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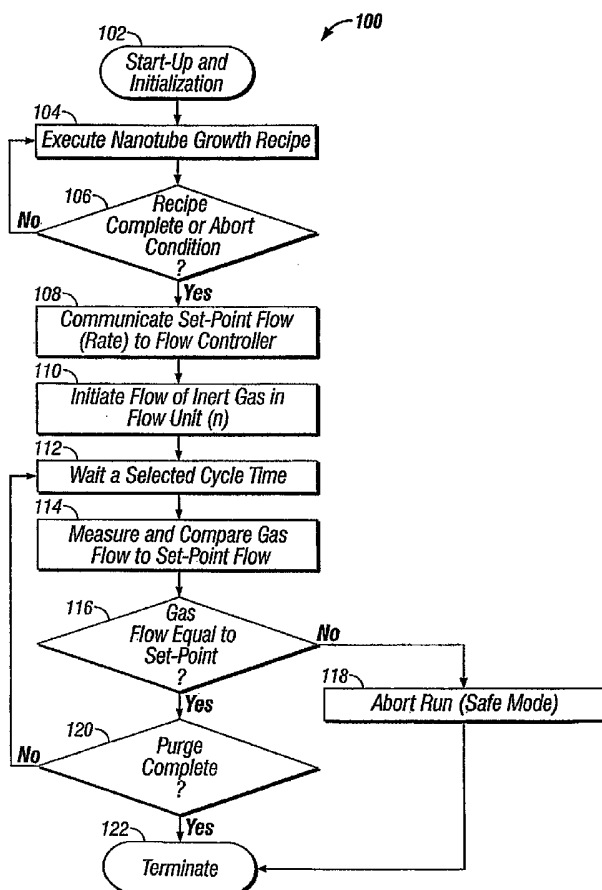
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[Continued on next page]

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

(57) Abstract: A method of fabricating carbon nanotubes in
a nanotube growth apparatus including executing a nanotube
growth process recipe (100) and monitoring a safety condi-
tion (112, 114, 116, 120) during the executing step (104).
The executing step (102, 104, 106, 108, 110, 122) is inter-
locked to the monitoring step (112, 114, 116, 120) such that
the executing step (104) can be aborted (118) based on the
output of the monitoring step.



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ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
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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.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/26276

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C01B 31/00, 31/02; H01L 21/20, 21/36
US CL : 423/445R; 438/478, 503, 507

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. : 423/445R; 438/478, 503, 507

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Please See Continuation Sheet

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	SEMI Manual S2-0302 entitled "Environmental, Health, and Safety Guideline for Semiconductor Manufacturing Equipment" 31 March 2002 (31.03.02), Section 6, "Safety Philosophy," Section 11 "Safety Interlock Systems," Section 17 "Hazardous Energy Isolation," Section 22, "Exhaust Ventilation," and Section 23 "Chemicals"	1-10
Y	US Patent Application Publication 2001/0024633 A1 (Lee et al.) 27 September 2001 (27.09.01) Abstract, Fig. 1, paragraphs [0021]-[0024].	1-10
Y	US 6,350,488 B1 (Lee et al.) 26 February 2002 (26.02.02) Abstract; Figs. 1, 3; col 4, line 59 to col 5, line 28.	1-10

☐ 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	"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
"E"	earlier application or patent published on or after the international filing date	"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
"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)	"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
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

05 August 2004 (05.08.2004)

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14 OCT 2004

Name and mailing address of the ISA/US

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/26276

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim 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. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

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.: 1-10

Remark on Protest

☐
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

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BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This International Search Authority has found 3 inventions claimed in the International Application covered by the claims indicated below:

Group I, claim(s) 1-10, drawn to a method of monitoring safety in a nanotubes growth apparatus.

Group II, claim(s) 11-22, drawn to a nanotubes growth apparatus with sensors.

Group III, claim(s) 23-28, drawn to a method of controlling nanotubes growth in a nanotubes growth apparatus.

The inventions listed as Groups I, II, and III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The special technical feature in Group I is monitoring safety. The special technical feature in Group II is a plurality of sensors. The special technical feature in Group III is using feedback to control the nanotubes growth process. Each of these special technical features has separate utility leading to different classifications and divergent searched which are unduly burdensome on the examiner.

Continuation of B. FIELDS SEARCHED Item 2:

SEMI Manual S2-0302 entitled "Environmental, Health, and Safety Guideline for Semiconductor Manufacturing Equipment"

Continuation of B. FIELDS SEARCHED Item 3:

EAST, search terms: nanotube, pressure, temperature, flow, growth, alarm, safety, alert, monitor, sensor, signal, explosive, combustion, hydrogen, oxygen, methane, ethylene, hydrocarbon