10/12/04
20040734 90

162162

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 December 2003 (24.12.2003)

PCT

(10) International Publication Number
WO 03/106030 A1

(51) International Patent Classification[7]: B01J 037/34

(21) International Application Number: PCT/SG03/00146

(22) International Filing Date: 12 June 2003 (12.06.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/387,920 13 June 2002 (13.06.2002) US

(71) Applicant *(for all designated States except US)*: **NATIONAL UNIVERSITY OF SINGAPORE** [SG/SG]; 10 Kent Ridge Crescent, Singapore 119260 (SG).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **WEE, Thye, Shen, Andrew** [SG/SG]; 22 Wilby Road, #05-10, Singapore 276306 (SG). **GOHEL, Amarsinh** [MY/SG]; 12 Seraya Lane, Singapore 437279 (SG). **CHIN Kok, Chung** [MY/SG]; Blk 2, Jalan Bukit Merah, #10-5148, Singapore 150002 (SG).

(74) Agent: **ELLA CHEONG MIRANDAH & SPRUSONS PTE LTD**; Robinson Road Post Office, P.O. Box 1531, Singapore 903031 (SG).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

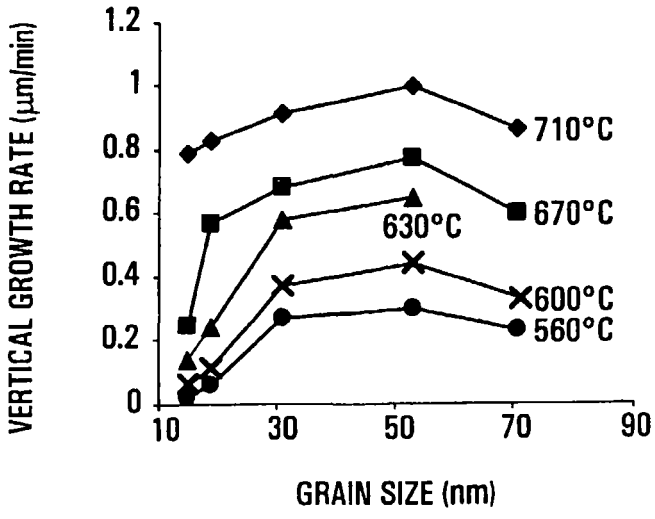
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,*

[Continued on next page]

(54) Title: SELECTIVE AREA GROWTH OF ALIGNED CARBON NANOTUBES ON A MODIFIED CATALYTIC SURFACE



(57) Abstract: This invention provides a method for making a catalyst for use in the preparation of carbon nanotubes, which method comprises subjecting a thin film of a catalytic metal on a support to selective mechanical or electromagnetic modification to enhance the grain size of the metal. This invention also provides a modified thin film of a catalytic metal on a support that is useful for the selective area growth of carbon nanotubes, which modification is selective in area and is made through mechanical or electromagnetic means to enhance the grain size of the metal. This invention also provides a process for the selective area growth of carbon nanotubes on a substrate which bears a catalyst thin film, the process comprising contacting a modified thin film catalyst defined above with a carbon source under pressure and temperature conditions which promote carbon nanotube synthesis. This invention also provides the use of the modified surface deposited carbon nanotubes for the manufacture of display, electronic and microelectromechanical devices.

WO 03/106030 A1

ACTION

GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

— *of inventorship (Rule 4.17(iv)) for US only*

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.