## (19) World Intellectual Property Organization International Bureau





(43) International Publication Date 22 February 2001 (22.02.2001)

PCT

# (10) International Publication Number WO 01/13449 A3

- (51) International Patent Classification<sup>7</sup>: H01M 8/02
- (21) International Application Number: PCT/US00/22418
- (22) International Filing Date: 16 August 2000 (16.08.2000)
- (25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

09/375,072

16 August 1999 (16.08.1999) U

- (71) Applicant: ALLIEDSIGNAL INC. [US/US]; 101 Columbia Avenue, P.O. Box 2245, Morristown, NJ 07960 (US).
- (72) Inventors: YANG, Jefferson; 7217 Dapple Circle, Orange, CA 92869 (US). REHG, Timothy; 26756 Basswood Avenue, Rancho Palos Verdes, CA 90275 (US).
- (74) Agents: CRISS, Roger, H. et al.; AlliedSignal Inc., 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960 (US).

- (81) Designated States (national): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

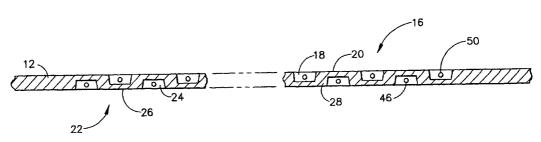
#### Published:

- With international search report.
- (88) Date of publication of the international search report: 25 May 2001

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: FUEL CELL AND BIPOLAR PLATE FOR USE WITH SAME

11/13449 A3



(57) Abstract: A fuel cell bipolar plate (12) including a fuel side (22) having a series of fuel channels (24) defining respective fuel paths and an oxidant side (16) having a series of oxidant channels (18) defining respective oxidant paths. At least some of the fuel channels (24) are offset from adjacent oxidant channels (18) in a direction transverse to the fuel and oxidant paths.

## INTERNATIONAL SEARCH REPORT

Into ional Application No PCT/US 00/22418

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H01M8/02

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 - 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 practical, search terms used)

EPO-Internal, PAJ

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	
Х	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 11, 29 November 1996 (1996-11-29) -& JP 08 180883 A (FUJI ELECTRIC CO LTD), 12 July 1996 (1996-07-12)	1-8	
Y	abstract	7	
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 05, 30 May 1997 (1997-05-30) -& JP 09 022708 A (FUJI ELECTRIC CO LTD), 21 January 1997 (1997-01-21)	1-8	
Y	abstract; figures 1-4  -/	7	

Further documents are listed in the continuation of box C.	Y 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	<ul> <li>"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</li> <li>"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</li> <li>"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.</li> <li>"&amp;" document member of the same patent family</li> </ul>
Date of the actual completion of the international search  9 February 2001	Date of mailing of the international search report  16/02/2001
Name and mailing address of the ISA  European Patent Office, P.B. 5818 Patentlaan 2  NL – 2280 HV Rijswijk  Tel. (+31–70) 340–2040, Tx. 31 651 epo nl,  Fax: (+31–70) 340–3016	Authorized officer  D'hondt, J

4

### INTERNATIONAL SEARCH REPORT

Intrictional Application No PCT/US 00/22418

Category °	ation) DOCUMENTS CONSIDERED TO BE RELEVANT  Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Ontainon of document, with indication, where appropriate, of the relevant passages	
Y	PATENT ABSTRACTS OF JAPAN vol. 012, no. 273 (E-639), 29 July 1988 (1988-07-29) -& JP 63 053858 A (ISHIKAWAJIMA HARIMA HEAVY IND CO LTD), 8 March 1988 (1988-03-08) abstract; figures 3-5	7
X	US 3 589 942 A (FLEMING DONALD K ET AL) 29 June 1971 (1971-06-29) column 3, line 49 - line 61; claim 1; figures 3-6 column 3, line 14 - line 17	1-5,8
X	PATENT ABSTRACTS OF JAPAN vol. 012, no. 099 (E-594), 31 March 1988 (1988-03-31) -& JP 62 229765 A (SHIN KOBE ELECTRIC MACH CO LTD), 8 October 1987 (1987-10-08) abstract	1-6,8
X	PATENT ABSTRACTS OF JAPAN vol. 010, no. 317 (E-449), 28 October 1986 (1986-10-28) -& JP 61 128469 A (HITACHI LTD), 16 June 1986 (1986-06-16) abstract	1-8
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 14, 31 December 1998 (1998-12-31) -& JP 10 241709 A (AISIN TAKAOKA LTD), 11 September 1998 (1998-09-11) abstract	1-7
X	WO 97 50139 A (DU PONT) 31 December 1997 (1997-12-31) page 7, line 11 - line 32	1,6
P,X	DE 199 10 487 C (FREUDENBERG CARL FA) 15 June 2000 (2000-06-15) column 1, line 5 - line 8 column 3, line 56 - line 57; figures 1,2	1-5
Ρ,Χ	EP 0 975 039 A (MATSUSHITA ELECTRIC IND CO LTD) 26 January 2000 (2000-01-26) column 5, line 27 - line 42; figures 1,2 column 4, line 50 - line 54	1-6
Ε.	DE 100 03 682 A (AISIN TAKAOKA LTD ;AISIN SEIKI (JP)) 31 August 2000 (2000-08-31) column 3, line 50 -column 4, line 30; figures 1-3,5,6	1-7

#### INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. ional Application No PCT/US 00/22418

Patent document cited in search report	rt	Publication date	Patent family member(s)	Publication date
JP 08180883	Α	12-07-1996	NONE	
JP 09022708	Α	21-01-1997	NONE	
JP 63053858	Α	08-03-1988	JP 2086616 C JP 8004008 B	02-09-1996 17-01-1996
US 3589942	Α	29-06-1971	NONE	
JP 62229765	Α	08-10-1987	NONE	
JP 61128469	Α	16-06-1986	NONE	
JP 10241709	Α	11-09-1998	NONE	
WO 9750139	Α	31-12-1997	CA 2259196 A EP 0909465 A JP 10074527 A	31-12-1997 21-04-1999 17-03-1998
DE 19910487	С	15-06-2000	EP 1035607 A	13-09-2000
EP 0975039	Α	26-01-2000	JP 2000100454 A	07-04-2000
DE 10003682	Α	31-08-2000	JP 2000223137 A	11-08-2000