

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
28 February 2008 (28.02.2008)

PCT

(10) International Publication Number
WO 2008/024241 A3

(51) International Patent Classification:
C08F 232/08 (2006.01)

27607 (US). SETO, Keitaro [US/US]; Raleigh, North Carolina (US).

(21) International Application Number:
PCT/US2007/018036

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(22) International Filing Date: 16 August 2007 (16.08.2007)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/839,522 23 August 2006 (23.08.2006) US

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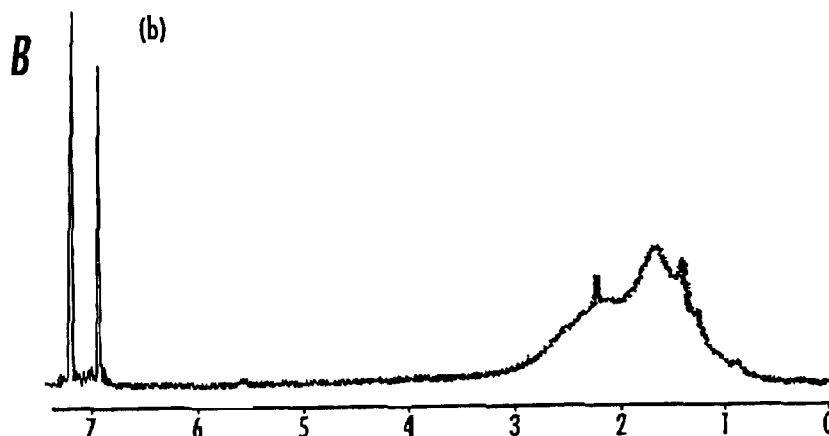
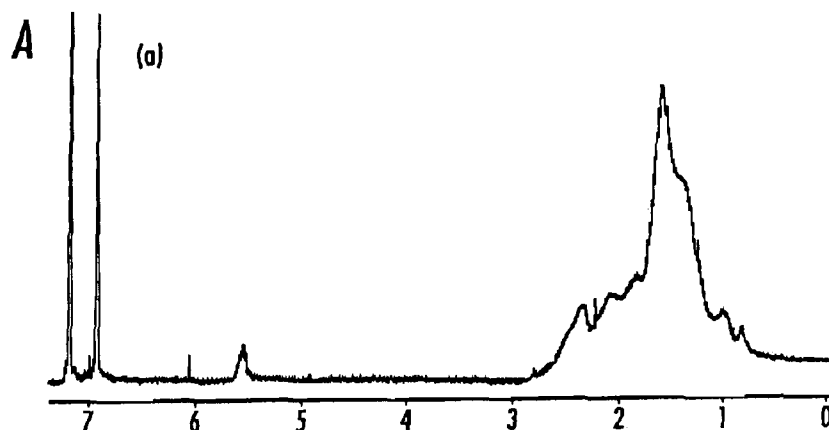
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

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[Continued on next page]

(54) Title: CYCLOBUTENE POLYMERS AND METHODS OF MAKING THE SAME



(57) Abstract: Described is a cyclobutene polymer comprising: monomeric units of cyclobutene, said cyclobutene having at least one fused ring system substituted thereon, said polymer comprising not more than 10 mol percent ring-opened units of said cyclobutene; and said polymer having a molecular weight of at least 1,000; said polymer optionally copolymerized with a comonomer to form a copolymer therewith. Compositions thereof and methods of making the same are also described.



FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, 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).

— *before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments*

Published:

— *with international search report*

(88) Date of publication of the international search report:

10 April 2008

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/018036

A. CLASSIFICATION OF SUBJECT MATTER
INV. C08F232/08

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)
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 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.
X	SETO K: "Metal Catalyzed Polymerization of Cyclic Olefins"	1-3,7, 16-18,20
Y	THESIS, XX, XX, 26 July 2006 (2006-07-26), page Complete, XP007903855 page 6 - page 8	4-6, 8-15,19
	page 79 page 103 - page 107 page 109 page 115	
Y	----- WO 2006/023511 A (PROMERUS LLC [US]; RAVIKIRAN RAMAKRISHA [US]; NG HENDRA [US]; PUTHENKO) 2 March 2006 (2006-03-02) paragraphs [0004], [0006], [0043] - [0045], [0083] examples 1-6,31-33 ----- -/--	4-6,8,9, 12

☒ 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

30 January 2008

Date of mailing of the international search report

14/02/2008

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/018036

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	SIMONE ANGIOLINI ET AL: "47.1: High Performance Plastic Substrates for Active Matrix Flexible FPD" PROCEEDINGS SID 2003, MAY 2003, BALTIMORE MD, USA, vol. XXXIV, 2003, page 1325, XP007008360 abstract; figure 2 -----	4-6,9-11
Y	RHODES. L F ET AL.: "Advanced Materials for Electronic Applications by Polymerization of Cyclic Olefins Using Late Transition Metal Catalysts" WORLDWIDE METALLOCENE CONFERENCE 1998, METCON'98 PROCEEDINGS, HOUSTON, TEXAS, USA, JUNE 10-11 1998, 1998, XP007903859 page 4, lines 8-14 page 5 - page 11 -----	5,10,11, 13,14
Y	SHICK R A ET AL: "New olefinic interlevel dielectric materials for multi-chip modules" MULTI-CHIP MODULE CONFERENCE, 1996. MCMC-96, PROCEEDINGS., 1996 IEEE SANTA CRUZ, CA, USA 6-7 FEB. 1996, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, US, 6 February 1996 (1996-02-06), pages 182-187, XP010162274 ISBN: 0-8186-7286-2 page 184, lines 1,2 page 182, lines 11-14 -----	5,10,11, 14,15
Y	GROVE N R ET AL: "Properties and processing of AVATREL<TM> as a high performance dielectric" MULTICHIP MODULES, 1997., INTERNATIONAL CONFERENCE ON DENVER, CO, USA 2-4 APRIL 1997, NEW YORK, NY, USA, IEEE, US, 2 April 1997 (1997-04-02), pages 224-227, XP010216655 ISBN: 0-7803-3787-5 abstract -----	5,10,11, 14
Y	ZEJIAN L ET AL.: "Addition Polymerization of Norbornene: Catalysis of Monocyclopentadienyltitanium Compounds Activated with Methylaluminoxane" ACS SYMPOSIUM SERIES 760, TRANSITION METAL CATALYSIS IN MACROMOLECULAR DESIGN, 2000, XP008087598 cited in the application page 169, lines 16,17 page 172, lines 1-3 -----	19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/018036

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 allsearchable 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.:

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-10, 16-20

Cyclobutene polymer and method for its preparation, shaped articles comprising the polymer

2. claim: 11(part.)

Flat panel display comprising a polymer corresponding to invention I

3. claim: 11(part.)

Waveguide comprising a polymer corresponding to invention I

4. claims: 11(part.), 14 and 15

Insulators comprising a polymer corresponding to invention I and microelectronic devices comprising them

5. claim: 12

Adhesive compositions comprising a polymer according to invention I

6. claim: 13

Photoresist compositions comprising a polymer according to invention I

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/018036

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006023511 A	02-03-2006	EP 1791888 A1 KR 20070053277 A	06-06-2007 23-05-2007
