(19) World Intellectual Property Organization

International Bureau



(43) International Publication Date 4 November 2004 (04.11.2004)

PCT

(10) International Publication Number $WO\ 2004/095545\ A3$

(51) International Patent Classification⁷: H01L 21/00

(21) International Application Number:

PCT/US2004/006847

(22) International Filing Date: 5 March 2004 (05.03.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

10/402,915 28 March 2003 (28.03.2003) U

(71) Applicant (for all designated States except US): SAINT-GOBAIN CERAMICS & PLASTICS, INC. [US/US]; 1 New Bond Street, Box Number 15138, Worcester, MA 01615-0138 (US).

- (72) Inventors; and
- (75) Inventors/Applicants (for US only): BUCKLEY, Richard, F. [US/US]; 8 Comstock Drive, Shrewsbury, Massachusetts 01545 (US). HAERLE, Andrew, G. [US/US]; 34 Manchaug Road, Sutton, MA 01590 (US). CHANG, Han, C. [US/—]; Science-Based Industrial Park, CRD 13F, No. 3 Li-Hsin Road II, Hsin-Chu City, 300 (**).

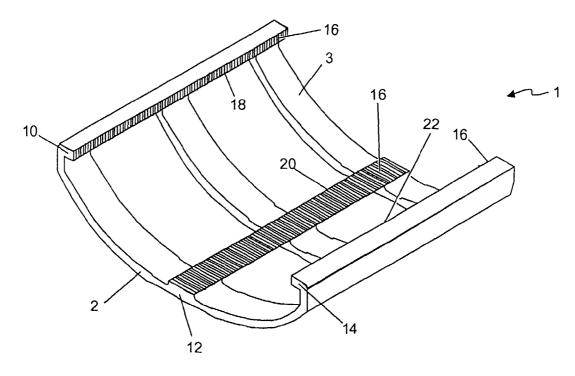
- (74) Agent: BUJOLD, Michael, J.; Davis & Bujold, P.L.L.C., 500 North Commercial Street, Fourth Floor, Manchester, NH 03101 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, 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, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

with international search report

[Continued on next page]

(54) Title: WAFER CARRIER HAVING IMPROVED PROCESSING CHARACTERISTICS



(57) Abstract: A wafer carrier for supporting a plurality of wafers, including a plurality of slots provided in a cradle, the cradle being formed of silicon carbide and having an oxide layer overlying the silicon carbide.

WO 2004/095545 A3



 before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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.

(88) Date of publication of the international search report:

12 May 2005

Internation No PCT/US2004/006847

Relevant to claim No.

a. classification of subject matter IPC 7 H01L21/00

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

B. FIELDS SEARCHED

Category °

Minimum documentation searched (classification system followed by classification symbols) IPC 7 H01L C23C C30B C04B B05C

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)

Citation of document, with indication, where appropriate, of the relevant passages

EPO-Internal, WPI Data, PAJ, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

X Y	PATENT ABSTRACTS OF JAPAN vol. 0110, no. 53 (C-404), 19 February 1987 (1987-02-19) -& JP 61 213374 A (HITACHI MICRO ENG LTD; others: 01), 22 September 1986 (1986-09-22) abstract	COMPUT	1-14, 29-31 18-22	
X	PATENT ABSTRACTS OF JAPAN vol. 0101, no. 97 (E-418), 10 July 1986 (1986-07-10) -& JP 61 042153 A (FUJITSU LTD), 28 February 1986 (1986-02-28) abstract	-/	1-4, 29-31	
	ner documents are listed in the continuation of box C.	X Patent family members are listed in	n annex.	
"A" docume consid "E" earlier of filing d "L" docume which citation "O" docume other r	ent which may throw doubts on priority claim(s) or is cited to establish the publication date of another on or other special reason (as specified) ent referring to an oral disclosure, use, exhibition or	 "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 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 		
	actual completion of the international search 1 February 2005	Date of mailing of the international sear		
Name and n	nailing 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 Hamdani, F		

