

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
12 October 2006 (12.10.2006)

PCT

(10) International Publication Number  
**WO 2006/107082 A3**

- (51) **International Patent Classification:**  
*C08G 65/00* (2006.01) *C08G 77/48* (2006.01)  
*C09D 183/02* (2006.01) *C09D 183/12* (2006.01)
- (21) **International Application Number:**  
PCT/JP2006/307260
- (22) **International Filing Date:** 30 March 2006 (30.03.2006)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**  
60/667,355 1 April 2005 (01.04.2005) US  
60/741,026 30 November 2005 (30.11.2005) US
- (71) **Applicants (for all designated States except US):** **DAIKIN INDUSTRIES, LTD.** [JP/JP]; Umeda Center Building, 4-12, Nakazaki-Nishi 2-chome, Kita-ku, Osaka-shi, Osaka, 5308323 (JP). **DOW CORNING CORPORATION** [US/US]; 2200 West Salzburg Road, Midland, Michigan, 486860994 (US).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **ITAMI, Yasuo** [JP/JP]; c/o Yodogawa Plant of DAIKIN INDUSTRIES, LTD., 1-1, Nishihitotsuya, Settsu-shi, Osaka, 5668585 (JP). **MASUTANI, Tetsuya** [JP/JP]; c/o Yodogawa Plant of DAIKIN INDUSTRIES, LTD., 1-1, Nishihitotsuya, Settsu-shi, Osaka, 5668585 (JP). **HUPFIELD, Peter, C.** [GB/GB]; c/o Dow Corning Ltd., Cardiff Road, Barry, South Glamorgan, CF632YL (GB). **KLEYER, Don, Lee** [US/US]; c/o Dow Corning Corporation, 2200 West Salzburg Road, Midland, Michigan, 486860994 (US).
- (74) **Agents:** **KAWAMIYA, Osamu** et al.; AOYAMA & PARTNERS, IMP Building, 3-7, Shiromi 1-chome, Chuo-ku, Osaka-shi, Osaka 540-0001 (JP).
- (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, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, 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, NA, 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, IS, IT, LT, LU, LV, 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
- (88) **Date of publication of the international search report:**  
25 January 2007
- 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:** SURFACE MODIFIER AND ITS USE

(57) **Abstract:** A surface modifier comprising an organosilicone compound represented by General Formula (A) and/or General Formula (B):  $F-(CF_2)_q-(OC_3F_6)_m-(OC_2F_4)_n-(OCF_2)_o(CH_2)_pXX''Si(X')_{3-a}(R')_a$  (A) and  $F-(CF_2)_q-(OC_3F_6)_m-(OC_2F_4)_n-(OCF_2)_o(CH_2)_pXX''(X')_{2-a}(R')_aSiO(F-(CF_2)_q-(OC_3F_6)_m-(OC_2F_4)_n-(OCF_2)_o(CH_2)_pXX''(X')_{1-a}(R')_aSiO)_zF-(CF_2)_q-(OC_3F_6)_m-(OC_2F_4)_n-(OCF_2)_o(CH_2)_pXX''(X')_{2-a}(R')_aSi$  (B) wherein q is an integer from 1 to 3; m, n, and o are independently integers from 0 to 200; p is 0, 1 or 2; X is oxygen or a bivalent organic spacer group; X'' is a bivalent organosilicone spacer group; X' is hydrolysable group; and z is an integer from 0 to 10 when a is 0 or 1.



WO 2006/107082 A3

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/JP2006/307260

## A. CLASSIFICATION OF SUBJECT MATTER

INV. C08G65/00 C09D183/02 C08G77/48 C09D183/12

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)

C08G C09D

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<br>vol. 2003, no. 04,<br>2 April 2003 (2003-04-02)<br>-& JP 2002 348370 A (SHIN ETSU CHEM CO LTD), 4 December 2002 (2002-12-04)<br>abstract                  | 6-52                  |
| X         | -----<br>EP 1 059 320 A (SHIN-ETSU CHEMICAL CO., LTD) 13 December 2000 (2000-12-13)<br>paragraph [0005]<br>paragraphs [0009], [0020]<br>-----  | 6-52                  |
| X         | PATENT ABSTRACTS OF JAPAN<br>vol. 1996, no. 11,<br>29 November 1996 (1996-11-29)<br>-& JP 08 170020 A (SHIN ETSU CHEM CO LTD),<br>2 July 1996 (1996-07-02)<br>abstract<br>-----<br>-/- | 6-16,<br>18-52        |

☒ 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 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 September 2006

