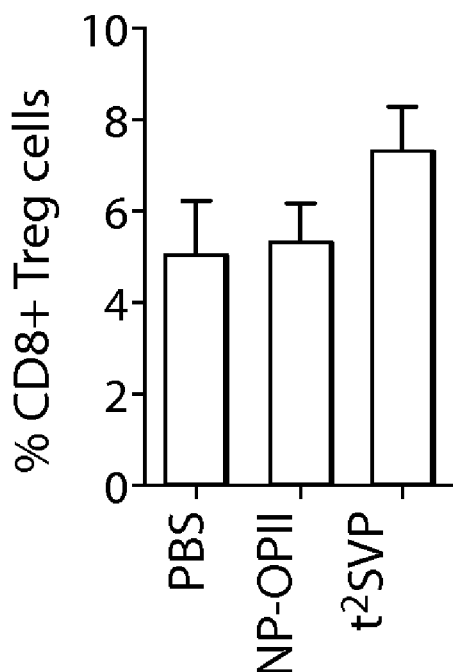




- (51) **International Patent Classification:**
- | | | | | |
|------------------------------|------------------------------|------------|-------------------------------|----|
| <i>A61K 31/445</i> (2006.01) | <i>A61K 47/48</i> (2006.01) | 61/531,180 | 6 September 2011 (06.09.2011) | US |
| <i>A61K 39/38</i> (2006.01) | <i>A61K 47/30</i> (2006.01) | 61/531,194 | 6 September 2011 (06.09.2011) | US |
| <i>A61K 9/16</i> (2006.01) | <i>A61K 39/395</i> (2006.01) | 61/531,204 | 6 September 2011 (06.09.2011) | US |
| <i>A61K 9/14</i> (2006.01) | | 61/531,215 | 6 September 2011 (06.09.2011) | US |
| | | 61/531,168 | 6 September 2011 (06.09.2011) | US |
- (21) **International Application Number:** PCT/US2012/035405
- (22) **International Filing Date:** 27 April 2012 (27.04.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
- | | | |
|------------|-------------------------------|----|
| 61/480,946 | 29 April 2011 (29.04.2011) | US |
| 61/513,514 | 29 July 2011 (29.07.2011) | US |
| 61/531,164 | 6 September 2011 (06.09.2011) | US |
| 61/531,153 | 6 September 2011 (06.09.2011) | US |
| 61/531,209 | 6 September 2011 (06.09.2011) | US |
| 61/531,147 | 6 September 2011 (06.09.2011) | US |
| 61/531,175 | 6 September 2011 (06.09.2011) | US |
- (71) **Applicant** (for all designated States except US): **SELECTA BIOSCIENCES, INC.** [US/US]; 480 Arsenal Street, Building One, Watertown, MA 02472 (US).
- (72) **Inventors; and**
- (75) **Inventors/Applicants** (for US only): **KISHIMOTO, Takashi, Kei** [US/US]; 46 Coolidge Avenue, Lexington, MA 02420 (US). **FRASER, Christopher** [US/US]; 88 Paul Revere Road, Unit#2, Arlington, MA 02476 (US). **MALDONADO, Roberto, A.** [VE/US]; 38 Robeson Street #1, Jamaica Plain, MA 02130 (US).
- (74) **Agent:** **VATLAND, Janice, A.**; **WOLF, GREENFIELD & SACKS, P.C.**, 600 Atlantic Avenue, Boston, MA 02210-2206 (US).

[Continued on next page]

(54) **Title:** TOLEROGENIC SYNTHETIC NANOCARRIERS FOR GENERATING CD8+REGULATORY T CELLS**Fig. 2**

(57) **Abstract:** Disclosed are synthetic nanocarrier methods, and related compositions, comprising administering MHC Class I-restricted and/or MHC Class II-restricted epitopes of an antigen and immunosuppressants in order to generate tolerogenic immune responses against the antigen, such as the generation of antigen-specific CD8+ regulatory T cells.



(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, 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, 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.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, 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, ML, MR, NE, SN, TD, TG).

