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26 February 2009

(54) Title: MEMORY CELL THAT EMPLOYS A SELECTIVELY DEPOSITED REVERSIBLE RESISTANCE-SWITCHING ELEMENT AND METHODS OF FORMING THE SAME

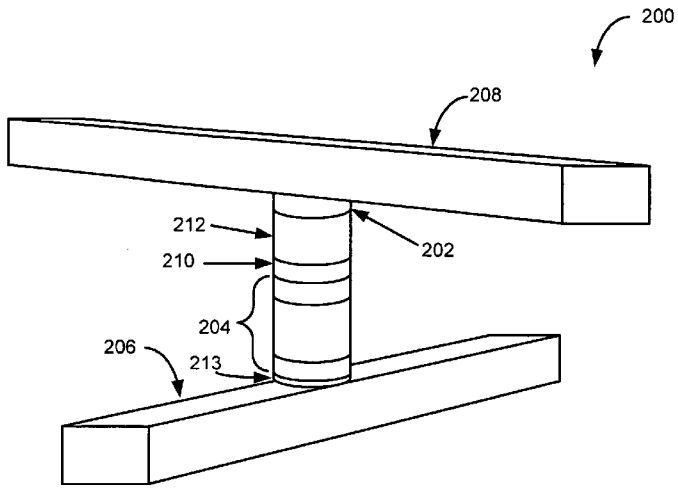


Fig. 2A

(57) Abstract: In some aspects, a method of forming a memory cell is provided that includes (1) forming a first conductor above a substrate; (2) forming a diode above the first conductor; (3) forming a reversible resistance-switching element above the first conductor using a selective deposition process; and (4) forming a second conductor above the diode and the reversible resistance-switching element. Numerous other aspects are provided.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/007986

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01L27/10

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)
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, WPI Data, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 100 717 286 B1 (SAMSUNG ELECTRONICS CO LTD [KR]) 15 May 2007 (2007-05-15) abstract; claims; figures	1,18,19, 40,52
P,X	-& US 2007/246743 A1 (CHO SUNG-LAE [KR] ET AL) 25 October 2007 (2007-10-25) abstract; claims; figures 1-3 paragraphs [0038], [0041]	1,18,19, 40,52
A	WO 2007/072308 A (KONINKL PHILIPS ELECTRONICS NV [NL]; IMEC INTER UNI MICRO ELECTR [BE];) 28 June 2007 (2007-06-28) abstract; claims; figure 3 page 8, line 16 - line 26 page 10, line 4 - line 14 page 13, line 11 - line 12	1,18,19, 40,52

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[X] Further documents are listed in the continuation of Box C.

[X] 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 document 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	Date of mailing of the international search report
16 October 2008	10/12/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Wirner, Christoph

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/007986

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/047727 A1 (CHIANG CHIEN [US]) 13 March 2003 (2003-03-13) abstract; claims; figures	1,18,19, 40,52
A	US 2006/094236 A1 (ELKINS PATRICIA C [US] ET AL) 4 May 2006 (2006-05-04) abstract; claims; figures paragraph [0001]	1,18,19, 40,52
E	WO 2008/097742 A (INTEROLECULAR INC [US]; KUMAR NITIN [US]; LANG CHI-I [US]; CHIANG TONY) 14 August 2008 (2008-08-14) abstract; claims; figures	1,18,19, 40,52

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/007986

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 additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an 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 reportcovers 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, 18, 19, 40, 52

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.

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, 18, 19, 40, 52

   Selective deposition of a reversible resistance-switching element

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2. claims: 2 - 8, 21 - 39, 41 - 51, 53 - 68

   A steering element comprising a diode or a thin film transistor in connection with a reversible resistance-switching element

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3. claims: 9 - 17, 20

   A reversible resistance switching element comprising a nickel-containing layer

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4. claims: 69 - 78

   A plurality of memory cells and a three dimensional memory array

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2008/007986

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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