(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 January 2009 (22.01.2009)

PCT

(10) International Publication Number
WO 2009/011981 A3

(51) International Patent Classification:
B82B 3/00 (2006.01) *B82B 1/00* (2006.01)

(21) International Application Number:
PCT/US2008/065534

(22) International Filing Date: 2 June 2008 (02.06.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/932,428 31 May 2007 (31.05.2007) US

(71) Applicant *(for all designated States except US)*: **THE ADMINISTRATORS OF THE TULANE EDUCATIONAL FUND** [US/US]; Office of Technology Transfer and, Business Development TB-32, 1430 Tulane Avenue, New Orleans, Louisiana 70112-2632 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **MITCHELL, Brian, S.** [US/US]; 300 Lindy Boggs, Tulane University, New Orleans, Louisiana 70118 (US). **FINK, Mark, J.** [US/US]; 2015 Percival Stern Hall, 6283 St. Charles Ave., New Orleans, Louisiana 70118 (US). **HEINTZ, Andrew, S.** [US/US]; 300 Lindy Boggs, Tulane University, New Orleans, Louisiana 70118 (US).

(74) Agents: **NEHRBASS, Seth, M.** et al.; GARVEY, SMITH, NEHRBASS & NORTH, L.L.C., 3838 N. Causeway Blvd., Suite 3290, Metairie, Louisiana 70002 (US).

(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, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

[Continued on next page]

(54) **Title:** METHOD OF FORMING STABLE FUNCTIONALIZED NANOPARTICLES

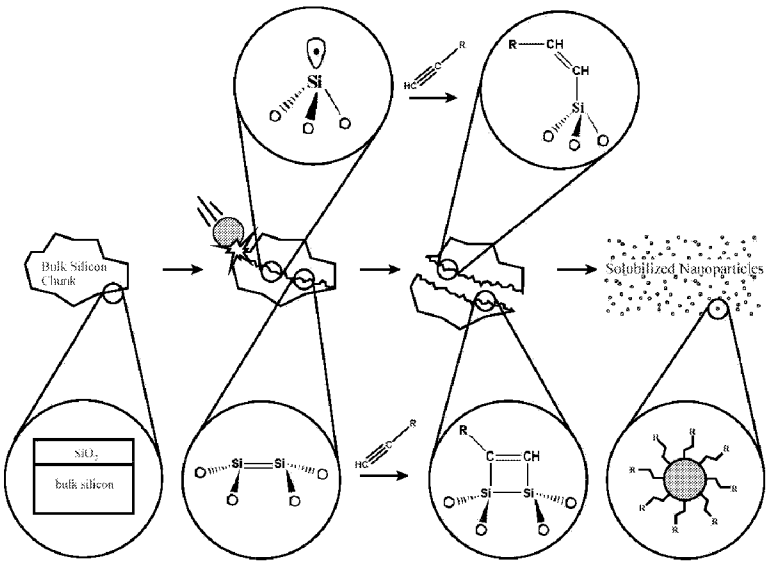


FIG. 1

(57) **Abstract:** A novel top-down procedure for synthesis of stable passivated nanoparticles uses a one-step mechanochemical process to form and passivate the nanoparticles. High-energy ball milling (HEBM) can advantageously be used to mechanically reduce the size of material to nanoparticles. When the reduction of size occurs in a reactive medium, the passivation of the nanoparticles occurs as the nanoparticles are formed. This results in stable passivated silicon nanoparticles. This procedure can be used, for example in the synthesis of stable alkyl- or alkenyl-passivated silicon and germanium nanoparticles. The covalent bonds between the silicon or germanium and the carbon in the reactive medium create very stable nanoparticles.

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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
16 July 2009

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/065534

A. CLASSIFICATION OF SUBJECT MATTER

B82B 3/00(2006.01)i, B82B 1/00(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)
IPC B05D, B22F, A61B

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 since 1975
Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS (KIPO internal) & Keywords: functionalization, nano, particles, milling

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,132,801 A (LINFORD, MATTHEW R.) 17 October 2000 See abstract and Example	1-24, 33-50
A	KR 10-2003-0085746 A (KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY) 07 November 2003 See claims 1-7	1-24, 33-50
A	US 2005/0267345 A1 (KORGEL, BRIAN A. et al.) 01 December 2005 See claims 1-15	1-24, 33-50
A	MAYERI, DANIEL et al., NMR Study of the Synthesis of Alkyl-Terminated Silicon Nanoparticles from the Reaction of SiCl4 with the Zintl Salt, NaSi, Chem. Mater., 2001, Vol. 13, pp. 765-770 See abstract	1-24, 33-50

☐ 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	Date of mailing of the international search report
29 MAY 2009 (29.05.2009)	**29 MAY 2009 (29.05.2009)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer Park, Jong Chul Telephone No. 82-42-481-8306

Form PCT/ISA/210 (second sheet) (July 2008)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/065534

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.: 25-32
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 25-32 pertain to methods for treatment of the human body by therapy, as well as diagnostic methods, 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.: 52
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:
The claim is too broad to make meaningful search.

3. ☒ Claims Nos.: 51
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 addtional 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/US2008/065534

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6132801 A	17.10.2000	NONE	
KR 10-2003-0085746 A	07.11.2003	NONE	
US 2005-0267345 A1	01.12.2005	US 2005-0266697 A1	01.12.2005