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(54) **Title:** RESISTIVE RAM DEVICES AND METHODS

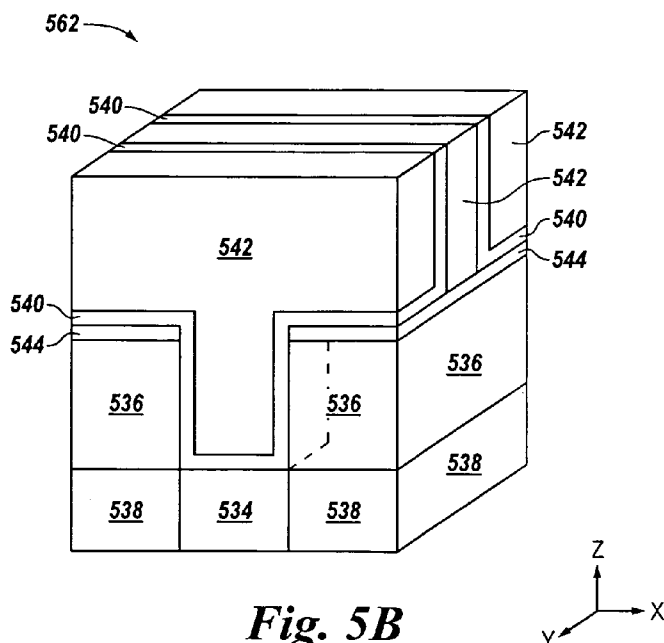


Fig. 5B

(57) **Abstract:** The present disclosure includes a high density resistive random access memory (RRAM) device, as well as methods of fabricating a high density RRAM device. One method of forming an RRAM device includes forming a resistive element having a metal-metal oxide interface. Forming the resistive element includes forming an insulative material over the first electrode, and forming a via in the insulative material. The via is conformally filled with a metal material, and the metal material is planarized within the via. A portion of the metal material within the via is selectively treated to create a metal-metal oxide interface within the via. A second electrode is formed over the resistive element.



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**A. CLASSIFICATION OF SUBJECT MATTER****HOIL 27/115(2006.01)i, HOIL 21/8247(2006.01)1**

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)

HOIL 27/1 15; HOIL 21/20; HOIL 21/8242; HOIL 45/00; HOIL 47/00; HOIC 7/10; HOIC 17/06

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords: RRAM, etch, electrode, insulate, via, metal, material, oxidize, slot, plane, antenna, gas, resistive, element.

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2009-0070780 A (DONGBU HITEK CO. , LTD.) 01 July 2009 See abstract, paragraphs [0005] , [0011]-[0018] , claim 1 and figure 3d.	1, 2-20, 21, 22, 23-39 , 40, 41-46
A	US 2009-0302302 A1 (JANG-EUN HE0 et al.) 10 December 2009 See abstract, paragraphs [0096]-[0097] , claims 1,7 and figure 6 .	1-46
A	US 2009-0309690 A1 (KENTARO KINOSHITA et al.) 17 December 2009 See abstract, paragraph [0062], claim 1 and figure 5A.	1-46
A	US 2008-0054243 A1 (HISASHI SHIMA et al.) 06 March 2008 See abstract, paragraph [0063], claims 6,16 and figure 1 .	1-46

 Further documents are listed in the continuation of Box C. See patent family annex.

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"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

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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

"&amp;" document member of the same patent family

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Information on patent family members

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**PCT/US201 1/001 160**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-2009-0070780 A	01.07.2009	None	
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