Internate Application No
PCT/US2004/006847

C./Continu	nation) DOCUMENTS CONSIDERED TO BE RELEVANT	1/05/2004/00084/
Category °		Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 0090, no. 49 (E-300), 2 March 1985 (1985-03-02) -& JP 59 191327 A (HITACHI SEISAKUSHO KK), 30 October 1984 (1984-10-30) abstract	1,12-14, 29-31
X	EP 0 308 695 A (TOSHIBA CERAMICS CO) 29 March 1989 (1989=03-29) abstract; claims; figures	1-14, 18-21, 29-31
Х	PATENT ABSTRACTS OF JAPAN vol. 0181, no. 99 (E-1534), 7 April 1994 (1994-04-07) -& JP 06 005530 A (TOSHIBA CORP), 14 January 1994 (1994-01-14)	1-12, 18-20, 29-31
X Y	abstract paragraph '0013!; figure 2	15-17,33 34
X	EP 0 713 245 A (SHINETSU HANDOTAI KK) 22 May 1996 (1996-05-22) abstract; claims; figures	1-12, 29-31
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 14, 31 December 1998 (1998-12-31) -& JP 10 242254 A (ADO MATSUPU:KK), 11 September 1998 (1998-09-11) abstract	1-14, 29-31
X	EP 1 187 189 A (SHINETSU HANDOTAI KK) 13 March 2002 (2002-03-13) abstract; claims; figures column 8, line 15 - line 54	1-14, 29-31
X	US 4 904 515 A (SASAKI YASUMI ET AL) 27 February 1990 (1990-02-27) abstract; claims	1-12, 29-31
Y	WO 01/95374 A (BUCKLEY RICHARD F; SAINT GOBAIN CERAMICS AND PLAS (US)) 13 December 2001 (2001-12-13) claim 5; figure 4 page 11, line 10 - line 25	18–22
X	page 11, Time 10 - Time 25 page 11, line 10 - line 25	15-17,33
Α	EP 1 184 355 A (TOSHIBA CERAMICS CO) 6 March 2002 (2002-03-06) the whole document	1
Α	US 3 634 116 A (WOERNER LLOYD M ET AL) 11 January 1972 (1972-01-11) the whole document	1
	-/	

Internate Application No PCT/US2004/006847

Relevant to claim No. 15-17,33 15-17,33 15-17,33
15-17,33 15-17,33
15-17,33 15-17,33
15-17,33
15-17,33
23-27,32 34
34
23-27,32
23-27,32
23-27,32
23-27,32

International Application No
PCT/US2004/006847

on) DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PATENT ABSTRACTS OF JAPAN vol. 012, no. 425 (E-681), 10 November 1988 (1988-11-10) -& JP 63 164312 A (TOSHIBA CERAMICS CO LTD; others: 01), 7 July 1988 (1988-07-07) abstract	23-27,32
GB 1 385 730 A (SIEMENS AG) -26-February-1975-(-1975-02-26) claims; figure 4	23-27,32
PATENT ABSTRACTS OF JAPAN vol. 001, no. 146 (E-068), 26 November 1977 (1977-11-26) -& JP 52 085476 A (HITACHI LTD), 15 July 1977 (1977-07-15) abstract	23-27,32
PATENT ABSTRACTS OF JAPAN vol. 011, no. 171 (E-512), 2 June 1987 (1987-06-02) -& JP 62 004337 A (TOSHIBA CERAMICS CO LTD), 10 January 1987 (1987-01-10) abstract	23,32
US 4 548 159 A (FOSTER DERRICK W ET AL) 22 October 1985 (1985-10-22) abstract; claims; figures	23,32,34
	Vol. 012, no. 425 (E-681), 10 November 1988 (1988-11-10) -& JP 63 164312 A (TOSHIBA CERAMICS CO LTD; others: 01), 7 July 1988 (1988-07-07) abstract GB 1 385 730 A (SIEMENS AG) -26-February-1975-(-1975-02-26) claims; figure 4 PATENT ABSTRACTS OF JAPAN vol. 001, no. 146 (E-068), 26 November 1977 (1977-11-26) -& JP 52 085476 A (HITACHI LTD), 15 July 1977 (1977-07-15) abstract PATENT ABSTRACTS OF JAPAN vol. 011, no. 171 (E-512), 2 June 1987 (1987-06-02) -& JP 62 004337 A (TOSHIBA CERAMICS CO LTD), 10 January 1987 (1987-01-10) abstract US 4 548 159 A (FOSTER DERRICK W ET AL) 22 October 1985 (1985-10-22)

International application No. PCT/US2004/006847

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)
This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:
1. Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such —an-extent that no-meaningful-International-Search-can-be-carried out, specifically:
3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).
Box III Observations where unity of invention is lacking (Continuation-of-item 3 of first sheet)
This International Searching Authority found multiple inventions in this international application, as follows:
see additional sheet
1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.: 1-27, 29-34
4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
Remark on Protest The additional search fees were accompanied by the applicant's protest. X No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14, 18-22, 29-31

Wafer carrier comprising a cradle formed by silicon carbide and an overlying oxide layer and method therfore.

