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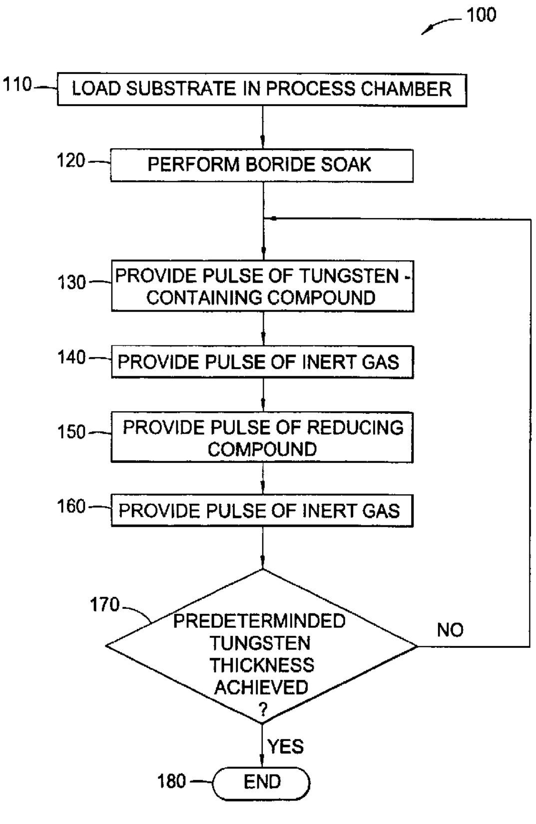
(54) Title: METHOD FOR DEPOSITING METAL LAYERS EMPLOYING SEQUENTIAL DEPOSITION TECHNIQUES



(57) **Abstract:** A method for forming a tungsten layer on a substrate surface is provided. In one aspect, the method includes positioning the substrate surface in a processing chamber (110) and exposing the substrate surface to a boride (120). A nucleation layer is then deposited on the substrate surface in the same processing chamber by alternately pulsing a tungsten-containing compound (130) and a reducing gas (150) selected from a group consisting of silane (SiH_4), disilane (Si_2H_6), dichlorosilane ($SiCl_2H_2$), derivatives thereof, and combinations thereof. A tungsten bulk fill may then be deposited on the nucleation layer using cyclical deposition, chemical vapor deposition, or physical vapor deposition techniques.

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C23C16/455 H01L21/00 C23C16/02 C23C16/06

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 7 C23C

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 practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	YANG M ET AL: "ATOMIC LAYER DEPOSITION OF TUNGSTEN FILM FROM WF6/B2H6: NUCLEATION LAYER FOR ADVANCED SEMICONDUCTOR DEVICES" ADVANCED METALLIZATION CONFERENCE. PROCEEDINGS OF THE CONFERENCE, XX, XX, 8 October 2001 (2001-10-08), pages 655-660, XP008014661 the whole document ---	1-20
Y	US 6 156 382 A (MAEDA YUJI ET AL) 5 December 2000 (2000-12-05) column 7, line 48 -column 9, line 67 ---	1-20
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 16, 8 May 2001 (2001-05-08) & JP 2001 011629 A (APPLIED MATERIALS INC), 16 January 2001 (2001-01-16) abstract --- -/--	1-20

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

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