



(51) International Patent Classification:
C09D 5/00 (2006.01)

(21) International Application Number:
PCT/IB2011/000269

(22) International Filing Date:
14 February 2011 (14.02.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2010-039936 25 February 2010 (25.02.2010) JP

(71) Applicant (*for all designated States except US*):
TOYOTA JIDOSHA KABUSHIKI KAISHA [JP/JP]; 1,
Toyota-cho, Toyota-shi, Aichi-ken 471-8571 (JP).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **BESSHO, Takeshi**
[JP/JP]; c/o Toyota Jidosha Kabushiki Kaisha, 1, Toyota-
cho, Toyota-shi, Aichi-ken 471-8571 (JP). **TAKATA,**
Satoshi [JP/JP]; c/o Toyota Technical Development Cor-
poration, of 1 -21, Imae, Hanamoto-cho, Toyota, Aichi
470-0334 (JP).

(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, KE, KG, KM, KN, KP, KR, KZ,
LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK,
SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA,
UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG,
ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(88) Date of publication of the international search report:
30 May 2014

(54) Title: INTERNAL COMBUSTION ENGINE CONSTITUENT MEMBER, AND FORMATION METHOD FOR WATER/OIL REPELLENT COATING FILM

(57) Abstract: An internal combustion engine constituent member of the invention has on its surface a water/oil repellent coating film that is formed from a solution that contains a fluoroalkyl group-substituted metal alkoxide that is represented by a general formula: $Rf_1M(OR^1)_{n-m}$ where Rf is a fluoroalkyl group represented by a formula: $CF_3-(CF_2)_3-R^2$ (where R^2 is each of alkylene groups that have a carbon number of 2 to 10, and that are the same as or different from each other), and m is the number of the fluoroalkyl groups, and M is a metal atom, and R^1 is each of alkyl groups that have a carbon number of 1 to 5, and that are the same as or different from each other, and n is a valence of the metal atom M.



INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2011/000269

A. CLASSIFICATION OF SUBJECT MATTER

INV. C09D5/00

ADD.

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)

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 2011/026093 A1 (BATTELLE MEMORIAL INSTITUTE [US]; LALGUDI RAMANATHAN S [US]; CAIN ROBE) 3 March 2011 (2011-03-03) claims 1-14; examples 1-10	1-6
X,P	WO 2010/061964 A1 (NIPPON STEEL CORP [JP]; MORISHITA ATSUSHI [JP]; KIKUCHI IKUO [JP]) 3 June 2010 (2010-06-03) the whole document	1-6
X	EP 2 116 518 A1 (ASAHI GLASS CO LTD [JP]) 11 November 2009 (2009-11-11) claims 1-16; example 1	1-6
X	EP 1 792 963 A1 (CENTRAL GLASS CO LTD [JP]) 6 June 2007 (2007-06-06) claims 1-15; examples 1-3	1-6
	-/--	



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

9 May 2011

Date of mailing of the international search report

09/06/2011

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Glomm, Bernhard

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2011/000269

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 0 803 528 A1 (DAIKIN IND LTD [JP]) 29 October 1997 (1997-10-29) claims 1-12; examples 1-17 -----	1-6
X	JP 10 159687 A (TOYOTA MOTOR CORP) 16 June 1998 (1998-06-16) cited in the application the whole document -----	1-6
X	JP 7 246365 A (TOYOTA MOTOR CORP) 26 September 1995 (1995-09-26) cited in the application the whole document -----	1-6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2011/000269

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011026093	A1	03-03-2011	NONE
WO 2010061964	A1	03-06-2010	NONE
EP 2116518	A1	11-11-2009	CN 101563301 A 21-10-2009 WO 2008072707 A1 19-06-2008 KR 20090089286 A 21-08-2009 US 2009304996 A1 10-12-2009
EP 1792963	A1	06-06-2007	WO 2006022118 A1 02-03-2006 US 2008026163 A1 31-01-2008
EP 0803528	A1	29-10-1997	CN 1335319 A 13-02-2002 CN 1149304 A 07-05-1997 WO 9533001 A1 07-12-1995 JP 3520522 B2 19-04-2004 KR 100266922 B1 15-09-2000 US 5734001 A 31-03-1998
JP 10159687	A	16-06-1998	JP 3156610 B2 16-04-2001
JP 7246365	A	26-09-1995	JP 3168810 B2 21-05-2001