Date of mailing of the international search report

28/09/2006

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

Michalitsch, Richard

## INTERNATIONAL SEARCH REPORT

International application No

PCT/JP2006/307260

## C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No.             |
|-----------|---|-----------------------------------|
| X         | EP 0 867 490 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD)<br>30 September 1998 (1998-09-30)<br>page 11, lines 1-33<br>page 27; compounds 1-12  | 6-16,<br>18-27,<br>29-52          |
| X         | PATENT ABSTRACTS OF JAPAN<br>vol. 016, no. 126 (C-0923),<br>31 March 1992 (1992-03-31)<br>-& JP 03 290437 A (SHIN ETSU CHEM CO LTD;<br>others: 01), 20 December 1991 (1991-12-20)<br>abstract | 6-16,<br>18-27,<br>29-52          |
| X         | PATENT ABSTRACTS OF JAPAN<br>vol. 1999, no. 12,<br>29 October 1999 (1999-10-29)<br>-& JP 11 181413 A (NONOGAWA SHOJI KK),<br>6 July 1999 (1999-07-06)<br>abstract                             | 6-16,<br>18-27,<br>29-52          |
| P,X       | EP 1 614 718 A (SHIN-ETSU CHEMICAL CO., LTD) 11 January 2006 (2006-01-11)<br>pages 9-11   | 6-52                              |
| X         | WO 02/34687 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD; OGAWA, KAZUFUMI; MINO, NORIHI) 2 May 2002 (2002-05-02)<br>compounds 4,9,18,19   | 6-16,<br>18-27,<br>29-52<br>17,28 |
| Y         | EP 1 300 433 A (SHIN-ETSU CHEMICAL CO., LTD) 9 April 2003 (2003-04-09)<br>abstract<br>compound 4<br>pages 5-7   | 17,28                             |
| X         | JP 07 179761 A (SHIN ETSU CHEM CO LTD)<br>18 July 1995 (1995-07-18)<br>pages 4-6  | 17,28                             |
| X         | JP 10 338734 A (SHIN ETSU CHEM CO LTD)<br>22 December 1998 (1998-12-22)<br>pages 4-5  | 17,28                             |
| X         | EP 1 279 443 A (SHIN-ETSU CHEMICAL CO., LTD) 29 January 2003 (2003-01-29)<br>pages 11-18  | 17,28                             |

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 1-5

Claim 1 is defined so broadly that virtually any perfluoroalkylether-siloxane with a terminal hydrolysable function falls under its definition. In fact, in the light of the dependent claims, claim 1 covers more than 100 billion compounds and combinations of compounds. It is therefore not possible to search claim 1 across the whole range claimed.

Furthermore, a major part of the claimed compounds does not appear to solve the problem underlying the present application.

Furthermore, the examples presented in the description relate exclusively to compound A of the present application and show only 7 compounds that were actually synthesized and that solve the problem underlying claim 1 and the present application as a whole.

As for compound B the lack of clarity is compounded by the fact that the chemical structure drawn in claim 1 as well as in the description appears unclear to one skilled in the art from a chemical viewpoint, since the structure suggests inter alia to include Fluorine substituents with 2 binding arms. It is not clear to one skilled in the art how the structure is to be read and how an example falling under the generic formula is to be chosen.

Furthermore, the structure cannot be construed without undue burden. The problem is compounded by the fact that the description contains no compound falling under the generic formula that would provide appropriate support for the generic formula and the broad definition contained therein. In consequence, a search based on the examples or in view of the description in general could not be carried out.

In summary the International Search Authority takes the viewpoint that the present claim 1 is so broad and so unclear that a meaningful search of the compound across the whole range claimed is not possible. In consequence, representative examples falling under the definition of the claim were construed by setting all parameters given in the claims to or close to their minimum values and formed the basis of the search.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

overcome.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/JP2006/307260

## 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:
2. ☒ Claims Nos.: 1-5  
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:  
see FURTHER INFORMATION sheet PCT/ISA/210
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.:
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: 1-16 (in part), 18-27, 29-52 (in part)

A surface modifier comprising a compound represented by general formula A, a method for its production, and its use.  
---

2. claims: 1-16 (in part), 18-52 (in part)

A surface modifier comprising a compound represented by general formula B, a method for its production, and its use.  
---

3. claims: 1-52 (in part)

A surface modifier comprising a mixture of compounds represented by general formula A and B, a method for its production, and its use.  
---

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/JP2006/307260

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) |  | Publication<br>date |
|---|---|---------------------|----------------------------|--|---------------------|
| JP 2002348370                             | A | 04-12-2002          | NONE                       |  |                     |
| EP 1059320                                | A | 13-12-2000          | DE 60003756 D1             |  | 14-08-2003          |
|   |   |                     | DE 60003756 T2             |  | 17-06-2004          |
|   |   |                     | JP 3601580 B2              |  | 15-12-2004          |
|   |   |                     | JP 2000327772 A            |  | 28-11-2000          |
|   |   |                     | US 6200684 B1              |  | 13-03-2001          |
| JP 08170020                               | A | 02-07-1996          | JP 3178980 B2              |  | 25-06-2001          |
| EP 0867490                                | A | 30-09-1998          | NONE                       |  |                     |
| JP 03290437                               | A | 20-12-1991          | NONE                       |  |                     |
| JP 11181413                               | A | 06-07-1999          | NONE                       |  |                     |
| EP 1614718                                | A | 11-01-2006          | JP 2006022223 A            |  | 26-01-2006          |
|   |   |                     | US 2006014895 A1           |  | 19-01-2006          |
| WO 0234687                                | A | 02-05-2002          | AU 9597501 A               |  | 06-05-2002          |
|   |   |                     | TW 508259 B                |  | 01-11-2002          |
| EP 1300433                                | A | 09-04-2003          | US 2003139620 A1           |  | 24-07-2003          |
| JP 7179761                                | A | 18-07-1995          | JP 3407815 B2              |  | 19-05-2003          |
| JP 10338734                               | A | 22-12-1998          | NONE                       |  |                     |
| EP 1279443                                | A | 29-01-2003          | JP 2003025510 A            |  | 29-01-2003          |
|   |   |                     | US 2003087102 A1           |  | 08-05-2003          |