, which can increase the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips.

[0130] Referring to FIG. **20**, a flow chart of the steps of the method for processing a carrier plate according to an embodiment of the present application is shown. The processing method may be used to process the carrier plate according to the above-described embodiments. The processing method may particularly comprise the following steps:

[0131] Step S**11**: forming the dissociation regulating feature on the transporting base plate.

[0132] In an embodiment of the present application, the dissociation regulating feature may be firstly formed on the transporting base plate **10**, to form the dissociation regulating feature between the dissociable-adhesive layer **12** and the transporting base plate **10** facilitatly. In the process of the mass transfer of the light-emitting-diode chips **20**, the dissociation regulating feature can regulate the dissociation accuracy of the dissociable-adhesive layer **12**. That can prevent position deviation of the light-emitting-diode chips **20** in the process of falling, and increase the yield and the dissociation accuracy of the light-emitting-diode chips **20**, thereby increasing the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips **20**.

[0133] In some alternative embodiments of the present application, the dissociation regulating feature may comprise a plurality of regulating micro-features, and each of the regulating micro-features corresponds to one of the light-emitting-diode chips **20**. The orthographic projection of the regulating micro-feature on the transporting base plate **10** is a first projection, and the orthographic projection of the light-emitting-diode chip **20** on the transporting base plate **10** is a second projection. The first projection of each of the regulating micro-features and the second projection of the light-emitting-diode chip **20** corresponding are thereto at least partially overlapped, and the area of the first projection is less than or equal to the area of the second projection.

[0134] Particularly, the regulating micro-feature may be a pattern and a micro-feature, and may also be a grating, a microlens, a pre-provided feature and so on. The micro-feature can optimize the interface morphology of the dissociable-adhesive layer **12**. Accordingly, the dissociable-adhesive layer **12** can automatically exhaust gas by the periphery in the process of dissociation. By providing a regulating micro-feature correspondingly to each of the light-emitting-diode chips **20**, the problem of deviation of the light-emitting-diode chips **20** caused by unsmooth gas exhaustion can be effectively solved.

[0135] As an example, the regulating micro-feature may be provided at the center region of the light-emitting-diode chip **20**, whereby the first projection and the center region of the second projection are overlapped. Alternatively, the regulating micro-feature may also be provided at the peripheral region of the light-emitting-diode chip **20**, whereby the first projection and the peripheral region of the second projection are overlapped. Alternatively, the regulating micro-feature may also be provided at the entire outer-surface region of the entire light-emitting-diode chip **20**, whereby the first projection and the second projection are completely overlapped. The particular position of the regulating micro-feature relative to the light-emitting-diode chip **20** is not limited in the present application.

[0136] Step S**12**: spread-coating a dissociable adhesive on the one side of the transporting base plate where the dissociation regulating feature is formed, to form the dissociable-adhesive layer, wherein the dissociable-adhesive layer is configured to be connected to a plurality of light-emitting-diode chips.

[0137] In an embodiment of the present application, the dissociable-adhesive layer **12** of the carrier plate may be configured to be connected to a plurality of light-emitting-diode chips **20**, and the plurality of light-emitting-diode chips **20** may be distributed on the carrier plate in an array. The light-emitting-diode chips **20** may be light-emitting-diode chips that emit the same color or different colors, which is not limited in the embodiments of the present application.

[0138] Particularly, the dissociable-adhesive layer **12** may be a laser-dissociable adhesive, and by irradiating a laser to some area of the transporting base plate **10**, the dissociable-adhesive layer **12** in the corresponding area can be dissociated, whereby the light-emitting-diode chips **20** in that area fall, and transfer to the driving substrate. Alternatively, the dissociable-adhesive layer **12** may also be a pyrolyzed

adhesive, and, in this case, some area of the transporting base plate **10** may be heated to dissociate the corresponding area of the dissociable-adhesive layer **12**, whereby the light-emitting-diode chips **20** in that area fall, and transfer to the driving substrate.