2. claims: 15-17, 33

Wafer carrier comprising a plurality of slots having a slot width not less than about 1.30 the wafer thickness and method therefore.

3. claims: 23-27, 32, 34

Wafer carrier comprising a plurality of slots having at least a portion of each slot with a curvature radius not less than about 1.15 the wafer radius and method therfore.

4. claim: 28

A wafer carrier comprising a plurality of slots having at 'least a portion of each slot with a curvature radius with opposite curvature compared to the wafer curvature radius.

Information on patent family members

Internate Application No
PCT/US2004/006847

		rc1/052004/00084/					
	atent document d in search report		Publication date		Patent family member(s)		Publication date
JP	61213374	Α	22-09-1986	NONE			
JP	61042153	Α	28-02-1986	NONE			
JP	59191327	Α	30-10-1984	NONE			
EP	0308695	А	29-03-1989	JP JP DE DE EP US	1061376 2548949 3877875 3877875 0308695 4987016	B2 D1 T2 A2	08-03-1989 30-10-1996 11-03-1993 01-07-1993 29-03-1989 22-01-1991
JP	0600553 0	Α	14-01-1994	NONE			
EP	0713245	A	22-05-1996	JP JP EP US	3285723 8148552 0713245 5759426	A A2	27-05-2002 07-06-1996 22-05-1996 02-06-1998
JP	10242254	Α	11-09-1998	NONE			
EP	1187189	A	13-03-2002	EP US WO TW	1187189 2003196588 0159826 490769	A1 A1	13-03-2002 23-10-2003 16-08-2001 11-06-2002
US	4904515	A	27-02-1990	JP JP	2573480 62122212		22-01-1997 03-06-1987
WO	0195374	Α	13-12-2001	AU CN JP TW WO	7502701 1401133 2003536254 548772 0195374	T T B	17-12-2001 05-03-2003 02-12-2003 21-08-2003 13-12-2001
EP	1184355	Α	06-03-2002	WO EP US	0160764 1184355 6699401	A1	23-08-2001 06-03-2002 02-03-2004
US	3634116	A	11-01-1972	BE DE FR GB JP NL	751247 2027041 2049743 1300664 53034201 7007942	A1 A5 A B	01-12-1970 17-12-1970 26-03-1971 20-12-1972 19-09-1978 04-12-1970
US	5417767	A	23-05-1995	DE JP	4446972 7211658		29-06-1995 11-08-1995
US	4355974	Α	26-10-1982	JP JP	62060025 57167625		14-04-1987 15-10-1982
US	3923156	Α	02-12-1975	NONE			
US	2003056391	A1	27-03-2003	JP JP	3535853 2003092281		07-06-2004 28-03-2003

Information on patent family members

Internation No
PCT/US2004/006847

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 4653636	Α	31-03-1987	NONE		
JP 04287915	Α	13-10-1992	NONE		
JP 01302814	A	06-12-1989	JP JP	2032919 C 7052720 B	19-03-1996 05-06-1995
JP 06302532	Α	28-10-1994	NONE		
US 3998333	Α	21-12-1976	JP	51002161 U	09-01-1976
JP 63164312	Α	07-07-1988	JP JP	2117391 C 8024140 B	06-12-1996 06-03-1996
GB 1385730	Α	26-02-1975	DE DE FR IT NL US US US	2133843 A1 2133876 A1 2133877 A1 2144678 A1 962430 B 7206014 A 3828726 A 3826377 A 3834349 A	18-01-1973 18-01-1973 18-01-1973 16-02-1973 20-12-1973 09-01-1973 13-08-1974 30-07-1974 10-09-1974
JP 52085476	A	15-07-1977	NONE		
JP 62004337	A	10-01-1987	JP JP	1891335 C 6022262 B	07-12-1994 23-03-1994
US 4548159	A	22-10-1985	AU EP JP JP JP	4464485 A 0167374 A2 1451172 C 61044179 A 62060466 B	09-01-1986 08-01-1986 25-07-1988 03-03-1986 16-12-1987