



(51) International Patent Classification:

C30B 25/02 (2006.01) C30B 29/08 (2006.01)
C30B 29/06 (2006.01) C30B 29/60 (2006.01)
C30B 33/10 (2006.01)

(21) International Application Number:

PCT/IL2009/001030

(22) International Filing Date:

4 November 2009 (04.11.2009)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/193,196 4 November 2008 (04.11.2008) US
61/272,291 8 September 2009 (08.09.2009) US

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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, 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, 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.

(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, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

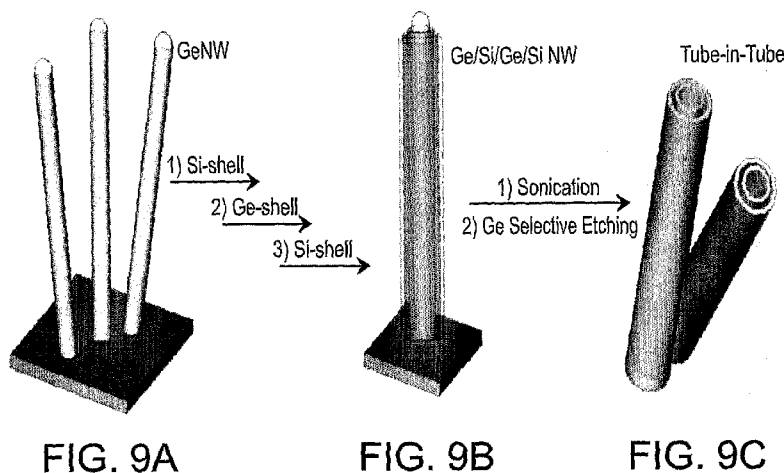
Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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

2 September 2010

(54) Title: TUBULAR NANOSTRUCTURES, PROCESSES OF PREPARING SAME AND DEVICES MADE THEREFROM



(57) Abstract: Method of producing single-walled and multi-walled, single-crystalline, tubular nanostructures, made of an inorganic substance (e.g., silicon), and single-walled and multi-walled, single-crystalline, tubular nanostructures produced thereby, are disclosed. Also disclosed are devices into which the nanostructures are integrated. The methods described herein are used to reproducibly and controllably producing single-crystalline nanostructures with well-defined shape, diameter and/or interwall distance, chemical composition and morphology, using sacrificial layers (such as Germanium).

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2009/001030

A. CLASSIFICATION OF SUBJECT MATTER

INV. C30B25/02 C30B29/06 C30B33/10 C30B29/08 C30B29/60
ADD.

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)
C30B

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 practical, search terms used)

EPO-Internal, PAJ, WPI Data, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/056118 A1 (XIA YOUNAN [US] ET AL) 17 March 2005 (2005-03-17)	1-17, 22, 28, 29, 32-38, 45-49
Y	paragraph [0056] - paragraph [0071]; claims 1-36; figures 10, 16; examples 15-16	23-27, 31, 39-43
X	EP 1 454 880 A1 (JAPAN SCIENCE & TECH AGENCY [JP]; NAT INST FOR MATERIALS SCIENCE [JP]) 8 September 2004 (2004-09-08)	1-7, 45, 47-49
Y	paragraph [0030] - paragraph [0069]; claims 1-10; figure 1	23-27, 31, 39-43
X	WO 2007/049880 A1 (KOREA BASIC SCIENCE INST [KR]; KIM HAE JIN [KR]; LEE JIN BAE [KR]) 3 May 2007 (2007-05-03) claims 1-4; figure 11; examples 1-3	1-7, 45, 47-49
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☒ 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 document 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.
- *G* document member of the same patent family

