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(54) Title: FUNCTIONALIZED INITIATORS FOR ANIONIC POLYMERIZATION, PROTECTED FUNCTIONALIZED POLYMERS, DEPROTECTED ANALOGUES THEREOF, AND METHODS OF MAKING THE SAME

(57) Abstract: The present invention provides functionalized electrophiles, their analogous initiators, and processes for preparing these compounds. The present invention also relates to homotelechelic, heterotelechelic, and radial functional polydiene polymers, polyarylene polymers and polydiene/polyarylene copolymers, their optionally hydrogenated analogues, their optionally deprotected analogues, and processes for preparing these functionalized polymers.

INTERNATIONAL SEARCH REPORT

Int onal Application No
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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C08F4/46 C08F4/48 C08F12/08 C08C19/44 C07F1/02

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)

IPC 7 C07F C08C 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)

CHEM ABS Data, 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	EP 1 057 808 A (MITSUI CHEMICALS, INC., JAPAN) 6 December 2000 (2000-12-06) page 191, paragraph 74 -page 197, line 35; claim 17	1,3-6
X	HUANG, JUI-WEN ET AL: "Magnesium bromide promoted Barbier-type intramolecular cyclization of halo-substituted acetals, ketals, and ortho esters" TETRAHEDRON LETTERS (1999), 40(49), 8647-8650, XP002213722 example 6; table 1	1,3-6

Further documents are listed in the continuation of box C.

Patent family members are listed in 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.
- *Z* document member of the same patent family

Date of the actual completion of the international search

21 October 2002

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CHEN, LING-CHING ET AL: "De(monothio)acetalization induced by hypervalent iodine and sodium iodide" ORGANIC PREPARATIONS AND PROCEDURES INTERNATIONAL (1999), 31(5), 562-564, XP001105178 example F; table 1 ---	1,3,5,6
P,X	CABRERA, G. ET AL: "Triisobutylaluminum (TIBA) as a reagent to convert 2,2-dimethoxyalkanes to 2-methoxy-1-alkenes" TETRAHEDRON LETTERS (2001), 42(34), 5867-5869, XP002213723 table 1, compounds 10, 11 ---	1,2,4,5, 7
X	IRIE, OSAMU ET AL: "Further Studies on Total Synthesis of Sarain A. Efforts Toward Annulation of the Macrocyclic Rings" JOURNAL OF ORGANIC CHEMISTRY (1999), 64(2), 587-595, XP002213724 scheme 5, compound 33 ---	1,2,4,5, 7
X	ROWLEY, MICHAEL ET AL: "4-Heterocyclylpiperidines as Selective High-Affinity Ligands at the Human Dopamine D4 Receptor" JOURNAL OF MEDICINAL CHEMISTRY (1997), 40(15), 2374-2385, XP002213725 scheme 6, compound 55 ---	1,2,4,5, 7
P,X	IWABUCHI, YOSHIHARU ET AL: "An enantio- and stereocontrolled synthesis of (-)-mycestericin E via cinchona alkaloid-catalyzed asymmetric Baylis-Hillman reaction" CHEMICAL COMMUNICATIONS (CAMBRIDGE, UNITED KINGDOM) (2001), (19), 2030-2031, XP002213726 scheme 1 page 2030, column 1, paragraph 2 ---	1,3,5,6, 9,10, 12-14
X	NODA, YOSHIHIRO ET AL: "Synthesis of both enantiomers of four different macrocyclic lactones" HETEROCYCLES (1998), 48(1), 5-10, XP001093769 * see compounds 8a-8d * page 7 ---	1,3,5,7

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	BORER; TAYLOR: SYNLETT, 1990, pages 601-602, XP002213728 cited in the application * see compound 3 *	9,10,12, 13,15-17
P,X	FENG, XIANGDONG ET AL: "An efficient synthesis of highly functionalized asymmetric porphyrins wit organolithium reagents" JOURNAL OF THE CHEMICAL SOCIETY, PERKIN TRANSACTIONS 1 (2001), (9), 1030-1038, XP002213729 * see scheme 1, compound 12 *	9,11-14
X	US 5 340 881 A (KENNEDY JOSEPH P ET AL) 23 August 1994 (1994-08-23) column 8 -column 9	24-26
X	DATABASE WPI Section Ch, Week 199227 Derwent Publications Ltd., London, GB; Class A14, AN 1992-223490 XP002213730 & JP 04 149207 A (NIPPON SHOKUBAI), 22 May 1992 (1992-05-22) * abstract *	24-26
X	US 4 473 686 A (GRIGO ULRICH ET AL) 25 September 1984 (1984-09-25) column 1, line 52 -column 2, line 26; claims 1,3	24-26
X	WO 00 32645 A (SHELL INT RESEARCH) 8 June 2000 (2000-06-08) example 2	24-26
Y	WO 98 02465 A (SCHWINDEMAN JAMES A ;QUIRK RODERIC P (US); KAMIENSKI CONRAD W (US)) 22 January 1998 (1998-01-22) the whole document	1-40
Y	WO 97 06192 A (FMC CORP) 20 February 1997 (1997-02-20) the whole document	1-40

INTERNATIONAL SEARCH REPORT

international application No.
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Box I Observations where certain claims were found unsearchable (Continuation of item 1 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:
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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

- 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

Continuation of Box I.2

Present claim 1 relates to an extremely large number of possible compounds. Support within the meaning of Article 6 PCT and disclosure within the meaning of Article 5 PCT is to be found, however, for only a very small proportion of the compounds claimed. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Consequently, the search has been carried out for those parts of the claims which appear to be supported and disclosed, namely those parts relating to the compounds wherein Z is an unsubstituted straight chain hydrocarbon connecting group.

The applicant's attention is drawn to the fact that claims, or parts of 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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/02963

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