

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
4 October 2001 (04.10.2001)

PCT

(10) International Publication Number
WO 01/073865 A3

(51) International Patent Classification⁷: H01M 10/36, 10/46, H01L 31/18, H01M 6/18

(21) International Application Number: PCT/US01/09438

(22) International Filing Date: 23 March 2001 (23.03.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/191,774 24 March 2000 (24.03.2000) US
60/225,134 14 August 2000 (14.08.2000) US
60/238,673 6 October 2000 (06.10.2000) US

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, 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, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, 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, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

(71) Applicant (*for all designated States except US*): CYMBET CORPORATION [US/US]; 18326 Joplin St. NW, Elk River, MN 55330 (US).

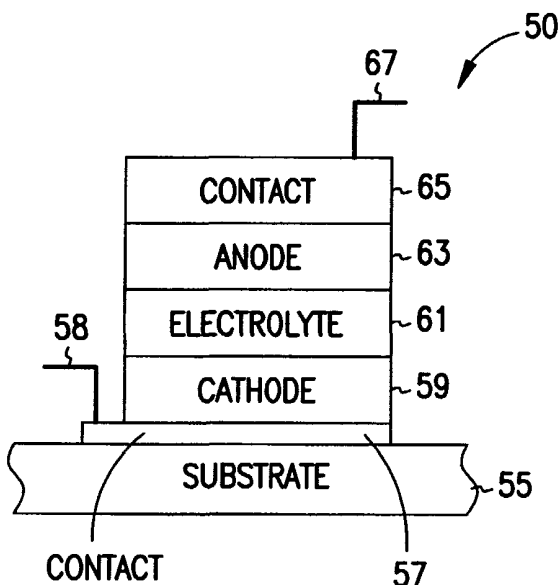
(88) Date of publication of the international search report:
25 July 2002

(71) Applicant and
(72) Inventor: JENSON, Mark, Lynn [US/US]; 33311 Dolphin Street N.W., Princeton, MN 55371 (US).

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.

(74) Agent: MCCRACKIN, Ann, M.; Schwegman, Lundberg, Woessner & Kluth, P.O. Box 2938, Minneapolis, MN 55402 (US).

(54) Title: CONTINUOUS PROCESSING OF THIN-FILM BATTERIES AND LIKE DEVICES



(57) Abstract: A system for making a thin-film device includes a substrate-supply station that supplies a substrate having a major surface area. The substrate has a first layer on a first surface area of the substrate's major surface area. Also included is a device for depositing a second layer onto the first layer, wherein the device supplies energy to the second layer to aid in layer formation without substantially heating the substrate.



WO 01/073865 A3

INTERNATIONAL SEARCH REPORT

national Application No
PCT/US 01/09438

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H01M10/36 H01M10/46 H01L31/18 H01M6/18
 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, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 318 127 A (GEN VACUUM EQUIP LTD) 15 April 1998 (1998-04-15)	1, 4, 5, 7, 9, 11, 13-15, 17, 19, 21-23, 25, 29
Y	page 5, line 14 -page 7, line 6 page 8, line 9 -page 14, line 5; claims 1, 12-31	2, 3
Y	--- US 4 740 431 A (LITTLE ROGER G) 26 April 1988 (1988-04-26) column 3, line 18 -column 6, line 44; claims 1-7	2, 3
X	--- US 5 189 550 A (ARNTZ FLOYD O ET AL) 23 February 1993 (1993-02-23) the whole document	1
	--- -/--	

Further documents are listed in the continuation of box C. 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
- *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.
- *G* document member of the same patent family

Date of the actual completion of the international search 15 April 2002	Date of mailing of the international search report 22/04/2002
---	---

