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- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, 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, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, 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, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
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- Published:**  
— with international search report (Art. 21(3))  
— with sequence listing part of description (Rule 5.2(a))
- (88) **Date of publication of the international search report:**  
7 November 2013

(54) **Title:** SYNTHESIZING FUNCTIONALIZED DENDRIMERS WITHIN BIOLOGICAL SETTINGS

(57) **Abstract:** The present invention relates to compositions (e.g., dendrimer scaffolds) capable of click chemistry for use in synthesis of functionalized dendrimers within biological settings, and methods of use of the same.



**WO 2013/115885 A3**

**A. CLASSIFICATION OF SUBJECT MATTER****G01N 33/53(2006.01)i, G01N 33/543(2006.01)i, G01N 33/48(2006.01)i**

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

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

G01N 33/53; A61K 31/787; A61K 31/74; A61K 47/48; G01N 33/543; G01N 33/48

Documentation 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 models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) &amp; Keywords:dendrimer, click, cycloaddition, functionalized, alkyne-derivatized, azide-derivatized, trigger, dipolar, and conjugation

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                          | Relevant to claim No. |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | MULLEN et al., `Design, synthesis, and biological functionality of a dendrimer-based modular drug delivery platform`<br>Bioconjugate Chemistry, Vol.22, No.4, pp.679-689 (22 March 2011)<br>See abstract; pages 680-682; table 1; and figures 1-2.          | 1-7, 12-14            |
| A         | WO 2011-072290 A2 (THE REGENTS OF THE UNIVERSITY OF MICHIGAN) 16 June 2011<br>See abstract; claims 1-61; and paragraphs [0008],[0018]-[0020].                                                                                                               | 1-7, 12-14            |
| A         | OPSTEEN et al., `Modular synthesis of block copolymers via cycloaddition of terminal azide and alkyne functionalized polymers`<br>Chemical Communications, Vol.1, pp.57-59 (2005)<br>See the whole document.                                                | 1-7, 12-14            |
| A         | YIM et al., `Versatile conjugation of octreotide to dendrimers by cycloaddition ( "Click" ) chemistry to yield high-affinity multivalent cyclic peptide dendrimers`<br>Bioconjugate Chemistry, Vol.20, No.7, pp.1323-1331 (2009)<br>See the whole document. | 1-7, 12-14            |
| A         | WO 2007-011967 A2 (THE SCRIPPS RESEARCH INSTITUTE) 25 January 2007<br>See abstract and claims 1-7.                                                                                                                                                          | 1-7, 12-14            |



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 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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

12 August 2013 (12.08.2013)

Date of mailing of the international search report

**14 August 2013 (14.08.2013)**

Name and mailing address of the ISA/KR

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# INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2012/065252**

## 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.: 8-11  
because they relate to subject matter not required to be searched by this Authority, namely:  
Claims 8-11 pertain to methods for treatment of the human body by therapy and thus relate to a subject matter which this International Searching Authority is not required, under Article 17(2)(a)(i) of the PCT and Rule 39.1(iv) of the Regulations under the PCT, to search.
2. ☐ Claims Nos.:  
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:
3. ☐ Claims Nos.:  
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 fee, this Authority did not invite payment of any additional fee.
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/US2012/065252**

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)              | Publication<br>date      |
|-------------------------------------------|---------------------|-----------------------------------------|--------------------------|
| WO 2011-072290 A2                         | 16/06/2011          | US 2013-004427 A1<br>WO 2011-072290 A3  | 03/01/2013<br>17/11/2011 |
| WO 2007-011967 A2                         | 25/01/2007          | US 2009-0306310 A1<br>WO 2007-011967 A3 | 10/12/2009<br>27/12/2007 |