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:

14 March 2013

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/035405**A. CLASSIFICATION OF SUBJECT MATTER****A61K 31/445(2006.01)i, A61K 39/38(2006.01)i, A61K 9/16(2006.01)i, A61K 9/14(2006.01)i, A61K 47/48(2006.01)i, A61K 47/30(2006.01)i, A61K 39/395(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)

A61K 31/445; A61K 9/14; A61K 39/02; A61K 39/21; A61K 9/48; A61K 39/00; A61K 31/74; A61K 38/20; A61K 47/48

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), NCBI (PubMed, MeSH), Google

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 2010-0129439 A1 (FRANK ALEXIS et al.) 27 May 2010 See paragraphs [0011], [0029]. [00224]–[0225], [0531] and [0533]; claims 1–3 and 22; abstract.	45–47, 52, 63 61
X A	WO 2010-138192 A2 (SELECTA BIOSCIENCES, INC.) 02 December 2010 See p. 24, lines 12–18, p. 41 lines 32–42, p. 42, lines 15–17; claims 1–6, 14–15; abstract.	45–47, 52, 63 61
A	US 2010-0151000 A1 (RANJENY THOMAS et al.) 17 June 2010 See the whole document.	45–47, 52, 61, 63
A	US 2010-0055189 A1 (JEFFREY A. HUBBELL et al.) 04 March 2010 See the whole document.	45–47, 52, 61, 63
A	US 2008-0160089 A1 (MARIA A. VITIELLO et al.) 03 July 2008 See the whole document.	45–47, 52, 61, 63



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

05 NOVEMBER 2012 (05.11.2012)

Date of mailing of the international search report

07 NOVEMBER 2012 (07.11.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

SUNG Sun Young

Telephone No. 82-42-481-8405



INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US2012/035405**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.: 1-40
because they relate to subject matter not required to be searched by this Authority, namely:
The claims 1-40 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.: 18, 20, 22-27, 29, 33-36, 42, 55
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 18, 20, 22-27, 29, 33-36, 42 and 55 are unsearchable because they are worded in reference to multiple dependent claims.
3. ☒ Claims Nos.: 5-17, 18, 21, 28, 30-32, 37-41, 43-44, 48-51, 53-54, 56-60, 62, 64-68
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/US2012/035405

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010-0129439 A1	27.05.2010	AU 2008-314647 A1	23.04.2009
		AU 2009-303334 A1	15.04.2010
		AU 2009-303338 A1	15.04.2010
		AU 2009-303344 A1	15.04.2010
		CA 2702083 A1	23.04.2009
		CA 2740155 A1	15.04.2010
		CA 2740162 A1	15.04.2010
		CA 2740248 A1	15.04.2010
		CN 101861165 A	13.10.2010
		CN 102245199 A	16.11.2011
		CN 102245200 A	16.11.2011
		CN 102245201 A	16.11.2011
		EP 2217269 A2	18.08.2010
		EP 2344185 A1	20.07.2011
		EP 2344186 A1	20.07.2011
		EP 2344187 A1	20.07.2011
		EP 2346528 A1	27.07.2011
		EP 2394657 A1	14.12.2011
		IL 212240 D0	30.06.2011
		JP 2011-500569 A	06.01.2011
		JP 2012-505245 A	01.03.2012
		JP 2012-505246 A	01.03.2012
		JP 2012-505248 A	01.03.2012
		JP 2012-505249 A	01.03.2012
		KR 10-2011-0074902 A	04.07.2011
		KR 10-2011-0074903 A	04.07.2011
		KR 10-2011-0091855 A	16.08.2011
		MX 2011003843 A	27.09.2011
		US 2010-0092425 A1	15.04.2010
		US 2010-0129392 A1	27.05.2010
		US 2010-0183727 A1	22.07.2010
		US 2010-0233251 A1	16.09.2010
		US 2011-0268805 A1	03.11.2011
		US 2012-0027808 A1	02.02.2012
		US 2012-0087890 A1	12.04.2012
		US 8277812 B2	02.10.2012
		WO 2009-051837 A2	23.04.2009
		WO 2010-042863 A1	15.04.2010
		WO 2010-042866 A1	15.04.2010
		WO 2010-042870 A1	15.04.2010
		WO 2010-042876 A1	15.04.2010
WO 2010-138192 A2	02.12.2010	AU 2010-254549 A1	15.12.2011
		AU 2010-254550 A1	15.12.2011
		AU 2010-254551 A1	15.12.2011
		CA 2762647 A1	02.12.2010
		CA 2762650 A1	02.12.2010
		CA 2762653 A1	02.12.2010
		CN 102481374 A	30.05.2012

