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- (71) Applicant: **THE REGENTS OF THE UNIVERSITY OF CALIFORNIA** [US/US]; 1111 Franklin Street, 5th Floor, Oakland, California 94607-5200 (US).
- (72) Inventors: **ZHANG, Liangfang**; 6191 Blue Dawn Trail, San Diego, California 92130 (US). **HU, Che-Ming Jack**; 11357 Miro Circle, San Diego, California 92131 (US). **GAO, Weiwei**; 8462 Via Sonoma, #38, La Jolla, Califor-

nia 92037 (US). **COPP, Jonathan**; 9152 Regents Road, Apt. A, La Jolla, California 92037 (US).

- (74) Agents: **WARREN, William L.** et al.; Sutherland Asbill & Brennan LLP, 999 Peachtree Street, N.E., Suite 2300, Atlanta, Georgia 30309 (US).

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[Continued on next page]

- (54) Title: HYDROGEL TOXIN-ABSORBING OR BINDING NANOPARTICLES

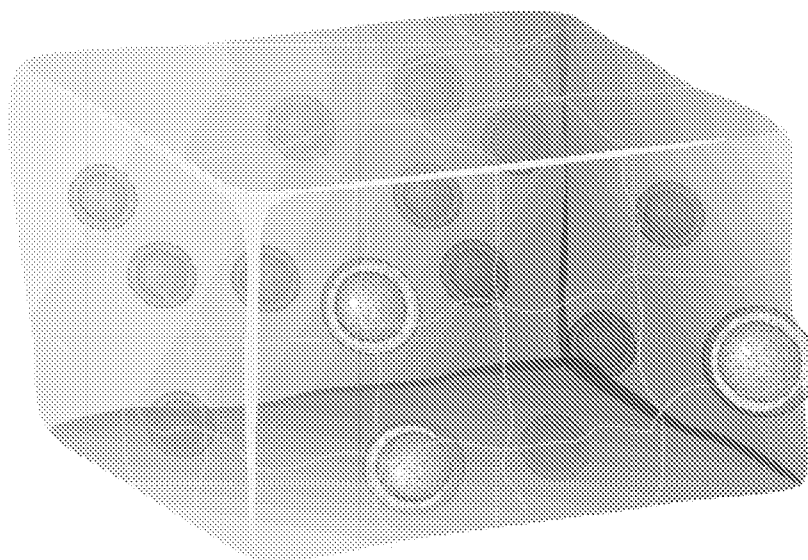


FIGURE 1

[Continued on next page]





DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT,
LU, 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).

Published:

— *with international search report (Art. 21(3))*

(88) Date of publication of the international search report:

10 March 2016

(57) Abstract: The present invention provides for compositions comprising a polymeric hydrogel impregnated with a toxin-absorbing or binding nanoparticle. The present invention also provides for the use of the above compositions for decreasing or neutralizing the effect of a toxin, or for treating or preventing an infection by a microbe that produces a toxin, in a subject. The exemplary toxin is a biological toxin such as a viral, bacterial, fungal, plant or animal toxin.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US15/21702

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61K 9/51, 9/30, 9/14 (2015.01)

CPC - A61K 47/48784, 39/085; Y10S 977/773

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)

IPC(8) - A61K 9/51, 9/30, 9/14 (2015.01)

CPC - Y10S 977/773, 977/915; A61K 47/48784, 39/085, 2039/55555

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

PatSeer (US, EP, WO, DE, GB, FR, KR, ES, CA); Google Scholar; ProQuest; EBSCO. Keywords: polymeric, hydrogel, nanoparticle, microparticle, toxin, absorb, bind, core, cavity, lumen, outer, red blood cell, plasma, membrane, half-life

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2011/0256183 A1 (FRANK, CW et al.) 20 October 2011; paragraphs [0007], [0023], [0027], [0048]	1-3, 4/1-3, 21-22, 75-77, 78/75-77, 79/78/75-77, 80
Y	US 2013/0337066 A1 (THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, et al.) 19 December 2013; paragraphs [0007], [0010], [0015], [0028], [0107], [0110], [0238], [0411]	1-3, 4/1-3, 21-22, 75-77, 78/75-77, 79/78/75-77, 80
Y	US 2007/0212419 A1 (BAKO, J et al.) 13 September 2007; paragraphs [0014]-[0015]	3, 4/3, 76, 78/76, 79/78/76
Y	US 6,361,797 B1 (KUZMA, P et al.) 26 March 2002; column 1, lines 54-61, column 6, lines 28-33	4/1-3
A	US 2005/0255152 A1 (EDWARDS, DA et al.) 17 November 2005; entire document	1-3, 4/1-3, 21-22, 75-77, 78/75-77, 79/78/75-77, 80

☐ 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

20 May 2015 (20.05.2015)

Date of mailing of the international search report

17 SEP 2015

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Authorized officer

Shane Thomas

PCT Helpdesk: 571-272-4300
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US15/21702

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.:
because they relate to subject matter not required to be searched by this Authority, namely:

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.: 5-20 and 23-74
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 additional fees, this Authority did not invite payment of 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.