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(54) Title: ATOMIC LAYER DEPOSITION OF METAL CARBIDE FILMS USING ALUMINUM HYDROCARBON COMPOUNDS

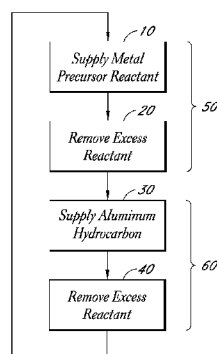


FIG. 1

(57) Abstract: Methods of forming metal carbide films are provided. In some embodiments, a substrate is exposed to alternating pulses of a transition metal species and an aluminum hydrocarbon compound, such as TMA, DMAH, or TEA. The aluminum hydrocarbon compound is selected to achieve the desired properties of the metal carbide film, such as aluminum concentration, resistivity, adhesion and oxidation resistance. In some embodiments, the methods are used to form a metal carbide layer that determines the work function of a control gate in a flash memory.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/040705**A. CLASSIFICATION OF SUBJECT MATTER*****H01L 21/205(2006.01)i, H01L 21/336(2006.01)i, H01L 21/28(2006.01)i, H01L 21/3205(2006.01)i***

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 H01L, C23C

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 since 1975

Japanese Utility models and applications for Utility models since 1975

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

eKOMPASS(KIPO Internal) & Keyword: tantalum, carbide, ALD, and aluminum

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 06794287 B2 (VILLE ANTERO SAANILA et al.) 21 September 2004 See the Abstract; Claims 1, 4, 5; Figures 1-4.	1-47
A	US 2007-0018342 A1 (GURTEJ S. SANDHU et al.) 25 January 2007 See the Abstract; Paragraphs [0001]-[0033]; Claims 1-90; Figures 1-6.	1-47
A	US 2007-0148350 A1 (ANTTI RAHTU et al.) 28 June 2007 See the Abstract; Paragraphs [0001]-[0126]; Claims 1-43; Figures 1-4.	1-47

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

* Special categories of cited documents:

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 06794287 B2	21.09.2004	US 2003-0186495 A1 US 06599572 B2 US 2001-0009695 A1	02.10.2003 29.07.2003 26.07.2001
US 2007-0018342 A1	25.01.2007	None	
US 2007-0148350 A1	28.06.2007	None	