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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, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KH, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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[Continued on next page]

(54) Title: MICELLES OF HYDROPHILICALLY SHIELDED MEMBRANE-DESTABILIZING COPOLYMERS

FIRST BLOCK

SECOND BLOCK

Polymer	Mn (kDa)	PD1	% PEGMA	% DMAEMA	Mn (kDa)	PD1	% BMA	% DMAEMA	% PAA
P7-PEGMA100	22.24	1.34	100	0	45.5	1.48	50	28	22
P7-PEGMA20	11.44	1.33	17	83	41.0	1.52	56	23	21
P7-PEGMA10	11.01	1.31	10	90	42.0	1.42	51	23	26
P7-PEGMA5	10.60	1.17	5	95	27.1	1.27	-	-	-
P7-PEGMA 50-14kDa	14.50	1.35	46	54	38.1	1.44	55	25	20
P7-PEGMA 50-24kDa	24.25	1.23	47	53	38.4	1.45	52	23	25

FIG. 1

(57) **Abstract:** Provided herein are micelles comprising a plurality of copolymers. In certain instances, micelles provided herein are pH sensitive particles.



(15) Information about Correction:

Previous Correction:

see Notice of 4 November 2010

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/043860**A. CLASSIFICATION OF SUBJECT MATTER***C08L 53/00(2006.01)i, C08F 293/00(2006.01)i, C08F 297/00(2006.01)i, A61K 9/127(2006.01)i, A61K 48/00(2006.01)i, A61K 47/42(2006.01)i, C12N 15/87(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)

C08L 53/00; G06F 15/16; H04J 3/22; H04B 7/02

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)

eKOMPASS(KIPO internal) & Keywords: micelle, block copolymer, polynucleotide, hydrophilic, hydrophobic

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006-0235161 A1 (JORGE HELLER et al.) 19 October 2006 See paragraph [0362]; claims 1,2,29,32.	1-20
X	US 2003-0134420 A1 (CHARLES PETER LOLLO et al.) 17 July 2003 See abstract; paragraph [0067],[0068]; claims 1,5.	1-20
X	US 2008-0069902 A1 (XUAN ZHAO et al.) 20 March 2008 See abstract; paragraph [0054],[0107],[0129]-[0131]; claims 1,4.	1-20
A	US 2005-0096454 A1 (TODD EMRICK et al.) 05 May 2005 See the whole document.	1-20
A	US 2005-0048650 A1 (FRANCIS IGNATIUS) 03 March 2005 See the whole document.	1-20
A	US 2006-0083854 A1 (CHRISTOPHER OBER et al.) 20 April 2006 See the whole document.	1-20



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

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US2009/043860**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.: 21, 30-39
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 21, 34-39 are unclear because they refer to themselves.
Claims 30-33 refer to multiple dependent claim 29 which is not drafted in accordance with PCT Rule 6.4(a), so they are unclear.
3. ☒ Claims Nos.: 22-29, 40-43
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/US2009/043860

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0235161 A1	19.10.2006	None	
US 2003-0134420 A1	17.07.2003	AU 2001-38485 A1 WO 01-60415 A1	27.08.2001 23.08.2001
US 2008-0069902 A1	20.03.2008	US 2004-0161403 A1 US 7316811 B2	19.08.2004 08.01.2008
US 2005-0096454 A1	05.05.2005	US 2010-036061 A1 US 7598313 B2	11.02.2010 06.10.2009
US 2005-0048650 A1	03.03.2005	US 7196145 B2	27.03.2007
US 2006-0083854 A1	20.04.2006	US 2007-0053867 A1 US 2007-0106040 A1 US 7709055 B2 US 7763687 B2	08.03.2007 10.05.2007 04.05.2010 27.07.2010