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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, 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.

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22 November 2012

(54) Title: PROCESS FOR FORMING SILVER FILMS ON SILICON

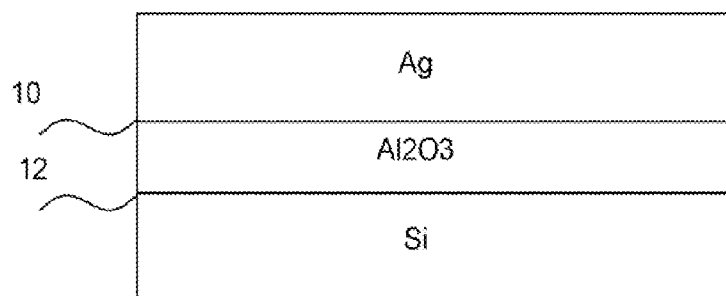


FIG. 3

(57) Abstract: A process is provided for etching a silicon-containing substrate. In the process, the surface of the substrate is cleaned. A film of alumina is deposited on the cleaned substrate surface. A silver film is deposited above the film of alumina. An etchant comprising HF is contacted with the silver film.

A. CLASSIFICATION OF SUBJECT MATTER***H01L 21/306(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)

H01L 21/306; H01L 23/48; H01L 29/06; H01L 21/26; H01L 29/15

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

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: etching, alumina, silver, nanoparticle, silicon dioxide, oxidizer

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	L. BOARINO et al., 'Self-catalytic etching of silicon: from nanowires to regular mesopores', Phys. Status Solidi A 206, No. 6, pp. 1250-1254, 17 March 2009	1-7, 10-15
Y	See full text.	8, 9
Y	US 2009-0256134 A1 (BRENT A. BUCHINE et al.) 15 October 2009 See abstract; figures 1-4; and paragraphs [0013]-[0044].	8, 9
A	US 6248674 B1 (THEODORE I. KAMINS et al.) 19 June 2001 See abstract; figures 1a-3; and column 2 line 65 - column 4 line 31.	1-15
A	US 6635184 B1 (URI COHEN et al.) 21 October 2003 See abstract; figures 1-2(b); and column 5 line 44 - column 7 line 50.	1-15



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

14 AUGUST 2012 (14.08.2012)

Date of mailing of the international search report

17 AUGUST 2012 (17.08.2012)

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/001904**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:

Group 1(claims 1-15) is directed to a process for etching a silicon-containing substrate.

Group 2(claims 16-19, 25-32) is directed to a solar cell comprising silicon nanowires, and a process for manufacturing a solar cell.

Group 3(claims 20-24) is directed to a fuel cell comprising silicon nanowires and metal catalyst particles or a metal catalyst-containing film.

Group 4(claim 33) is directed to a lithium ion battery comprising silicon nanowires.

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.: 1-15

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/US2011/001904

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009-0256134 A1	15.10.2009	CN 102084467 A EP 2277045 A2 JP 2011-523902 A US 8143143 B2 WO 2009-137241 A2 WO 2009-137241 A3 WO 2009-137241 A3 WO 2009-137241 A9 WO 2009-137241 A9	01.06.2011 26.01.2011 25.08.2011 27.03.2012 12.11.2009 21.01.2010 12.11.2009 08.04.2010 12.11.2009
US 6248674 B1	19.06.2001	None	
US 6635184 B1	21.10.2003	None	