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(54) Title: SPIN TORQUE TRANSFER MEMORY CELL STRUCTURES AND METHODS

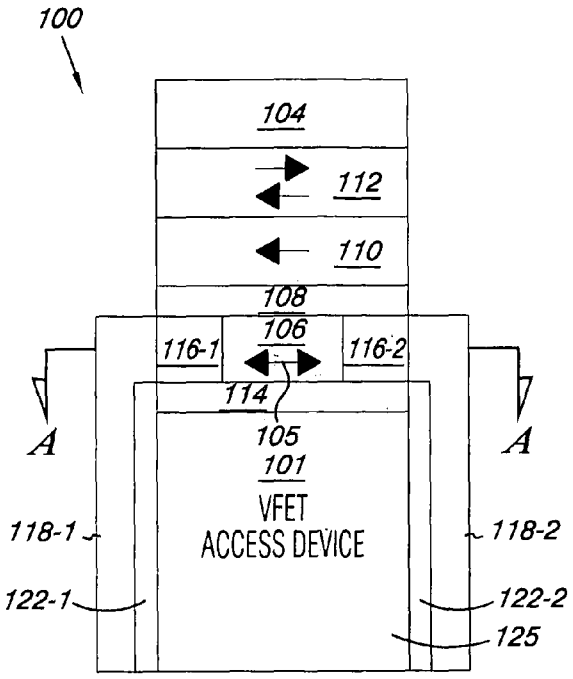

Fig. 1A

(57) Abstract: Spin Torque Transfer (STT) memory cell structures and methods are described herein. One or more STT memory cell structures comprise a STT stack including: a pinned ferromagnetic material in contact with an antiferromagnetic material; a tunneling barrier material positioned between a ferromagnetic storage material and the pinned ferromagnetic material; a multiferroic material in contact with the ferromagnetic storage material; and a first electrode and a second electrode, wherein the antiferromagnetic material, the pinned ferromagnetic material, and the ferromagnetic storage material are located between the first electrode and the second electrode. The STT memory cell structure can include a third electrode and a fourth electrode, wherein at least a first portion of the multiferroic material is located between the third and the fourth electrode.

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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

eKOMPASS(KIPO internal) & Keywords: spin torque transfer, STT, memory cell, multiferroic, ferroic magnetic, antiferroic magnetic

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2010-032574 A1 (HITACHI, LTD.) 25 March 2010 See figures 1-4; paragraphs [15]-[20],[22],[24] and [26]-[28]	1-51
A	JP 2010-098259 A (INSTITUTE OF PHYSICAL & CHEMICAL RESEARCH) 30 April 2010 See figure 1; paragraphs [28]-[31],[46]-[51]	1-51
A	WO 2010-039424 A1 (MICRON TECHNOLOGY, INC.) 08 April 2010 See figures 3,5 and paragraphs [28]-[33],[37]-[39]	1-51
A	US 2010-0193888 A1 (GU, SHIQUN et al.) 05 August 2010 See figures 4-6; paragraphs [35]-[39]; claim 1	1-51
A	US 2010-0220516 A1 (LEE, KANGHO et al.) 02 September 2010 See figure 2; paragraphs [6],[24]-[28]	1-51
A	KR 10-0866973 B1 (EWHA WOMAN`S UNIVERSITY RESEARCH AND BUSINESS CENTER) 05 November 2008 See figure 2; paragraphs [61]-[70]; claim 1	1-51
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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