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 De Vos, L
--	--

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/09438

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 051 274 A (ARNTZ FLOYD O ET AL) 24 September 1991 (1991-09-24) the whole document ---	1
X	PATENT ABSTRACTS OF JAPAN vol. 018, no. 306 (P-1752), 10 June 1994 (1994-06-10) & JP 06 067018 A (TOKAI RUBBER IND LTD), 11 March 1994 (1994-03-11) abstract ---	1,11
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 12, 25 December 1997 (1997-12-25) & JP 09 211204 A (TOYO METALLIZING CO LTD), 15 August 1997 (1997-08-15) abstract ---	1,4,5,9, 11
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 06, 30 June 1997 (1997-06-30) & JP 09 035233 A (KAO CORP), 7 February 1997 (1997-02-07) abstract ---	1,4,5,9, 11,14, 15,19, 21-23
P,X	US 6 094 292 A (GEROUKI ALEXANDRA ET AL) 25 July 2000 (2000-07-25) column 16, line 50 -column 22, line 14; claims 1-8,20-23 ---	1
P,X	VEREDA F ET AL: "A study of electronic shorting in IBDA-deposited Lipon films" JOURNAL OF POWER SOURCES, ELSEVIER SEQUOIA S.A. LAUSANNE, CH, vol. 89, no. 2, August 2000 (2000-08), pages 201-205, XP004201951 ISSN: 0378-7753 page 201, column 1, paragraph 1 -page 202, column 1, paragraph 3 ---	1
A	WO 97 39491 A (UNIV JOHNS HOPKINS) 23 October 1997 (1997-10-23) page 2, line 28 -page 4, line 8 page 5, line 4 -page 7, line 14; claims 1-22 ---	2,3
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 01, 31 January 1997 (1997-01-31) & JP 08 236105 A (NISSIN ELECTRIC CO LTD), 13 September 1996 (1996-09-13) abstract ---	1,6
	-/--	

INTERNATIONAL SEARCH REPORT

International Application No

P/US 01/09438

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 411 592 A (OVSHINSKY STANFORD R ET AL) 2 May 1995 (1995-05-02) column 7, line 65 -column 8, line 3 column 10, line 31 -column 13, line 32; claims 1-15 -----	1-31
A	US 5 763 058 A (ISEN IRVIN ET AL) 9 June 1998 (1998-06-09) column 7, line 30 -column 12, line 3; claims 1-31 -----	1-31

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Present claims 1-31, with several sets of independent claims and complex interdependence between the claims in each set, relate to an extremely large number of possible methods of making "thin-film devices" and "systems" for making these devices. Support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT is to be found, however, for only a very small proportion of the methods and systems claimed. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Consequently, the search has been carried out for those parts of the claims which appear to be supported and disclosed, namely those parts relating to the methods and systems for making thin-film devices, especially batteries or capacitors, comprising the deposition of a first layer on a substrate, preferably a flexible material supplied from a roll, followed by deposition of a second layer "energized" during deposition without heating the said substrate, especially by supplying ions of at least 5eV during said deposition.

The applicant's attention is drawn to the fact that claims, or parts of 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.

INTERNATIONAL SEARCH REPORT

national Application No
PCT/US 01/09438

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2318127	A	15-04-1998	NONE	
US 4740431	A	26-04-1988	NONE	
US 5189550	A	23-02-1993	US 5051274 A	24-09-1991
US 5051274	A	24-09-1991	US 5189550 A	23-02-1993
JP 06067018	A	11-03-1994	NONE	
JP 09211204	A	15-08-1997	NONE	
JP 09035233	A	07-02-1997	NONE	
US 6094292	A	25-07-2000	NONE	
WO 9739491	A	23-10-1997	US 5644207 A CA 2260789 A1 EP 0948829 A1 SG 49360 A1 WO 9739491 A1	01-07-1997 23-10-1997 13-10-1999 18-05-1998 23-10-1997
JP 08236105	A	13-09-1996	NONE	
US 5411592	A	02-05-1995	AU 684192 B2 AU 2814895 A CA 2190856 A1 EP 0764221 A1 WO 9533863 A1	04-12-1997 04-01-1996 14-12-1995 26-03-1997 14-12-1995
US 5763058	A	09-06-1998	US 5758575 A CA 2224236 A1 DE 857348 T1 EP 0857348 A1 US 6010771 A WO 9714157 A1 CA 2224147 A1 WO 9640522 A1 US 5622652 A	02-06-1998 17-04-1997 06-05-1999 12-08-1998 04-01-2000 17-04-1997 19-12-1996 19-12-1996 22-04-1997