

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
13 January 2000 (13.01.2000)

PCT

(10) International Publication Number  
**WO 00/002233 A3**

- (51) International Patent Classification<sup>6</sup>: **H01L 21/316**,  
21/3105, C01B 33/159
- (21) International Application Number: PCT/US99/15345
- (22) International Filing Date: 7 July 1999 (07.07.1999)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
09/111,084 7 July 1998 (07.07.1998) US
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- (81) Designated States (*national*): AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:**  
— with international search report
- (88) Date of publication of the international search report:  
17 April 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.*



**WO 00/002233 A3**

(54) Title: SIMPLIFIED PROCESS FOR PRODUCING NANOPOROUS SILICA

(57) Abstract: The present invention relates to low dielectric constant nanoporous silica films and to processes for their manufacture. A substrate, e.g., a wafer suitable for the production of an integrated circuit, having a plurality of raised lines and/or electronic elements present on its surface, is provided with a relatively high porosity, low dielectric constant, silicon-containing polymer film composition.

# INTERNATIONAL SEARCH REPORT

International Application No <b>PCT/US 99/15345</b>
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**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 H01L21/316 H01L21/3105 C01B33/159

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 H01L C01B

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

<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	EP 0 775 669 A (TEXAS INSTRUMENTS INC) 28 May 1997 (1997-05-28) cited in the application	1-8, 11, 19-24
Y	page 13, line 46 - line 52 page 20, line 21 - line 49 ---	9, 12, 13
Y	EP 0 643 421 A (MATSUSHITA ELECTRIC IND CO LTD) 15 March 1995 (1995-03-15)	9, 12, 13
A	column 7, line 40 - column 8 ---	25
X	EP 0 688 052 A (TEXAS INSTRUMENTS INC) 20 December 1995 (1995-12-20)	21-24, 40-43
A	page 3 page 5, line 58 - page 6, line 1 ---	16, 25
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*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)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*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</p> <p>*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</p> <p>*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.</p> <p>*Z* document member of the same patent family</p>
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Date of the actual completion of the international search  <b>8 August 2000</b>	Date of mailing of the international search report  <b>16/08/2000</b>
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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  <b>Szarowski, A</b>
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## INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/15345

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 018, no. 333 (P-1759), 23 June 1994 (1994-06-23) & JP 06 082603 A (SEIKO EPSON CORP), 25 March 1994 (1994-03-25) abstract ---	6
A	US 5 708 069 A (BURNS GARY THOMAS ET AL) 13 January 1998 (1998-01-13) column 6 -column 8 ---	25-30
A	US 5 753 305 A (JENG SHIN-PUU ET AL) 19 May 1998 (1998-05-19) column 5, line 28 - line 61 ---	25
P,X	WO 98 46526 A (ALLIED SIGNAL INC) 22 October 1998 (1998-10-22)  same applicant example 3 -----	25-28, 30-35, 37-40, 42

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 99/15345

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 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:
  
2.  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 II Observations where unity of invention is lacking (Continuation of item 2 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.:
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.
- 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: 1-24

A process for treating a nanoporous silica dielectric film, which comprises reacting a nanoporous silica film with a vapor phase material comprising a hydrophobic surface modification agent.

2. Claims: 25-43

A process for treating a nanoporous silica dielectric film, which comprises reacting a nanoporous silica film with a reaction solution comprising a hydrophobic surface modification agent together with a ketone co-solvent.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/15345

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