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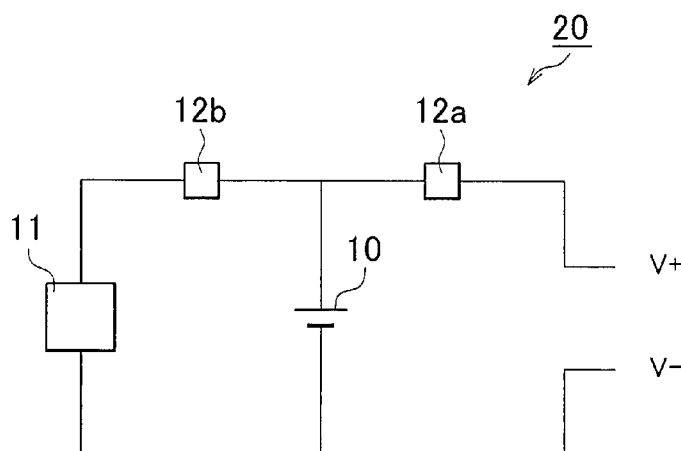
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[Continued on next page]

(54) Title: SOLID SECONDARY BATTERY SYSTEM AND MANUFACTURING METHOD OF RECOVERABLE SOLID SECONDARY BATTERY

FIG. 2



(57) Abstract: The invention provides a solid secondary battery system including a solid secondary battery having a cathode active material layer, an anode active material layer, and a solid electrolyte layer formed between the cathode active material layer and the anode active material layer, and an overdischarge processing unit for discharging the solid secondary battery until a SOC of the solid secondary battery becomes less than 0%.

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INTERNATIONAL SEARCH REPORT

International application No PCT/IB2012/001006
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A. CLASSIFICATION OF SUBJECT MATTER INV. H01M10/44 H01M10/0562 H01M10/0525 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) H01M				
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, 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	JP 2010 225582 A (IDEMITSU KOSAN CO) 7 October 2010 (2010-10-07)	1,3-5		
Y	paragraphs [0013] - [0022], [0026] - [0028], [0033], [0034], [0063] abstract figure 3	6,7		
X	----- JP 2010 225581 A (IDEMITSU KOSAN CO) 7 October 2010 (2010-10-07) paragraphs [0022] - [0029], [0033] - [0034], [0063] abstract figure 3 ----- -/--	1,3-5		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents : <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> "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 </td> <td style="width: 50%; border: none; vertical-align: top;"> "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 </td> </tr> </table>			"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
"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	Date of mailing of the international search report			
12 September 2012	04/01/2013			
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 Mercedes González			

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2012/001006

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 59 073851 A (SANYO ELECTRIC CO) 26 April 1984 (1984-04-26) abstract pages 253-254 figures 1,2	6
Y	----- WO 2009/101506 A1 (TOYOTA MOTOR CO LTD [JP]; NAT INST FOR MATERIALS SCIENCE [JP]; TSUCHID) 20 August 2009 (2009-08-20) paragraphs [0058] - [0060] -----	7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2012/001006

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.: 2
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 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.:

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.:
1, 3-7

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, 3-7

Solid secondary battery system and discharging method of said solid secondary battery system

2. claims: 8-13

Manufacturing method of a recoverable solid secondary battery

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 2

Present claim 2 relates to a product defined (inter alia) by reference to the following unusual parameter: Ep V, when Ep V denotes a cathode potential before a cathode active material contained in the cathode active material layer emits metal ions. The use of this unusual parameter in the present context is considered to lead to a lack of clarity because the claim does not clearly identify the product encompassed by it as the parameter cannot be clearly and reliably determined by indications in the description or by objective procedures which are usual in the art. This makes it impossible to compare the claim to the prior art. As a result, the application does not comply with the requirement of clarity under Article 6 PCT. Moreover, the wording of said claim "cathode potential before a cathode active material contained in the cathode active material layer emits metal ions" attempts to define the subject-matter in terms of the result to be achieved, which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result. The lack of clarity is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search of claim 2.

The applicant's attention is drawn to the fact that 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. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IB2012/001006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 2010225582	A	07-10-2010	NONE	

JP 2010225581	A	07-10-2010	NONE	

JP 59073851	A	26-04-1984	JP 1940995 C	23-06-1995
			JP 6070905 B	07-09-1994
			JP 59073851 A	26-04-1984

WO 2009101506	A1	20-08-2009	JP 2009193803 A	27-08-2009
			WO 2009101506 A1	20-08-2009