[0139] In the carrier plate according to the embodiments of the present application, by providing the dissociation regulating feature between the dissociable-adhesive layer and the transporting base plate, in the process of the mass transfer of the light-emitting-diode chips, the dissociation regulating feature can regulate the dissociation accuracy of the dissociable-adhesive layer. Accordingly, position deviation of the light-emitting-diode chips in the process of falling can be prevented, to increase the yield and the dissociation accuracy of the light-emitting-diode chips, whereby it can increase the yield in the process of the mass transfer and the efficiency of the mass transfer of the light-emitting-diode chips.

[0140] The above-described device embodiments are merely illustrative, wherein the units that are described as separate components may or may not be physically separate, and the components that are displayed as units may or may not be physical units; in other words, they may be located at the same one location, and may also be distributed to a plurality of network units. Some or all of the modules may be selected according to the actual demands to realize the purposes of the solutions of the embodiments. A person skilled in the art can understand and implement the technical solutions without paying creative work.

[0141] The "one embodiment", "an embodiment" or "one or more embodiments" as used herein means that particular features, structures or characteristics described with reference to an embodiment are included in at least one embodiment of the present disclosure. Moreover, it should be noted that here an example using the wording "in an embodiment" does not necessarily refer to the same one embodiment.

[0142] The description provided herein describes many concrete details. However, it can be understood that the embodiments of the present disclosure may be implemented without those concrete details. In some of the embodiments, well-known processes, structures and techniques are not described in detail, so as not to affect the understanding of the description.

[0143] In the claims, any reference signs between parentheses should not be construed as limiting the claims. The word "comprise" does not exclude elements or steps that are not listed in the claims. The word "a" or "an" preceding an element does not exclude the existing of a plurality of such elements. The present disclosure may be implemented by means of hardware comprising several different elements and by means of a properly programmed computer. In unit claims that list several devices, some of those devices may be embodied by the same item of hardware. The words first, second, third and so on do not denote any order. Those words may be interpreted as names.

[0144] Finally, it should be noted that the above embodiments are merely intended to explain the technical solutions of the present disclosure, and not to limit them. Although the present disclosure is explained in detail with reference to the above embodiments, a person skilled in the art should understand that he can still modify the technical solutions set forth by the above embodiments, or make equivalent substitutions to part of the technical features of them. However, those modifications or substitutions do not make the essence of the corresponding technical solutions depart from the spirit and scope of the technical solutions of the embodiments of the present disclosure.

1. A carrier plate, wherein the carrier plate comprises: a transporting base plate, a dissociation regulating feature and a dissociable-adhesive layer that are sequentially arranged, the dissociation regulating feature is configured to regulate a dissociation accuracy of the dissociable-adhesive layer, and the dissociable-adhesive layer is configured to be connected to a plurality of light-emitting-diode chips.

2. The carrier plate according to claim **1**, wherein the dissociation regulating feature comprises a plurality of regulating micro-features, and each of the regulating micro-features corresponds to one of the light-emitting-diode chips;

an orthographic projection of the regulating micro-feature on the transporting base plate is a first projection, and an orthographic projection of the light-emitting-diode chip on the transporting base plate is a second projection; and

the first projection of each of the regulating micro-features and the second projection of the light-emitting-diode chip corresponding thereto at least partially overlap, and an area of the first projection is less than or equal to an area of the second projection.

3. The carrier plate according to claim **2**, wherein the regulating micro-feature comprises: an arc-shaped protrusion provided on one side of the dissociable-adhesive layer that is closer to the transporting base plate.

4. The carrier plate according to claim **3**, wherein the transporting base plate is provided with a first arc-shaped slot at a position facing the arc-shaped protrusion, a shape of the first arc-shaped slot and a shape of the arc-shaped protrusion are matched, and the arc-shaped protrusion is embedded in the first arc-shaped slot.

5. The carrier plate according to claim **3**, wherein the carrier plate further comprises: a medium layer, the medium layer is provided between the transporting base plate and the dissociable-adhesive layer, the medium layer is provided with a second arc-shaped slot at a position facing the arc-shaped protrusion, a shape of the second arc-shaped slot and a shape of the arc-shaped protrusion are matched, and the arc-shaped protrusion is embedded in the second arc-shaped slot.