Date of the actual completion of the international search

29 June 2010

Date of mailing of the international search report

13/07/2010

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IL2009/001030

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2008 189496 A (FUJIKI HIDEO) 21 August 2008 (2008-08-21) * abstract; figure 1 -----	1-7, 45, 47-49
X	US 2004/175844 A1 (YANG PEIDONG [US] ET AL) 9 September 2004 (2004-09-09) cited in the application	8-18, 22-29, 31-35, 37, 38, 44, 46-49
A	paragraph [0066] - paragraph [0098]; claims 1-27; figure 1 -----	36, 39-43, 45
X	MAYYA K S ET AL: "Nanotubes prepared by templating sacrificial nickel nanorods" NANO LETTERS, ACS, WASHINGTON, DC, US LNKD- DOI:10.1021/NL015622C, vol. 1, no. 12, 1 January 2001 (2001-01-01), pages 727-730, XP002466399 ISSN: 1530-6984 page 727, column 2, line 20 - page 728, column 1, line 3; figures 1-2 -----	8-18, 22-29, 31-35, 37, 38, 44, 46-49
X	CHEN ET AL: "Epitaxial ZnS/Si core-shell nanowires and single-crystal silicon tube field-effect transistors" JOURNAL OF CRYSTAL GROWTH, ELSEVIER, AMSTERDAM, NL LNKD- DOI:10.1016/J.JCRYSGRO.2007.09.047, vol. 310, no. 1, 12 October 2007 (2007-10-12), pages 165-170, XP022374946 ISSN: 0022-0248 page 165, column 2, line 13 - page 169, column 2, line 3; figures 2-3 -----	8-18, 22-29, 31-35, 37, 38, 44, 46-49
X	US 6 194 066 B1 (HOFFMAN WESLEY P [US]) 27 February 2001 (2001-02-27) column 2, line 51 - column 6, line 30; claims 1-24; figures 1-8 -----	8-18, 22-29, 31-35, 37, 38, 44, 46, 47
X	SUN J ET AL: "TiO2 TUBES SYNTHESIZED BY USING AMMONIUM SULFATE AND CARBON NANOTUBES AS TEMPLATES" JOURNAL OF MATERIALS SCIENCE LETTERS, CHAPMAN AND HALL LTD. LONDON, GB LNKD- DOI:10.1023/A:1022680707068, vol. 22, no. 5, 1 March 2003 (2003-03-01), pages 339-341, XP001145118 ISSN: 0261-8028 the whole document -----	8-14, 44, 47-49
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INTERNATIONAL SEARCH REPORT

International application No

PCT/IL2009/001030

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	<p>KUANG Q ET AL: "Versatile fabrication of aligned SnO₂ nanotube arrays by using various ZnO arrays as sacrificial templates"</p> <p>JOURNAL OF MATERIALS CHEMISTRY 2009 ROYAL SOCIETY OF CHEMISTRY GB, vol. 19, no. 7, 26 November 2008 (2008-11-26), pages 1019-1023, XP002588570 DOI: DOI:10.1039/B815514C</p> <p>page 1019, column 2, line 34 - page 1020, column 2, line 3; figure 1</p> <p style="text-align: center;">-----</p>	<p>8-18, 22-29, 31-35, 37,38, 44,46-49</p>

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL2009/001030

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.:
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:

see additional sheet

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 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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-7, 36, 39-43, 45(completely); 16-34, 37, 38, 46-49(partially)

Multi-walled tubular nanostructure made of single crystalline inorganic substance and method to grow it.

2. claims: 8-15, 35, 44(completely); 16-34, 37, 38, 46-49(partially)

Single-walled tubular nanostructure made of single crystalline inorganic substance and method to grow it.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IL2009/001030

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2005056118	A1	17-03-2005	US 2009282948 A1	19-11-2009
EP 1454880	A1	08-09-2004	WO 03042099 A1	22-05-2003
			JP 3579689 B2	20-10-2004
			JP 2003146631 A	21-05-2003
			US 2005002849 A1	06-01-2005
WO 2007049880	A1	03-05-2007	NONE	
JP 2008189496	A	21-08-2008	NONE	
US 2004175844	A1	09-09-2004	US 2004262636 A1	30-12-2004
US 6194066	B1	27-02-2001	NONE	