

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
30 January 2003 (30.01.2003)

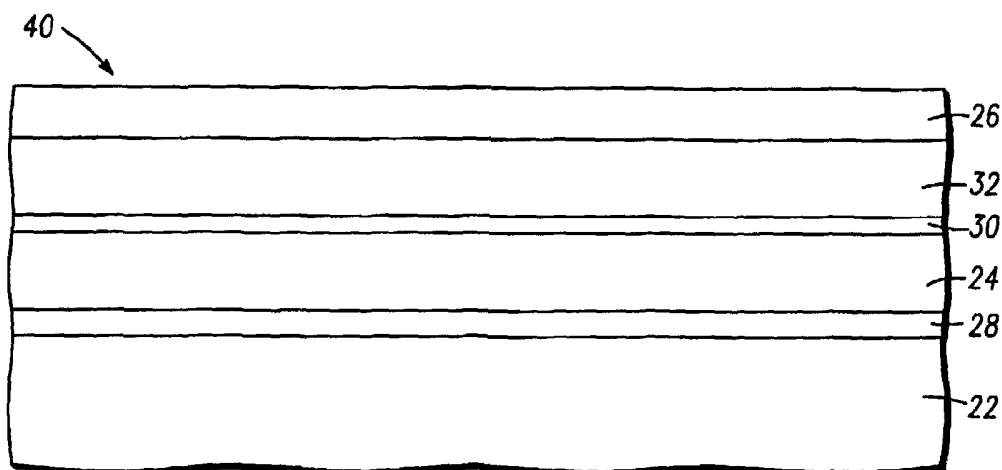
PCT

(10) International Publication Number  
WO 03/009357 A3

- (51) International Patent Classification<sup>7</sup>: H01L 21/20, 21/762
- (21) International Application Number: PCT/US02/22800
- (22) International Filing Date: 17 July 2002 (17.07.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
09/908,707 20 July 2001 (20.07.2001) US
- (71) Applicant: MOTOROLA, INC. [US/US]; 1303 East Algonquin Road, Schaumburg, IL 60196 (US).
- (72) Inventors: EISENBEISER, Kurt, W.; 9442 S. Beck Avenue, Tempe, AZ 85284 (US). YU, Zhiyi; 449 W. Merrill Avenue, Gilbert, AZ 85233 (US). DROOPAD, Ravindranath; 4515 W. Tyson Street, Chandler, AZ 85226 (US).
- (74) Agents: KOCH, William, E. et al.; 3102 North 56th Street, AZ11/56-238, Phoenix, AZ 85018-6606 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report
- (88) Date of publication of the international search report:  
28 August 2003

[Continued on next page]

(54) Title: EPITAXIAL SEMICONDUCTOR ON INSULATOR (SOI) STRUCTURES AND DEVICES



(57) Abstract: High quality epitaxial layers of monocrystalline materials (26) can be grown overlying monocrystalline substrates (22) such as large silicon wafers by forming a compliant substrate for growing the monocrystalline layers. An accommodating buffer layer (24) comprises a layer of monocrystalline oxide spaced apart from the silicon wafer (22) by an amorphous interface layer (28) of silicon oxide. The amorphous interface layer dissipates strain and permits the growth of a high quality monocrystalline oxide accommodating buffer layer. The accommodating buffer layer is lattice matched to both the underlying silicon wafer and the overlying monocrystalline material layer. A monocrystalline layer (26) is then formed over the accommodating buffer layer, such that a lattice constant of the monocrystalline layer substantially matches the lattice constant of a subsequently grown monocrystalline film.



WO 03/009357 A3



---

*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.*

## INTERNATIONAL SEARCH REPORT

Int ional Application No  
PCT/US 02/22800

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 H01L21/20 H01L21/762		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) IPC 7 H01L		
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		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 059 895 A (CHU JACK OON ET AL) 9 May 2000 (2000-05-09) figure 4	1-3,9-15
A	DE 100 17 137 A (SIEMENS AG) 26 October 2000 (2000-10-26) abstract; figure 1	1-24
A	US 5 556 463 A (GUENZER CHARLES S) 17 September 1996 (1996-09-17) column 2, line 35 - line 59; figure 2	1-24
A	US 5 830 270 A (WALKER FREDERICK JOSEPH ET AL) 3 November 1998 (1998-11-03) abstract	1-24
	-/--	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
° Special categories of cited documents : *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 documents, 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  22 April 2003		Date of mailing of the international search report  29/04/2003
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  Le Meur, M-A

INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 02/22800

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>YU Z ET AL: "Epitaxial oxide thin films on Si(001)"                      JOURNAL OF VACUUM SCIENCE AND TECHNOLOGY: PART B, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US,                      vol. 18, no. 4, July 2000 (2000-07), pages 2139-2145, XP002172595                      ISSN: 0734-211X                      the whole document</p> <p style="text-align: center;">----</p>	1-24
A	<p>EP 1 037 272 A (ASAHI CHEMICAL IND)                      20 September 2000 (2000-09-20)</p> <p style="text-align: center;">-----</p>	

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/22800

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6059895	A	09-05-2000	US 5906951 A	25-05-1999
			JP 2908787 B2	21-06-1999
			JP 10308503 A	17-11-1998
			TW 388969 B	01-05-2000
DE 10017137	A	26-10-2000	DE 10017137 A1	26-10-2000
US 5556463	A	17-09-1996	US 5478653 A	26-12-1995
			JP 8051106 A	20-02-1996
US 5830270	A	03-11-1998	AU 3903497 A	25-02-1998
			EP 0950132 A1	20-10-1999
			JP 2000517280 T	26-12-2000
			KR 2000029832 A	25-05-2000
			WO 9805807 A1	12-02-1998
			US 6023082 A	08-02-2000
			US 6093242 A	25-07-2000
EP 1037272	A	20-09-2000	AU 8036898 A	04-01-1999
			EP 1037272 A1	20-09-2000
			CN 1260907 T	19-07-2000
			WO 9858408 A1	23-12-1998
			US 6528387 B1	04-03-2003