Title: A METHOD OF FORMING A TANTALUM-CONTAINING LAYER FROM A METALORGANIC PRECURSOR

Abstract: A method and precursor for forming and integrating a Ta-containing layer in a semiconductor processing. The tantalum precursor has the formula (CpRₙ)(CpR₂)TaH(CO), where Cp is a cyclopentadienyl functional group and R₁ and R₂ are H or alkyl groups. The method includes providing a substrate in a process chamber of a deposition system, and exposing a process gas comprising the tantalum precursor to the substrate to form the Ta-containing layer. The Ta-containing layer may be treated to remove contaminants and modify the layer. The Ta-containing layer may contain tantalum metal, tantalum carbide, tantalum nitride, or tantalum carbonitride, or a combination thereof, and may be deposited in a TCVD, ALD, or PEALD process. A semiconductor device containing a Ta-containing layer formed on a patterned substrate containing one or more vias or trenches is provided.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC: C23C 16/00 (2006.01); H05H 1/24 (2006.01)

USPC: 427/248.1,255.26,569

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)

U.S.: 427/248.1,255.26,569

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)

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X, E</td>
<td>US 2006/0223300 A1 (SIMKA et al) 5 October 2006 (05.10.2006), [0007]-[0008], [0011]-[0013], [0019]-[0020], [0029].</td>
<td>1, 2, 5-9, 11-22, 25-35, 38, 40-42</td>
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<tr>
<td>Y, E</td>
<td>US 2003/0124264 (CHEN et al ) 03 July 2003 (03.07.2003), [0029]-[0033].</td>
<td>3, 4, 10, 23, 24, 36, 37, 39</td>
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<tr>
<td>Y</td>
<td>US 6491978 (KALYANAM) 10 December 2002 (10.12.2002), Abstract, Col. 5, line 35, Col. 7, line 23, Col. 15. lines 50-65.</td>
<td>23, 24, 36, 37, 39</td>
</tr>
</tbody>
</table>

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

Date of the actual completion of the international search

Name and mailing address of the ISA/US
Mail Stop PCT, Attn ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
Facsimile No. (571) 273-3201

Authorized officer
Timothy H Meeks
Telephone No. 571-272-1700

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