6. The carrier plate according to claim **5**, wherein a thickness of the medium layer is greater than a depth of the second arc-shaped slot.

7. The carrier plate according to claim **3**, wherein a thickness of the dissociable-adhesive layer is greater than a depth of the arc-shaped protrusion.

8. The carrier plate according to claim **2**, wherein the regulating micro-feature comprises a grating, and an orthographic projection of the grating on the transporting base plate and a center region of the orthographic projection of the light-emitting-diode chip on the transporting base plate are at least partially overlapped.

9. The carrier plate according to claim **8**, wherein both of a slit width and a passband width of the grating are greater than a wavelength of a dissociating light; and

a height of the grating is 1000-3000A, and both of the slit width and the passband width of the grating are 500-1400A.

10. The carrier plate according to claim **8**, wherein an orthographic projection of the grating on the transporting

base plate is a third projection, and an orthographic projection of the light-emitting-diode chip on the transporting base plate is a second projection, wherein an area of the third projection is 5%-10% of the area of the second projection.

11. The carrier plate according to claim **8**, wherein the carrier plate further comprises: a microlens component, and the microlens component is provided on one side of the transporting base plate that is away from the dissociable-adhesive layer; and

an orthographic projection of the microlens component on the transporting base plate and a peripheral region of the orthographic projection of the light-emitting-diode chip on the transporting base plate are at least partially overlapped.

12. The carrier plate according to claim **10**, wherein

the grating is located on one side of the transporting base plate that is closer to the dissociable-adhesive layer.

13. The carrier plate according to claim **2**, wherein the regulating micro-feature comprises: a plurality of pre-arranged units, orthographic projections of the plurality of pre-arranged units on the transporting base plate and the orthographic projections of the light-emitting-diode chips on the transporting base plate are at least partially overlapped, a plurality of protrusions are formed on one side of the dissociable-adhesive layer that is away from the transporting base plate, each of the protrusions corresponds to one of the pre-arranged units, and an exhaust passage is formed between the neighboring instances of the protrusions.

14. The carrier plate according to claim **13**, wherein the pre-arranged units are fabricated by using a transparent material.

15. The carrier plate according to claim **14**, wherein a height of the pre-arranged units is 15000-20000A, and widths of the pre-arranged units in all directions are greater than or equal to 2.5 μm.

16. The carrier plate according to claim **13**, wherein each of the light-emitting-diode chips is provided with a plurality of instances of the pre-arranged units, and two neighboring instances of the pre-arranged units have a distance therebetween.

17. The carrier plate according to claims, wherein the dissociable-adhesive layer comprises: a laser dissociation layer and a viscous-adhesive-material layer, the laser dissociation layer is located on one side of the transporting base plate that is closer to the light-emitting-diode chips, and the viscous-adhesive-material layer is located between the laser dissociation layer and the light-emitting-diode chips; and

the viscous-adhesive-material layer is provided with a first micro-feature on side that is closer to the laser dissociation layer, the laser dissociation layer is provided with a second micro-feature on side that is closer to the viscous-adhesive-material layer, a shape of the second micro-feature and a shape of the first micro-feature are complementary, and the second micro-feature and the first micro-feature are embedded into each other.

18. The carrier plate according to claim **17**, wherein a thickness of the laser dissociation layer is 1-3 μm, and a thickness of the viscous-adhesive-material layer is 1-10 μm.

19. The carrier plate according to claim **17**, wherein the first micro-feature is a nanometer micro-feature, and the first micro-feature is selected from at least one of a circular-cone-shaped micro-feature and a rhombic micro-feature.

20. (canceled)

21. (canceled)

22. A transferring device, wherein the transferring device comprises: a plurality of light-emitting-diode chips and the carrier plate according to claim **1**; and

the plurality of light-emitting-diode chips are connected to the dissociable-adhesive layer of the carrier plate.

* * * * *