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C10M 133/16 (2006.01) **C08F 210/14** (2006.01)
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C08F 20/14 (2006.01) **C10N 10/10** (2006.01)

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(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, JP, 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, QA, RO, RS, RU, RW, 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, RW, 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).

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- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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15 November 2012

(54) **Title:** FUNCTIONALIZED MONOMERS

(57) **Abstract:** This invention relates to functionalized monomers. The functionalized monomer may be reacted with an enophilic reagent (e.g., maleic anhydride) to form an enophilic reagent modified functionalized monomer. The invention relates to lubricants, functional fluids, fuels, dispersants, detergents, functional compositions (e.g., food products, cleaners, etc.), and the like.



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/030296

A. CLASSIFICATION OF SUBJECT MATTER		
INV. C10M129/72	C10M133/16	C10M159/20
C11C3/00	C08F20/14	C08F20/68
ADD. C10N10/02	C10N10/04	C10N10/06
C10L1/18	C10L1/22	C08F210/14
C10N10/08	C10N10/10	
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) C10M C08F		
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) EPO-Internal, 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	XUEDONG WU ET AL: "The Study of Epoxidized Rapeseed Oil Used as a Potential Biodegradable Lubricant", JOURNAL OF THE AMERICAN OIL CHEMISTS' SOCIETY, SPRINGER, BERLIN, DE, vol. 77, no. 5, 1 January 2000 (2000-01-01), pages 561-563, XP007909629, ISSN: 0003-021X, DOI: 10.1007/S11746-000-0089-2 the whole document ----- -/--	1-3,5, 9-11, 57-60, 62,63, 65,67-76
☒ 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 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 7 September 2012		Date of mailing of the international search report 14/09/2012
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 Greß, Tobias

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/030296

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:

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 fees, this Authority did not invite payment of 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.:
1-16, 18-22, 25, 27, 29, 30, 49, 50, 52-96
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/US2012/030296

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2004/113403 A1 (BAKER HUGHES INC [US]) 29 December 2004 (2004-12-29) the whole document	1-16, 18-22, 25,27, 29,30, 49,50, 57-96
X	US 2 964 545 A (HARRISON STUART A) 13 December 1960 (1960-12-13) the whole document	1-3,5, 9-11,57, 58,62, 70,73
X	WARWEL S ET AL: "COPOLYMERIZATION OF ETHYLENE WITH OMEGA-UNSATURATED FATTY ACID METHYL ESTERS USING A CATIONIC PALLADIUM COMPLEX", MACROMOLECULAR CHEMISTRY AND PHYSICS, WILEY-VCH VERLAG, WEINHEIM, DE, vol. 202, no. 6, 18 April 2001 (2001-04-18), pages 849-855, XP001038802, ISSN: 1022-1352, DOI: 10.1002/1521-3935(20010301)202:6<849::AID- MACP849>3.0.CO;2-8 the whole document	1-5,7,8, 57-59, 62,63, 65,67, 69-76, 79-81, 83,95,96
X	WARWEL S ET AL: "Polymers and polymer building blocks from meadowfoam oil", INDUSTRIAL CROPS AND PRODUCTS, ELSEVIER, NL, vol. 20, no. 3, 1 November 2004 (2004-11-01), pages 301-309, XP004592257, ISSN: 0926-6690, DOI: 10.1016/J.INDCROP.2003.11.002 the whole document	1-5, 9-11,57, 62, 70-74, 79-81, 83-85, 90,91, 93,95,96
X	WANG F ET AL: "Synthesis and antitumor activity of C-9 epimers of the tetrahydrofuran containing acetogenin 4-deoxyannoreticuin", BIOORGANIC & MEDICINAL CHEMISTRY, PERGAMON, GB, vol. 16, no. 18, 15 September 2008 (2008-09-15), pages 8413-8418, XP025427634, ISSN: 0968-0896, DOI: 10.1016/J.BMC.2008.08.030 [retrieved on 2008-08-19] pages 8414-841	1-5, 7-11, 57-59, 62,63, 65,67, 69,70

