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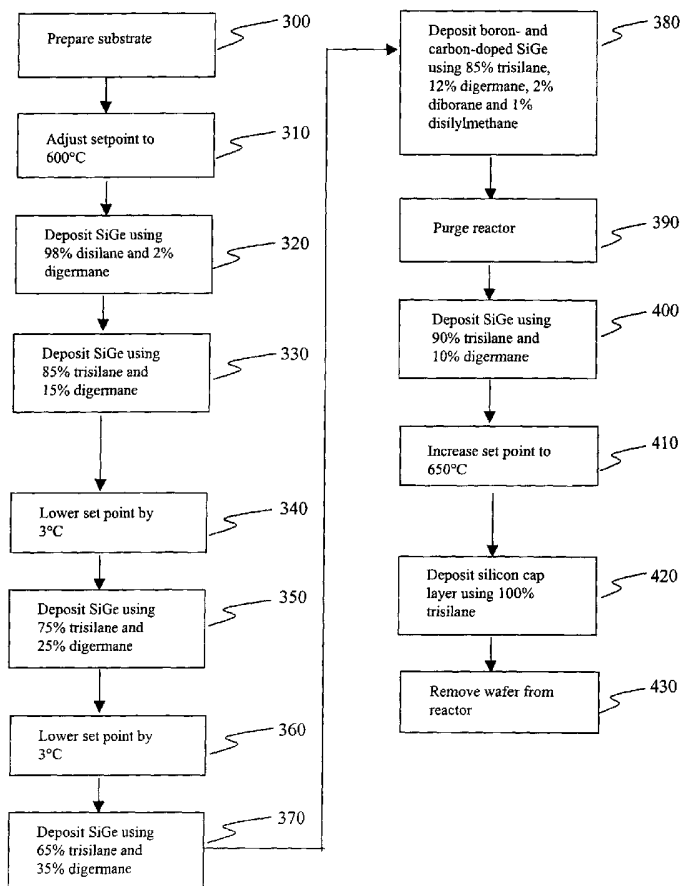
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- (21) International Application Number: PCT/US2002/002921
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60/340,454	7 December 2001 (07.12.2001)	US

[Continued on next page]

(54) Title: IMPROVED PROCESS FOR DEPOSITION OF SEMICONDUCTOR FILMS



(57) Abstract: Chemical vapor deposition processes utilize chemical precursors that allow for the deposition of thin films to be conducted at or near the mass transport limited regime. The processes have high deposition rates yet produce more uniform films, both compositionally and in thickness, than films prepared using conventional chemical precursors. In preferred embodiments, trisilane is employed to deposit thin films containing silicon useful in the semiconductor industry in various applications such as transistor gate electrodes.

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INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L21/205 C23C16/00 C30B25/02

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 C23C C30B

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 01, 31 January 1996 (1996-01-31) & JP 07 249618 A (FUJITSU LTD;OTHERS: 01), 26 September 1995 (1995-09-26)	1,4-9, 13, 16-18, 20-23, 27-29, 35,37, 78-80,83
A	abstract ----- -/--	12,26

Further documents are listed in the continuation of box C. 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 28 July 2003	Date of mailing of the international search report 13. 11. 2003
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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 Voignier, V.
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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/02921

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 017, no. 375 (E-1397), 14 July 1993 (1993-07-14) & JP 05 062911 A (FUJITSU LTD), 12 March 1993 (1993-03-12)	1,2, 6-10,13, 16,17, 20-22, 24, 27-29, 31,35, 37,38
A	abstract; figure 1	18,19, 23,25
X	----- PATENT ABSTRACTS OF JAPAN vol. 017, no. 160 (E-1342), 29 March 1993 (1993-03-29) & JP 04 323834 A (SEIKO EPSON CORP), 13 November 1992 (1992-11-13) abstract	1,3,14, 15, 35-37, 39,74
A		16,30, 32,34
X	----- PATENT ABSTRACTS OF JAPAN vol. 2000, no. 02, 29 February 2000 (2000-02-29) & JP 11 317530 A (SEMICONDUCTOR ENERGY LAB CO LTD), 16 November 1999 (1999-11-16)	1,3-9, 14,16, 20-23, 27,28, 30,32, 33,35, 37,39,40
A	abstract	
X	----- US 5 227 329 A (HASHIMOTO TAKASHI ET AL) 13 July 1993 (1993-07-13)	1,8,9, 12,14, 15, 35-37, 40,66-69
A	column 2, line 22 - line 29 column 5, line 35 - line 43; figures 3,7,8; examples 3,4	16, 26-28, 30,33,34
X	----- US 5 214 002 A (HAYASHI YUTAKA ET AL) 25 May 1993 (1993-05-25)	1-4, 6-11,13, 14,16, 20, 22-25, 27-33, 35,37-40
A	the whole document	66,68-71
A	-----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/02921

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.:

1-40, 66-83

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: 1-40, 66-83

A process for depositing a Si-containing film on a substrate in a chamber using trisilane.

An apparatus to implement this process.

A compound Si-containing film in an integrated circuit.

2. claims: 41-56

A process for depositing a SiGe film on a substrate in a CVD chamber using a gas mixture comprising high-order silane and high order germane.

A SiGe film in an integrated circuit

3. claims: 57-65

A process for depositing, in a CVD chamber, a first Si-containing layer on a substrate at a first controlled temperature using a first gas comprising a first Si-containing precursor, and a second Si-containing layer at a second controlled temperature onto the first Si-containing layer using a second gas comprising a second Si-containing precursor.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 02/02921

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 07249618	A	26-09-1995	NONE
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JP 04323834	A	13-11-1992	JP 3200863 B2 20-08-2001
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