

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
4 March 2004 (04.03.2004)

PCT

(10) International Publication Number
WO 2004/018745 A3

(51) International Patent Classification⁷: **D01F 9/12**

(21) International Application Number:
PCT/US2003/026318

(22) International Filing Date: 21 August 2003 (21.08.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/405,231 21 August 2002 (21.08.2002) US
10/402,454 28 March 2003 (28.03.2003) US

(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, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, 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).

(71) Applicant: **FIRST NANO, INC.** [US/US]; 5571 Ekwill Street, Santa Barbara, CA 93111 (US).

(72) Inventors: **ADDERTON, Dennis, M.**; 4493 Vieja Drive, Santa Barbara, CA 93110 (US). **LAI, Jonathan, W.**; 5090 Rocoso Way, Santa Barbara, CA 93111 (US). **MINNE, Stephen, C.**; 4493 Vieja Drive, Santa Barbara, CA 93111 (US).

(74) Agent: **DURST, Jay, G.**; BOYLE FREDRICKSON NEWHOLM STEIN & GRATZ, S.C., 250 East Wisconsin Avenue, Suite 1030, Milwaukee, WI 53202 (US).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
10 June 2004

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.

(54) Title: METHOD AND APPARATUS OF CARBON NANOTUBE FABRICATION

(57) Abstract: A carbon nanotube fabricating system and method that employs control automation to ensure safety during the fabrication of nanotubes in a variety of applications. A method of producing carbon nanotubes in a process chamber 18 includes executing a nanotube growth recipe and purging oxygen from the process chamber in response to the executing step. The purge step is performed by flowing an inert gas through the process chamber at appropriate times and for predetermined durations during the fabrication process.



WO 2004/018745 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/26318

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : D01F 9/12
US CL : 423/447.3; 422/129

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)
U.S. : 423/447.3; 422/129

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,315,977 B1 (CANTACUZENE) 13 November 2001, columns 3-5.	1-34

☐

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 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 "&" document member of the same patent family
---	--	---

Date of the actual completion of the international search

05 April 2004 (05.04.2004)

Date of mailing of the international search report

04 MAY 2004

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

Stuart Hendrickson

Telephone No. 571-272-1700