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Published:

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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

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7 April 2005

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: POLYIMIDE BASED ELECTROLYTE AND IMPROVED BATTERIES THEREFROM

(57) Abstract: A battery includes an anode, a cathode, and a polymer matrix electrolyte (PME) separator disposed between the anode and the cathode. The PME separator includes a polyimide, at least one lithium salt in a concentration of at least 0.5 moles of lithium per mole of imide ring provided by the polyimide, and at least one solvent intermixed. The PME is generally homogeneous as evidenced by its high level of optically clarity. The battery can be a lithium ion or lithium metal battery.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/13009

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H01M 6/18

US CL : 429/314, 317, 339, 291.95, 231.1, 231.2, 231.3

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)

U.S. : 429/314, 317, 339, 291.95, 231.1, 231.2, 231.3

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)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 7-320780 A (YAMAZAKI et al.) 08 December 1995 (08.12.1995), [0009], [0011], [0015] and [0027].	1-19, 21-23, 27-28, 30-37



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 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

02 February 2005 (02.02.2005)

Date of mailing of the international search report

11 FEB 2005

Name and mailing address of the ISA/US

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/13009

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:

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.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/13009

Continuation of B. FIELDS SEARCHED Item 3:

EAST

search terms: polyimide, polymer matrix electrolyte, PME, imide ring, lithium, N-methylpyrrolidinone, NMP, diethylacetamide (DMAC), dimethyl formamide, DMF, ionic conductivity, absorption peaks