(19) World Intellectual Property Organization International Bureau





(43) International Publication Date 14 November 2002 (14.11.2002)

PCT

(10) International Publication Number WO 02/091451 A3

(51) International Patent Classification7: H01L 21/316

(21) International Application Number: PCT/US02/14653

(22) International Filing Date: 7 May 2002 (07.05.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

7 May 2001 (07.05.2001) 09/851,201

(71) Applicant: APPLIED MATERIALS, INC. [US/US]; P.O. Box 450A, Santa Clara, CA 95052 (US).

(72) Inventor: YUAN, Zheng; 42024 Benbow Drive, Fremont, CA 94539 (US).

Agents: BERNADICOU, Michael, A. et al.; Blakely, Sokoloff, Taylor & Zafman LLP, 12400 Wilshire Boulevard, 7th Floor, Los Angeles, CA 90025 (US).

(81) Designated States (national): CN, JP, KR.

(84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

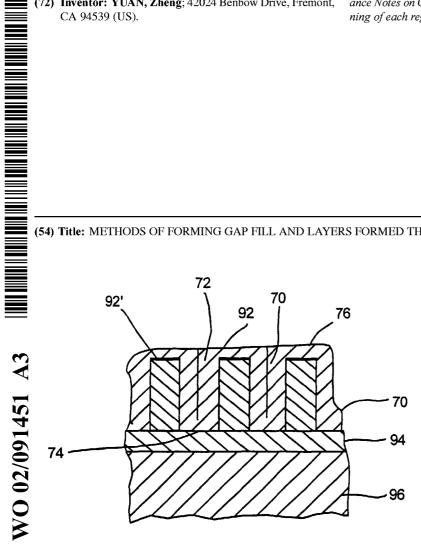
Published:

with international search report

(88) Date of publication of the international search report: 3 July 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHODS OF FORMING GAP FILL AND LAYERS FORMED THEREBY



(57) Abstract: A method of forming a fill layer over a layer in a semiconductor stack having gaps of high aspect ratio topography, and products produced thereby.

WO 02/091451 A3

INTERNATIONAL SEARCH REPORT

Intermional Application No PCI/US 02/14653

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H01L21/316

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

 $\begin{array}{lll} \mbox{Minimum documentation searched} & \mbox{(classification system followed by classification symbols)} \\ \mbox{IPC 7} & \mbox{H01L} & \mbox{C23C} \end{array}$

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, WPI Data, PAJ, INSPEC

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 4 949 671 A (DAVIS CECIL J ET AL) 21 August 1990 (1990-08-21) column 53, line 3 - line 43 claims 8-14	1,2,4,5, 11 7,9,12 3,6,8-10
(EP 1 063 692 A (APPLIED MATERIALS INC) 27 December 2000 (2000-12-27) the whole document	6,8 7,9,12
4	US 5 763 018 A (SATO JUNICHI) 9 June 1998 (1998-06-09) cited in the application the whole document/	1-12

Further documents are listed in the continuation of box C.	Patent family members are listed in annex.			
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	 "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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 document is, such combination being obvious to a person skilled in the art. "&" document member of the same patent family 			
Date of the actual completion of the international search 19 March 2003	Date of mailing of the international search report $26/03/2003$			
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Authorized officer Giordani, S			

INTERNATIONAL SEARCH REPORT

Intermational Application No
PC1/US 02/14653

C.(Continua	tion) DOCUMENTS CONSIDERED TO BE RELEVANT	101/03 02/14033		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
A	US 6 194 304 B1 (SUZUKI EIJI ET AL) 27 February 2001 (2001-02-27) the whole document	1–12		
A	US 6 030 460 A (SUKHAREV VALERIY K) 29 February 2000 (2000-02-29) the whole document	1–12		
	•			

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCI/US 02/14653

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 4949671		21-08-1990	US	4685999 A	11-08-1987
			JP	1186621 A	26-07-1989
			DE	3684093 D1	09-04-1992
			EΡ	0220901 A2	06-05-1987
			JP	2087992 C	02-09-1996
			JP	8004086 B	17-01-1996
			JP	62165332 A	21-07-1987
			US	4849068 A	18-07-1989
EP 1063692	Α	27-12-2000	US	6413583 B1	02-07-2002
			EP	1063692 A1	27-12-2000
			JP	2001148382 A	29-05-2001
			TW	457630 B	01-10-2001
US 5763018	Α	09-06-1998	JP	9008032 A	10-01-1997
US 6194304	B1	27-02-2001	JP	11074352 A	16-03-1999
			JP	11074351 A	16-03-1999
			JP	11074353 A	16-03-1999
			TW	401612 B	11-08-2000
			US	6137176 A	24-10-2000
US 6030460	Α	29-02-2000	US	5710079 A	20-01-1998
			JP	10107028 A	24-04-1998