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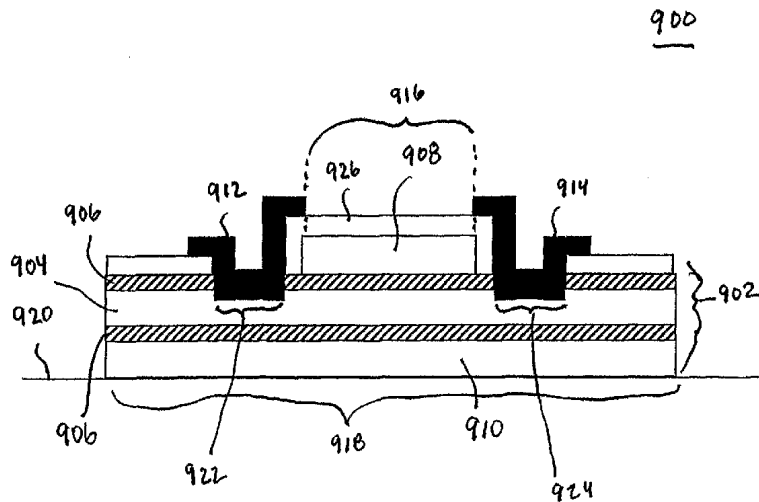
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Declarations under Rule 4.17:

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

[Continued on next page]

(54) Title: METHOD, SYSTEM, AND APPARATUS FOR GATING CONFIGURATIONS AND IMPROVED CONTACTS IN
NANOWIRE-BASED ELECTRONIC DEVICES



(57) Abstract: Methods, systems, and apparatuses for electronic devices having improved gate structures are described. An electronic device includes at least one nanowire; a gate contact is positioned along part of the length of the nanowire, and a dielectric material layer is between the gate contact and the at least one nanowire. At least a portion of the source contact and/or the drain contact overlaps with the gate contact along the nanowire length. In another aspect, an electronic device includes a nanowire having a semiconductor core surrounded by an insulating shell layer. A ring shaped first gate region surrounds the nanowire along a portion of the length of the nanowire. A second gate region is positioned along the length of the nanowire between the nanowire and the substrate. A source contact and a drain contact are coupled to the semiconductor core of the nanowire at respective exposed portions of the semiconductor core.

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— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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see Notice of 18 May 2007

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/37237

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H01L 29/775 (2007.01)

USPC - 977/938

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(8) - H01L 29/775 (2007.01)

USPC - 977/938

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

Nano and Molecular Electronics (CRC Press), S.E. Lyshevski (Ed.), 2007

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

USPTO EAST System (US, USPG-PUB, EPO, JPO, FPRS, DERWENT), GoogleScholar

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 2004/0036128 A1 (ZHANG et al) 26 February 2004 (26.02.2004) entire document	1-4, 7-16, 30, 31 5,6
Y	US 2004/0192072 A1 (SNOW et al) 30 September 2004 (30.09.2004) Fig. 1, paragraphs [0006], [0022], [0028]-[0031]	5
Y	MARTEL et al. Single- and multi-wall carbon nanotube field-effect transistors. Applied Physics Letters. vol. 73, no. 17. 26 October 1998 (26.10.1998) Fig.1	6
A	US 5,612,255 A (CHAPPLE-SOKOL et al) 18 March 1997 (18.03.1997) column 3, lines 25-50 and figures 2A-2E	1-16, 30, 31

 Further documents are listed in the continuation of Box C.


* 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 but 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

21 September 2007

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18 MAR 2008

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/37237

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See extra 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 additional fees, this Authority did not invite payment of additional fees.
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.:
1-16, 30-31

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

Continuation of Box III.

Group I, claims 1-16, 30, 31, drawn to an electronic device comprising at least one nanowire, wherein the nanowire comprises gate, source and drain contact regions, and a gate dielectric region.

Group II, claims 17-29, drawn to a method for fabricating an electronic device, comprising a substrate including at least one nanowire, the nanowire having a semiconductor core, insulating shell and ring shaped conductive region; etching the nanowire to define source, drain and gate regions.

The inventions listed as Groups I and II 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 of the Group I invention: an electronic device comprising at least one nanowire, wherein the nanowire comprises gate, source and drain contact regions, and a gate dielectric region as claimed therein is present in the invention of Group II, but is not considered to be a linking special technical feature. The special technical feature of the Group II invention: a method for fabricating an electronic device, comprising a substrate including at least one nanowire, the nanowire having a semiconductor core, insulating shell and ring shaped conductive region as claimed therein is not present in the invention of Group I.

The limitation of "an electronic device comprising at least one nanowire, wherein the nanowire comprises gate, source and drain contact regions, and a gate dielectric region" is not considered a linking special technical feature as this limitation is clearly disclosed by Chapple-Sokol et al. (US 5,612,255 A), column 3, lines 25-50 and figures 2A-2E, published on 18 March 1997.

Since none of the special technical features of the Group I or II inventions are found in more than one of the inventions, unity of invention is lacking.