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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: ETHYLENEOXIDE-SILANE AND BRIDGED SILANE PRECURSORS FOR FORMING LOW K FILMS

(57) Abstract: An organosilicon precursor for vapor deposition, e.g., low pressure (< 100 Torr), plasma-enhanced chemical vapor deposition (PECVD) of a low k, high strength dielectric film, wherein the precursor includes at least one of: (i) silicon-pendant oxiranyl functionality; and (ii) a disilyl moiety of the formula wherein x is an integer having a value of from 0 to 4 inclusive. These precursors are useful for the formation of dielectric films having dielectric constants on the order of ~3 and less, and a hardness exceeding ~ 1 GigaPascals.



WO 2005/010941 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/22721

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C07F 7/18, 7/08

US CL : 549/215; 556/430,435

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)
U.S. : 549/215; 556/430,435

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 practicable, search terms used)
CAS ONLINE- Structure searches

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CAS ONLINE, RN 18191-70-3, Chemical Abstract 136:142449, 21 February 2002, the compound anticipates the listed claims.	1-3,6,8,10 and 13
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X	CAS ONLINE, RN266337-39-7, Chemical Abstract 142:14508, 24 May 2000, the compound anticipates the listed claims.	1-4 and 8
X	CHEMICAL ABSTRACT 6:9305 (1912), Me ₃ SiSiMe ₃ is made from Si ₂ Cl ₆ and MeMgBr.	1,2,14 and 15
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X	CAS ONLINE, RN 60484-85-7, Chemical Abstract 136:37651 (2001) the compound anticipates the listed claims.	1-3
X	CHEMICAL ABSTRACT 48:56424 (1952), most of the numerous compounds disclosed in the abstract anticipate the claims.	1,2,14,16 and 17
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X	CAS ONLINE, RN 17611-73-3, Chemical Abstract 69:11248, (1984), the compound anticipates the claims.	1-4 and 7



Further documents are listed in the continuation of Box C.



See patent family 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 application or patent 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

11 January 2006 (11.01.2006)

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/22721

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CAS ONLINE, RN 30423-45-1, Chemical Abstract 68:87648 (1984), the compound anticipates the listed claims.	1-5 and 7
X	CAS ONLINE, RN 33979-86-1, Chemical Abstract 75:140971 (1971), the compound anticipates the listed claims.	1-5 and 7
X	CAS ONLINE, RN 41570-8-50-8, Chemical Abstract 136:326874 (2002), the compound anticipates the listed claims.	1,2,4 and 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/22721

Box No. 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:

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 No. 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:
Please See Continuation 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 additional fees, this Authority did not invite payment of any additional fees.
 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.: 1-17

 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 and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/22721

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-13 drawn to Si oxiranyl compounds.

Group II, claim(s) 1,2 and 14-17, drawn to disilane compounds.

Group III, claim(s) 18-21, drawn to compositions containing a Si oxiranyl compound.

Group IV, claim(s) 18-21, drawn to compositions containing disilane compounds.

Group V, claim(s) 22-34, drawn to a method of synthesizing the cpds. of Gp. I.

Group VI, claim(s) 35-39, drawn to a method of synthesizing the compounds of Gp. II.

Group VII, claim(s) 40-46 drawn to a method of forming a low K, high strength dielectric film on a substrate using a Si oxiranyl cpd. using vapor deposition.

Group VIII, claim(s) 40-46, drawn to a method of forming a low K, high strength dielectric film on a substrate using a disilane cpd. using vapor deposition.

The inventions listed as Groups I-VIII do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The generic formulae claiming the silanes containing an epoxide moiety and likewise those containing the disilyl compounds contain many known compounds and the claims are anticipated. Thus the presumption of unity of the Markush claim and all of applicants other inventions no longer exists. See PCT Administrative Instructions, Annex B, page AI- 36 and 37, Paragraph (f). Of course further each of the generic compound groups are of tremendous scope.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/22721

Applicants argue the propriety of the restriction requirement of Gps. III-VIII. However applicants may not do this for Gps. they have not paid for.