Abstract: The present invention provides membrane cassettes and stacks thereof which are suitable for a use in a variety of electrochemical applications. The invention further provides membrane cassettes which comprise one or more bipolar plates which have one or two reactant or coolant flow fields consisting of at least one groove in opposing surfaces of the bipolar plate. In certain preferred embodiments, the invention provides cassettes and stacks which are suitable for use in fuel cell applications. Particularly preferred embodiments of the invention include design improvements which enhance the performance and reliability of certain components of the fuel cell stack.
# INTERNATIONAL SEARCH REPORT

## A. CLASSIFICATION OF SUBJECT MATTER

| IPC: | HOIM 8/04(2006.01), 8/02(2006.01) |

**USPC:** 429/36,39,32

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. 429/36,39,32,

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)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US2003/0096153 A1 (OSENAR et al.) 22 May 2003 (22.05.2003) see entire document.</td>
<td>1-47</td>
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</table>

- **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

- **+** 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

- **Date of the actual completion of the international search:** 22 January 2007 (22.01.2007)
- **Date of mailing of the international search report:** 16 FEB 2007

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