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(54) Title: COLUMN IV TRANSISTORS FOR PMOS INTEGRATION

(57) Abstract: Techniques are disclosed for forming column IV transistor devices having source/drain regions with high concentrations of germanium, and exhibit reduced parasitic resistance relative to conventional devices. In some example embodiments, the source/drain regions each includes a thin p-type silicon or germanium or SiGe deposition with the remainder of the source/drain material deposition being p-type germanium or a germanium alloy (e.g., germanium:tin or other suitable strain inducer, and having a germanium content of at least 80 atomic % and 20 atomic % or less other components). In some cases, evidence of strain relaxation may be observed in the germanium rich cap layer, including misfit dislocations and/or threading dislocations and/or twins. Numerous transistor configurations can be used, including both planar and non-planar transistor structures (e.g., FinFETs and nanowire transistors), as well as strained and unstrained channel structures.

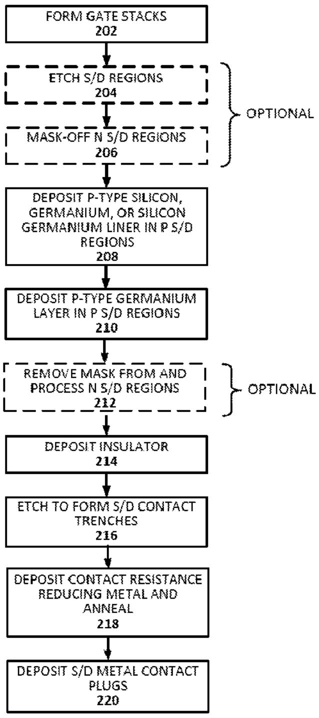

FIG. 2

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A. CLASSIFICATION OF SUBJECT MATTER

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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 29/78; H01L 29/778; H01L 027/12; H01L 21/336; H01L 021/8238; H01L 21/8238

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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: transistor, PMOS, and germanium

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005-0145944 A1 (MURTHY ANAND et al.) 07 July 2005 See the abstract; figs. 1-7; paragraphs [0011]-[0046].	1-32
A	US 2007-0004123 A1 (MARK BOHR et al.) 04 January 2007 See the abstract; figs. 1-9; paragraphs [0014]-[0038].	1-32
A	US 2010-0109044 A1 (TEKLEAB DANIEL G. et al.) 06 May 2010 See the abstract; figs. 1-8; paragraphs [0016]-[0038].	1-32

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

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