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Declarations under Rule 4.17:

[Continued on next page]

(54) Title: IRON-AIR RECHARGEABLE BATTERY

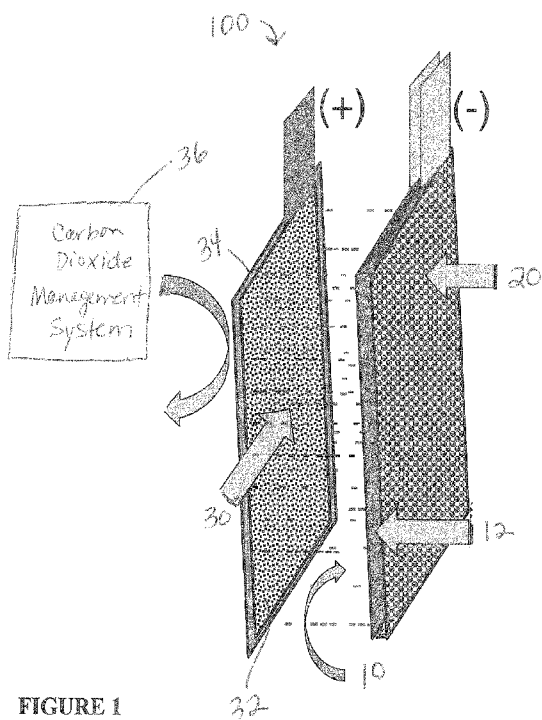


FIGURE 1

(57) Abstract: Embodiments include an iron-air rechargeable battery having a composite electrode including an iron electrode and a hydrogen electrode integrated therewith. An air electrode is spaced from the iron electrode and an electrolyte is provided in contact with the air electrode and the iron electrodes. Various additives and catalysts are disclosed with respect to the iron electrode, air electrode, and electrolyte for increasing battery efficiency and cycle life.



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- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
 - *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
 - *of inventorship (Rule 4.17(iv))*
- *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))*
- (88) Date of publication of the international search report:**
26 April 2012

Published:

- *with international search report (Art. 21(3))*

A. CLASSIFICATION OF SUBJECT MATTER**H01M 12/06(2006.01)i**

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 12/06; H01M 2/16; H01M 4/42; H01M 4/96; H01M 4/46; H01M 8/10; H01M 2/14; H01M 4/86; H01M 4/58; H01M 4/88

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords:air, battery, iron, hydrogen electrode, catalyst layer

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 7695840 B2 (BARTLING BRANDON A.) 13 April 2010 See column 8, line 50 - column 9, line 5 and claim 17	20, 25-27 1-19, 21-24, 28-30
A	US 2007-0077491 A1 (TRYGVE BURCHARDT) 05 April 2007 See paragraphs [0060]-[0071]	1-30
A	US 2005-0271932 A1 (KUEI WANG CHEN) 08 December 2005 See paragraphs [0016]-[0031]	1-30
A	US 6899971 B2 (AKIRA HAMADA et al.) 31 May 2005 See column 2, line 32 - column 3, line 13	1-30
A	US 2003-0054208 A1 (KLAUS HEINRICH OEHR et al.) 20 March 2003 See paragraphs [0014]-[0019]	1-30
A	US 2005-0112451 A1 (SEOL-AH LEE et al.) 26 May 2005 See claim 15	1-30

 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 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

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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:

Claims 1-19 and 28-30 are directed to an iron-air rechargeable battery or a method therefor comprising a composite electrode including an iron electrode and a hydrogen electrode integrated therewith.

Claims 20-27 are directed to an iron-air rechargeable battery comprising an air electrode including a thin film nano structured catalyst layer.

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 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

Information on patent family members

International application No.

PCT/US2011/045030

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