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/035405

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		CN 102481375 A	30.05.2012
		CN 102481376 A	30.05.2012
		KR 10-2012-0023830 A	13.03.2012
		KR 10-2012-0087807 A	07.08.2012
		US 2010-0303850 A1	02.12.2010
		US 2011-0020388 A1	27.01.2011
		US 2011-0027217 A1	03.02.2011
		WO 2010-138192 A3	03.06.2011
		WO 2010-138193 A3	03.06.2011
		WO 2010-138194 A2	02.12.2010
US 2010-0151000 A1	17.06.2010	AU 2007-306936 A1	17.04.2008
		CA 2702340 A1	17.04.2008
		CN 101646418 A	10.02.2010
		EP 2077821 A1	15.07.2009
		JP 2010-505883 A	25.02.2010
		WO 2008-043157 A1	17.04.2008
US 2010-0055189 A1	04.03.2010	AU 2009-285628 A1	04.03.2010
		CA 2735318 A1	04.03.2010
		CN 102202653 A	28.09.2011
		EP 2341897 A2	13.07.2011
		JP 2012-501341 A	19.01.2012
		WO 2010-025324 A2	04.03.2010
		WO 2010-025324 A3	24.06.2010
US 2008-0160089 A1	03.07.2008	AU 2001-287015 B2	01.06.2006
		AU 2001-87015 A1	13.03.2002
		AU 2005-302469 A1	11.05.2006
		AU 2006-210863 A1	10.08.2006
		AU 2006-214655 A1	24.08.2006
		AU 2006-255262 A1	14.12.2006
		CA 2419429 A1	07.03.2002
		CA 2585740 A1	11.05.2006
		CA 2595783 A1	10.08.2006
		CA 2596011 A1	24.08.2006
		CA 2610745 A1	14.12.2006
		CA 2623198 A1	29.03.2007
		CA 2676601 A1	09.08.2007
		CN 101115471 A	30.01.2008
		CN 101115471 B	09.02.2011
		CN 101437528 A	20.05.2009
		CN 101506266 A	12.08.2009
		EP 1313794 A2	28.05.2003
		EP 1313794 B1	29.11.2006
		EP 1809310 A2	25.07.2007
		EP 1848410 A1	31.10.2007
		EP 1865983 A2	19.12.2007
		EP 1906976 A2	09.04.2008
		EP 1926780 A2	04.06.2008

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/035405

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		EP 1962894 A2	03.09.2008
		EP 1986685 A2	05.11.2008
		JP 2004-507600 A	11.03.2004
		JP 2008-518666 A	05.06.2008
		JP 2008-530206 A	07.08.2008
		JP 2008-532929 A	21.08.2008
		JP 2008-542393 A	27.11.2008
		JP 2009-510197 A	12.03.2009
		JP 2009-524584 A	02.07.2009
		JP 2009-525341 A	09.07.2009
		KR 10-2007-0101341 A	16.10.2007
		US 2004-0063606 A1	01.04.2004
		US 2006-0024357 A1	02.02.2006
		US 2006-0177416 A1	10.08.2006
		US 2006-0188469 A1	24.08.2006
		US 2006-0188486 A1	24.08.2006
		US 2006-0286064 A1	21.12.2006
		US 2007-0027293 A1	01.02.2007
		US 2007-0160622 A1	12.07.2007
		US 2008-0020015 A1	24.01.2008
		US 2008-0299174 A1	04.12.2008
		US 6503538 B1	07.01.2003
		US 7304122 B2	04.12.2007
		US 7408018 B2	05.08.2008
		US 7794706 B2	14.09.2010
		WO 02-18477 A2	07.03.2002
		WO 2006-050091 A2	11.05.2006
		WO 2006-083874 A2	10.08.2006
		WO 2006-088647 A1	24.08.2006
		WO 2006-132950 A2	14.12.2006
		WO 2007-035938 A2	29.03.2007
		WO 2007-067744 A2	14.06.2007
		WO 2007-089870 A2	09.08.2007