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| (21) International Application Number: | | PCT/US2011/049347 | (71) Applicant (for all designated States except US): ADVANCED TECHNOLOGY MATERIALS, INC. [US/US]; 7 Commerce Drive, Danbury, CT 06810 (US). | | |
| (22) International Filing Date: | | 26 August 2011 (26.08.2011) | (72) Inventors; and | | |
| (25) Filing Language: | | English | (75) Inventors/Applicants (for US only): CHEN, Tianniu [CN/US]; 146 Sunset Ridge, Rocky Hill, CT 06067 (US). BILODEAU, Steven [US/US]; 20 Carriage Drive, Oxford, CT 06478 (US). SHEU, Chimin; c/o ATMI Taiwan Co., Ltd., 4F-7, No. 81, Shui-lee Rd., Hsin Chu, 300 (TW). NAKANISHI, Mutsumi [JP/JP]; c/o Sanyo Chemical Industries, Ltd., 1-40 Goyo-ohara, Nishkyo-ku, Kyoto, 615-8245 (JP). MATSUOKA, Masahiro [JP/JP]; c/o Sanyo Chemical Industries, Ltd., 1-40 Goyo-ohara, | | |
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[Continued on next page]

(54) Title: METHOD FOR PREVENTING THE COLLAPSE OF HIGH ASPECT RATIO STRUCTURES DURING DRYING

(57) Abstract: Methods of reducing the capillary forces experienced by fragile high aspect ratio structures during drying to substantially prevent damage to said high aspect ratio structures during drying. They include modifying the surface of the high aspect ratio structures such that the forces are sufficiently minimized and as such less than 10% of the high aspect ratio features will have bent or collapsed during drying of the structure having said features thereon.

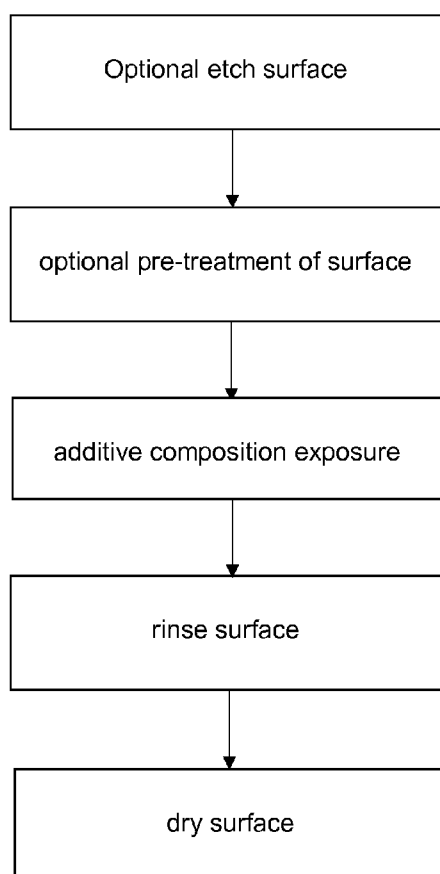


FIGURE 1



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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, 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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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))*

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/049347**A. CLASSIFICATION OF SUBJECT MATTER*****H01L 21/302(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 21/302; C11D 1/00; H01L 21/306; G03C 5/00

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:high aspect ratio feature,additive composition,forces,contact angle,surfactant,co-surfactant,buffering,defoaming,stability

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
| X | US 2010-0075504 A1 (TOMITA HIROSHI et al.) 25 March 2010 See paragraphs [0051]-[0061], [0066]-[0096], [0171]-[0183] and figures 1-3. | 1-6,29-31 |
| A | US 2004-0204328 A1 (PENG ZHANG et al.) 14 October 2004 See paragraphs [0022]-[0026], [0031]-[0052], [0057]-[0058]. | 1-6,29-31 |
| A | US 05374502 A (TANAKA; TOSHIHIKO et al.) 20 December 1994 See column 4, lines 7-11, column 4, lines 20-26. | 1-6,29-31 |

☐ 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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Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/049347**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.: 8-9,21-23,25
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 8-9, 21-23, 25 are unclear because the claims refer to multiple dependent claims 7, 20, 24 which do not comply with PCT Rule 6.4(a).
3. ☒ Claims Nos.: 7,10-20,24,26-28
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

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