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AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
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LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).

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(54) Title: BIOMIMETIC ARTIFICIAL CELLS: ANISOTROPIC SUPPORTED LIPID BILAYERS ON BIODEGRADABLE MICRO AND NANOPARTICLES FOR SPATIALLY DYNAMIC SURFACE BIOMOLECULE PRESENTATION

(57) Abstract: The presently disclosed subject matter provides compositions and methods for using a non-spherical biomimetic artificial cell comprising a three-dimensional microparticle or nanoparticle having an asymmetrical shape and a supported lipid bilayer (SLB). The non-spherical biomimetic artificial cells can be used in cell biomimicry and for active targeting mediated drug delivery.



A. CLASSIFICATION OF SUBJECT MATTER**A61K 47/48(2006.01)i, A61K 39/395(2006.01)i, A61K 47/06(2006.01)i, A61K 47/30(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
A61K 47/48; C12N 11/08; A61K 39/00; A61K 39/395; A61K 47/06; A61K 47/30Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility modelsElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & keywords: A non-spherical biomimetic artificial cell, a supported lipid bilayer (SLB), nanoparticles, microparticles, biomolecule, curvature, ellipsoidal shape, sonication, liposomes**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2013-086500 A1 (THE JOHNS HOPKINS UNIVERSITY) 13 June 2013 See abstract; pages 10, 25, 40-41; claims 1-47; and figure 17.	1-3, 20, 25, 28-32
Y	MOON, J. J. et al., "Antigen-displaying lipid-enveloped PLGA nanoparticles as delivery agents for a Plasmodium vivax malaria vaccine", PloS One, 2012, Vol. 7, No. 2, e31472, internal pages 1-9 See abstract; internal page 2.	1-3, 20, 25, 28-32
A	MEYER, R. A. et al., "An automated multidimensional thin film stretching device for the generation of anisotropic polymeric micro- and nanoparticles", Journal of Biomedical Materials Research Part A, [Epub.] 24 February 2015, Vol. 103A, No. 8, pp. 2747-2757 See the whole document.	1-3, 20, 25, 28-32
A	MEYER, R. A. et al., "Biodegradable Nanoellipsoidal Artificial Antigen Presenting Cells for Antigen Specific T-Cell Activation", Small, [Epub.] 12 January 2015, Vol. 11, No. 13, pp. 1519-1525 See the whole document.	1-3, 20, 25, 28-32

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

27 September 2016 (27.09.2016)

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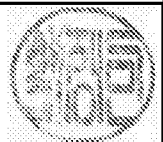
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2016/024500

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ASHLEY, C. E. et al., "The targeted delivery of multicomponent cargos to cancer cells by nanoporous particle-supported lipid bilayers", Nature Materials, 2011, Vol. 10, pp. 389-397 See the whole document.	1-3, 20, 25, 28-32

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: 21-24, 26-27
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 21-24, 26-27 pertain to a method for treatment of the human body by therapy or surgery, and thus relate to a subject matter which this International Searching Authority is not required, under PCT Article 17(2)(a)(i) and PCT Rule 39.1(iv), to search.
2. Claims Nos.: 5, 7, 9, 13-15
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
Claims 5, 7, 9, 13-15 refer to the multiple dependent claim which does not comply with PCT Rule 6.4(a).
3. Claims Nos.: 4, 6, 8, 10-12, 16-19
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/024500

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013-086500 A1	13/06/2013	CA 2858115 A1 CN 104136603 A EP 2788473 A1 EP 2788473 A4 JP 2015-500296 A US 2014-0370099 A1	13/06/2013 05/11/2014 15/10/2014 11/11/2015 05/01/2015 18/12/2014