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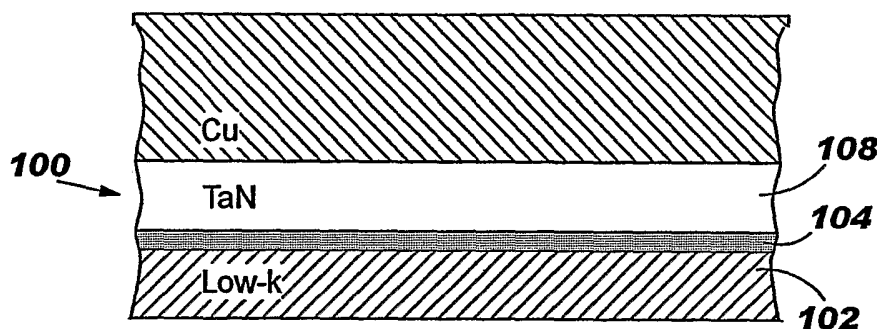
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(54) **Title:** PE-ALD OF TaN DIFFUSION BARRIER REGION ON LOW-K MATERIALS



(57) **Abstract:** Methods of depositing a tantalum nitride (TaN) diffusion barrier region on low-k materials. The methods include forming a protective layer (104) on the low-k material substrate (102) by performing plasma-enhanced atomic layer deposition (PE-ALD) from tantalum-based precursor and a nitrogen plasma in a chamber. The protective layer (104) has a nitrogen content greater than its tantalum content. A substantially stoichiometric tantalum-nitride layer is then formed by performing PE-ALD from the tantalum-based precursor and a plasma including hydrogen and nitrogen. The invention also includes the tantalum-nitride diffusion barrier region (108) so formed. In one embodiment, the metal precursor includes tantalum penta-chloride (TaCl<sub>5</sub>). The invention generates a sharp interface between low-k materials and liner materials.

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## INTERNATIONAL SEARCH REPORT

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<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
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<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 438/627,653, FOR. 350,751;257/e21.584		
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 practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E,Y	US 2006/0019494 (CAO et al)	1-12
E,Y	US 2006/0027167 (ISHIZAKA et al) 09 February 2006	1-12
E,Y	US 2005/0101132 (KIM et al)	1-12
E,Y	US 2005/0095443 (KIM et al), [0010-0011],[0026],[0028],[0031-0035]	1-12
Y	US 2004/0009307 (KOH et al), [0071]	1-12
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