

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
25 November 2004 (25.11.2004)

PCT

(10) International Publication Number  
**WO 2004/101852 A3**

- (51) International Patent Classification<sup>7</sup>: **C25B 11/04**, (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, 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, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (21) International Application Number: PCT/US2004/014357
- (22) International Filing Date: 7 May 2004 (07.05.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/486,445 7 May 2003 (07.05.2003) US
- (71) Applicant (for all designated States except US): **ELTECH SYSTEMS CORPORATION** [US/US]; 100 Seventh Avenue, Suite 300, Chardon, OH 44024 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **CARLSON, Richard, C.** [US/US]; 51 216th Street, Euclid, OH 44123 (US). **DIFRAMCO, Dino** [US/US]; 553 Zorn Lane, Mayfield Village, OH 44143 (US). **MOATS, Michael, S.** [US/US]; 1604 Clipper Court, Painseville, OH 44077 (US). **HARDEE, Kenneth, L.** [US/US]; 15818 Georgia Road, Middlefield, OH 44062 (US).
- (74) Agents: **TYRPAK, Michele, M.** et al.; Renner, Otto, Boisselle & Sklar, LLP, 1621 Euclid Avenue, 19th Floor, Cleveland, OH 44115-2191 (US).
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report
- (88) Date of publication of the international search report: 24 March 2005
- 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.



WO 2004/101852 A3

(54) Title: SMOOTH SURFACE MORPHOLOGY ANODE COATINGS

(57) Abstract: The present invention relates to an electrocatalytic coating and an electrode having the coating thereon, wherein the coating is a mixed metal oxide coating, preferably ruthenium, titanium and tin or antimony oxides. The coating uses water as a solvent that provides for a smoother surface than alcohol based solvents. The electrocatalytic coating can be used especially as an anode component of an electrolysis cell and in particular a cell for the electrolysis of aqueous chlor-alkali solutions.

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/014357

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 C25B11/04 C23C18/42

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 C25B C23C

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, 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	US 2002/148736 A1 (GEUSIC MARK J ET AL) 17 October 2002 (2002-10-17)  paragraphs '0025! - '0031! example 1  -----	1-6, 9, 13-21, 24, 28, 29
X	US 4 318 795 A (BIANCHI GIUSEPPE ET AL) 9 March 1982 (1982-03-09)  examples 7, 8  -----	1-5, 7-9, 12-14, 16-20, 22-24, 27, 28
A	US 6 527 924 B1 (ANDOLFATTO FRANCOISE ET AL) 4 March 2003 (2003-03-04)  column 1, line 65 - column 3, line 2  -----  -/--	1-4, 12-14, 16-19, 27, 28

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.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

22 October 2004

Date of mailing of the international search report

02/11/2004

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  
  
Desbois, V

# INTERNATIONAL SEARCH REPORT

International Application No  
US2004/014357

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 4 189 358 A (BORNER WILLIAM G ET AL) 19 February 1980 (1980-02-19)  examples 4,5 -----	1-4, 12-19, 27-29
A	US 4 005 004 A (SEKO MAOMI ET AL) 25 January 1977 (1977-01-25) column 3, line 35 - line 50 example 1 -----	12,27
A	PATENT ABSTRACTS OF JAPAN vol. 010, no. 214 (C-362), 25 July 1986 (1986-07-25) & JP 61 052385 A (TDK CORP), 15 March 1986 (1986-03-15) abstract -----	1-29

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

.../US2004/014357

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 2002148736	A1	17-10-2002	BR 0206957 A	09-03-2004
			CA 2437457 A1	15-08-2002
			EP 1360345 A2	12-11-2003
			NO 20033469 A	03-10-2003
			WO 02063068 A2	15-08-2002
US 4318795	A	09-03-1982	US 3948751 A	06-04-1976
			BE 725491 A	13-06-1969
			BE 725492 A	13-06-1969
			CA 962228 A1	04-02-1975
			CA 925045 A1	24-04-1973
			CS 222661 B2	29-07-1983
			DE 1814567 A1	14-08-1969
			DE 1814576 A1	26-11-1970
			DE 1818035 B1	16-08-1979
			DE 1818051 C2	27-11-1986
			DK 148660 B	26-08-1985
			ES 361436 A1	16-11-1970
			ES 366987 A1	16-05-1972
			ES 366988 A1	16-06-1971
			FR 1595024 A	08-06-1970
			FR 1597806 A	29-06-1970
			GB 1231280 A	12-05-1971
			GB 1235570 A	16-06-1971
			IL 31129 A	30-03-1973
			IL 31209 A	30-08-1972
			NL 6817957 A ,B,	17-06-1969
			NL 6817966 A	17-06-1969
			NL 7908873 A ,C	31-03-1980
			NO 138664 B	10-07-1978
			PH 12129 A	07-11-1978
			PH 12145 A	07-11-1978
			PL 80632 B1	30-08-1975
			SE 411674 B	28-01-1980
			SE 7902439 A	19-03-1979
			SU 976838 A3	23-11-1982
US 3846273 A	05-11-1974			
US 3810770 A	14-05-1974			
US 3616445 A	26-10-1971			
US 4003817 A	18-01-1977			
YU 292668 A ,B	30-06-1976			
YU 294568 A ,B	31-12-1976			
SE 432448 B	02-04-1984			
US 4070504 A	24-01-1978			
US 6527924	B1	04-03-2003	FR 2797646 A1	23-02-2001
			AU 7014300 A	19-03-2001
			CA 2347728 A1	01-03-2001
			CN 1348510 T	08-05-2002
			EP 1125005 A1	22-08-2001
			WO 0114615 A1	01-03-2001
			JP 2003507580 T	25-02-2003
			NO 20011931 A	28-05-2001
			US 4189358	A
AU 4873379 A	17-01-1980			
CA 1129805 A1	17-08-1982			
CA 1157811 A2	29-11-1983			

# INTERNATIONAL SEARCH REPORT

Information on patent family members

national Application No

PCT/US2004/014357

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 4189358	A	DE 2964533 D1	24-02-1983	
		EP 0007239 A2	23-01-1980	
		EP 0029272 A2	27-05-1981	
		EP 0047566 A2	17-03-1982	
		FI 792211 A ,B,	15-01-1980	
		JP 1416523 C	22-12-1987	
		JP 55058387 A	01-05-1980	
		JP 62023078 B	21-05-1987	
		NO 792299 A ,B,	15-01-1980	
US 4005004	A	25-01-1977	JP 51037877 A	30-03-1976
			JP 52020440 B	03-06-1977
			DE 2543033 A1	15-04-1976
			FR 2286209 A1	23-04-1976
			GB 1481767 A	03-08-1977
JP 61052385	A	15-03-1986	JP 6033489 B	02-05-1994