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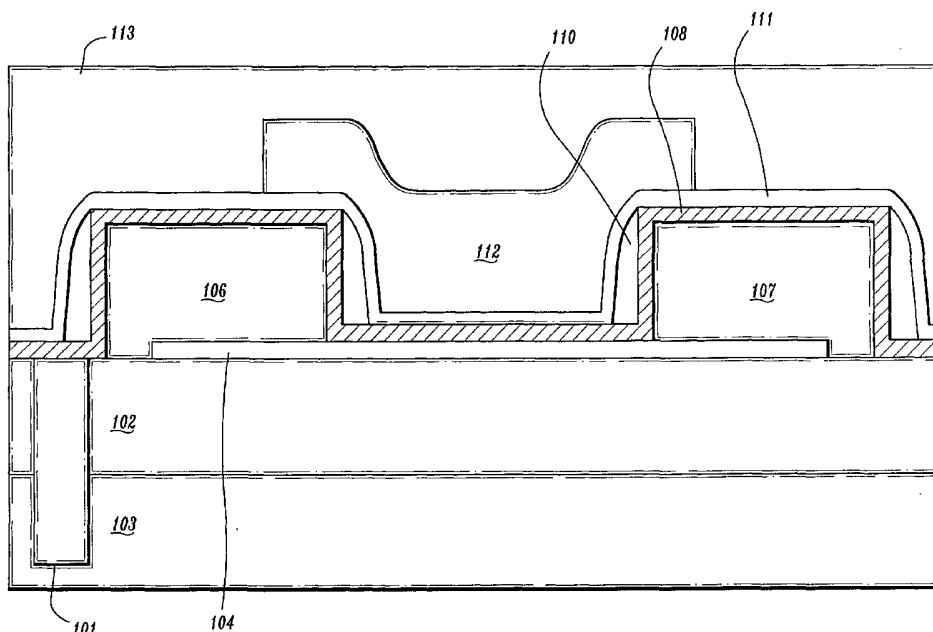
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[Continued on next page]

(54) Title: SELF-ALIGNED NANOTUBE FIELD EFFECT TRANSISTOR AND METHOD OF FABRICATING SAME



(57) Abstract: A self-aligned carbon-nanotube field effect transistor semiconductor device comprises a carbon-nanotube [104] deposited on a substrate [102], a source and a drain [106-107] formed at a first end and a second end of the carbon-nanotube [104], respectively, and a gate [112] formed substantially over a portion of the carbon-nanotube [104], separated from the carbon-nanotube by a dielectric film [111].

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SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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.

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INTERNATIONAL SEARCH REPORT

International Application No

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H01L51/30 H01L51/20 H01L29/51

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)
 IPC 7 H01L

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 practical, search terms used)

EPO-Internal, INSPEC, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PARK J W ET AL: "EFFECTS OF ARTIFICIAL DEFECTS ON THE ELECTRICAL TRANSPORT OF SINGLE-WALLED CARBON NANOTUBES" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 80, no. 1, 7 January 2002 (2002-01-07), pages 133-135, XP001066273 ISSN: 0003-6951	1-3
Y	page 134, column 2, line 23 - line 31; figure 3A	4-7, 15, 16
A		8
Y	EP 1 124 262 A (SHARP KK) 16 August 2001 (2001-08-16) paragraph '0030!; figure 2	4
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
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- *O* document referring to an oral disclosure, use, exhibition or other means
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- *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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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 03/07269

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	page 160, column 1, line 4; figure 3 -----	8
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Y	US 6 025 235 A (KRIVOKAPIC ZORAN) 15 February 2000 (2000-02-15) figures 8-15 -----	5,15,16
Y	XUEJUE HUANG ET AL: "Sub 50-nm FinFET: PMOS" ELECTRON DEVICES MEETING, 1999. IEDM TECHNICAL DIGEST. INTERNATIONAL WASHINGTON, DC, USA 5-8 DEC. 1999, PISCATAWAY, NJ, USA, IEEE, US, 5 December 1999 (1999-12-05), pages 67-70, XP010372115 ISBN: 0-7803-5410-9 figure 1 -----	5,15,16
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A	ROSCHIER L ET AL: "MULTIWALLED CARBON NANOTUBES AS ULTRASENSITIVE ELECTROMETERS" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 78, no. 21, 21 May 2001 (2001-05-21), pages 3295-3297, XP001063505 ISSN: 0003-6951 figure 1 -----	8,18
A	DATABASE WPI Section Ch, Week 200251 Derwent Publications Ltd., London, GB; Class L03, AN 2002-477660 XP002290584 & KR 2002 001 259 A (SAMSUNG ELECTRONICS CO LTD) 9 January 2002 (2002-01-09) abstract -----	
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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 03/07269

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	paragraph '0028!; figures 1,2	19
A	WON BONG CHOI ET AL: "ULTRAHIGH-DENSITY NANOTRANSISTORS BY USING SELECTIVELY GROWN VERTICAL CARBON NANOTUBES" 26 November 2001 (2001-11-26), APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, PAGE(S) 3696-3698 , XP001066274 ISSN: 0003-6951 figures 1a,1b,2b	9, 10, 19
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P, X	WO 03/010837 A (DEKKER CEES ;BACHTOLD ADRIAN (NL); UNIV DELFT TECH (NL)) 6 February 2003 (2003-02-06) figure 1	1
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 03/07269

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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.:
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. Claims 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:

see additional 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.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1 - 7, 11 - 17

CNT-FET with gate over (= on top of) horizontal nanotube and method

2. claims: 8, 18

CNT-FET with gate around horizontal nanotube and method

3. claims: 9, 10, 19

CNT-FET with vertical nanotube and method

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/07269

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