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Declarations under Rule 4.17:

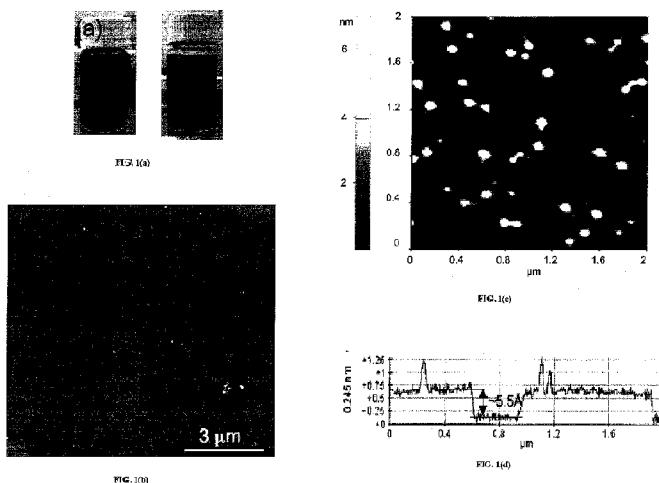
— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

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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(54) Title: EXFOLIATION OF GRAPHITE OXIDE IN PROPYLENE CARBONATE AND THERMAL REDUCTION OF RESULTING GRAPHENE OXIDE PLATELETS



(57) Abstract: Disclosed are compositions and methods wherein graphite oxide was exfoliated and dispersed in propylene carbonate (PC) by bath sonication. Heating the graphene oxide suspensions at 150°C significantly reduced the graphene oxide platelets; paper samples comprised of such reduced graphene oxide platelets had an electrical conductivity of 5230 S/m. By adding TEA BF₄ to the reduced graphene oxide/PC slurry and making a 2-cell ultracapacitor, specific capacitance values of about 120 F/g were obtained.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/051101**A. CLASSIFICATION OF SUBJECT MATTER***C01B 31/04(2006.01)i, C01B 31/02(2006.01)i, H01B 1/24(2006.01)i, B01J 19/10(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)

C01B 31/04; C09C 1/44; B05D 5/12; C01B 31/00; H01B 1/00

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: graphite, graphene, non-aqueous liquid, propylene carbonate, reduced graphene oxide, graphene oxide platelet, ultracapacitor, exfoliating

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|--------------------------|
| X | WO 2009-056696 A2 (CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE-CNRS et al.) 07 May 2009 | 1-3, 28-29, 37-38 |
| A | See abstract, claims 1, 20, 21, 27, 28 | 11-13, 30 |
| A | WO 2009-117628 A1 (THE GOVERNMENT OF THE UNITED STATES OF AMERICA, AS REPRESENTED BY THE SECRETARY OF THE NAVY et al.) 24 September 2009 See example 1, claims 1, 13 | 1-3, 11-13, 28-30, 37-38 |
| A | US 2009-0146111 A1 (HYEON-JIN SHIN et al.) 11 June 2009 See abstract, claims 1, 5 | 1-3, 11-13, 28-30, 37-38 |
| PX | ACS NANO, January 2010, Vol. 4, No. 2, pp. 1227-1233. (YANWU ZHU et al.) See pages 1227-1231 | 1-3, 11-13, 28-30, 37-38 |

 Further documents are listed in the continuation of Box C. See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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"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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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| WO 2009-056696 A2 | 07.05.2009 | EP 2176164 A2 JP 2010-535690 A US 2011-0130494 A1 WO 2009-056696 A3 WO 2009-056696 A4 | 21.04.2010 25.11.2010 02.06.2011 07.05.2009 07.05.2009 |
| WO 2009-117628 A1 | 24.09.2009 | US 2009-0235721 A1 | 24.09.2009 |
| US 2009-0146111 A1 | 11.06.2009 | KR 10-2009-0059871 A US 2009-146111 A1 | 11.06.2009 11.06.2009 |