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/030296

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DORINSON A: "Influence of Chemical Structures in Sulfurized Fats on Antiwear Behavior", ASLE TRANSACTIONS, ENGINEERS, PARK RIDGE, IL, vol. 14, no. 2, 1 January 1971 (1971-01-01), pages 124-134, XP009162467, ISSN: 0569-8197 pages 124-126; tables 1-2 page 131	1-16, 18-22, 25,27, 29,30, 49,50, 57-96
X	----- US 4 518 757 A (SCHULZ DONALD N [US] ET AL) 21 May 1985 (1985-05-21) the whole document	1-5,7,8, 57-59, 62,63, 69,70
X	----- US 3 293 201 A (SHAHADE FRED S ET AL) 20 December 1966 (1966-12-20) example D	1-16, 18-22, 25, 27-33, 38,49, 50,52-96
X	----- DE 188 909 C (SULZBERGER N) 25 April 1906 (1906-04-25) page 3; example 3 -----	1-16, 18-22, 25,27, 29,30, 49,50, 57-96

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/030296

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004113403	A1	29-12-2004	AT 429456 T 15-05-2009
		EP 1633793 A1	15-03-2006
		KR 20060083859 A	21-07-2006
		US 2005014664 A1	20-01-2005
		WO 2004113403 A1	29-12-2004

US 2964545	A	13-12-1960	NONE

US 4518757	A	21-05-1985	JP 60231709 A 18-11-1985
		US 4518757 A	21-05-1985

US 3293201	A	20-12-1966	NONE

DE 188909	C	25-04-1906	NONE

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 9-11(completely); 1-8, 57-96(partially)

A composition, comprising: a functionalized monomer; wherein the functionalized monomer is reacted with an enophilic reagent to form an enophilic reagent modified functionalized monomer, the enophilic reagent comprising an oxidizing agent.

2. claims: 12, 25, 27(completely); 1-8, 57-96(partially)

A composition, comprising: a functionalized monomer; wherein the functionalized monomer is reacted with an enophilic reagent to form an enophilic reagent modified functionalized monomer, the enophilic reagent comprising a sulfurizing agent.

3. claims: 13-16, 29-31, 49, 50(completely); 1-8, 28, 32-42, 46, 47, 52-96(partially)

A composition, comprising: a functionalized monomer; wherein the functionalized monomer is reacted with an enophilic reagent to form an enophilic reagent modified functionalized monomer, the enophilic reagent comprising an enophilic acid reagent.

4. claims: 17, 26, 43-45, 48, 51(completely); 1-8, 28, 32-42, 46, 47, 52-96(partially)

A composition, comprising: a functionalized monomer; wherein the functionalized monomer is reacted with an enophilic reagent to form an enophilic reagent modified functionalized monomer, the enophilic reagent comprising an enophilic anhydride reagent.

5. claims: 1-8, 28, 33-42, 46, 47, 52-96(all partially)

A composition, comprising: a functionalized monomer; wherein the functionalized monomer is reacted with an enophilic reagent to form an enophilic reagent modified functionalized monomer, the enophilic reagent comprising an enophilic ester reagent.

6. claims: 18-22(completely); 1-8, 57-96(partially)

A composition, comprising: a functionalized monomer; wherein the functionalized monomer is reacted with an enophilic reagent to form an enophilic reagent modified functionalized

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

monomer, the enophilic reagent comprising an aromatic compound.

7. claims: 23(completely); 1-8, 57-96(partially)

A composition, comprising: a functionalized monomer; wherein the functionalized monomer is reacted with an enophilic reagent to form an enophilic reagent modified functionalized monomer, the enophilic reagent comprising a hydroxylating agent.

8. claims: 24(completely); 1-8, 57-96(partially)

A composition, comprising: a functionalized monomer; wherein the functionalized monomer is reacted with an enophilic reagent to form an enophilic reagent modified functionalized monomer, the enophilic reagent comprising a halogenating agent.
