(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
28 June 2012 (28.06.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/087816 A3

(51) International Patent Classification:
A61N 1/362 (2006.01) *A61M 1/10* (2006.01)
A61N 1/05 (2006.01)

(21) International Application Number:
PCT/US2011/065463

(22) International Filing Date:
16 December 2011 (16.12.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/425,162 20 December 2010 (20.12.2010) US

(71) Applicant *(for all designated States except US)*: **ABIOMED, INC.** [US/US]; 22 Cherry Hill Drive, Danvers, MA 01923 (US).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **D'AMBROSIO, Ralph, L.** [US/US]; 11 Woodside Lane, Wenham, MA 01984 (US).

(74) Agents: **ENGELLENNER, Thomas J.** et al.; Nutter Mclennen & Fish LLP, Seaport West, 155 Seaport Boulevard, Boston, MA 02210-2604 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR ACCURATELY TRACKING AVAILABLE CHARGE IN A TRANSCUTANEOUS ENERGY TRANSFER SYSTEM

(57) Abstract: Improved devices and methods for tracking power consumption and available charge in a transcutaneous energy transfer (TET) system are provided. The method includes measuring the available charge in a battery and the current rate of power consumption in an implanted medical device, determining the remaining time before the charge level of the battery reaches a predetermined threshold level, and communicating the remaining time to a user.

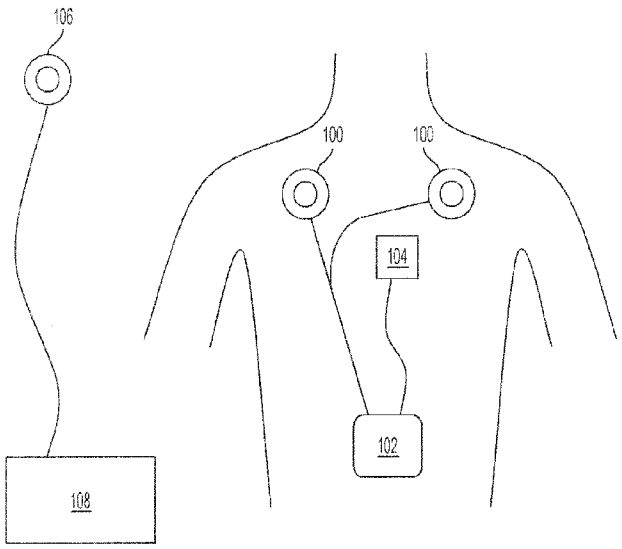

FIG. 1

WO 2012/087816 A3

WO 2012/087816 A3

Published:

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

(88) Date of publication of the international search report:
22 November 2012

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/065463

A. CLASSIFICATION OF SUBJECT MATTER

A61N 1/362(2006.01)i, A61N 1/05(2006.01)i, A61M 1/10(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)
A61N 1/362; A61N 1/378; G01R 31/28; A61M 37/00; A61N 1/08; G01R 31/36

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: battery, charge remaining time, transcutaneous energy transfer system, implantable device, and threshold level

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008-0312852 A1 (HANNS-INGO MAACK) 18 December 2008 See abstract; paragraphs 22-26; claims 1,12; figs. 1-2.	1-11
A	US 2006-0107148 A1 (ALEC GINGGEN et al.) 18 May 2006 See abstract; paragraphs 22-32; claims 1,9; figs. 1-2.	1-11
A	US 2002-0016568 A1 (RONALD J. LEBEL et al.) 07 February 2002 See abstract; paragraphs 389-391.	1-11
A	US 2005-0288739 A1 (WILLIAM L. HASSLER JR. et al.) 29 December 2005 See abstract; paragraphs 35-39; claims 6,9; fig. 1.	1-11
A	US 2006-0247737 A1 (DAVID P. OLSON et al.) 02 November 2006 See abstract; paragraphs 61-66; claims 1,9; figs. 1-2.	1-11

☐ 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	Date of mailing of the international search report
21 AUGUST 2012 (21.08.2012)	**22 AUGUST 2012 (22.08.2012)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
BYUN, SUNG CHEAL
Telephone No. 82-42-481-8262

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/065463

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0312852 A1	18.12.2008	CN 101052889 A0	10.10.2007
		EP 1828794 A1	05.09.2007
		JP 2008-518711 A	05.06.2008
		US 7805263 B2	28.09.2010
		WO 2006-048838 A1	11.05.2006
US 2006-0107148 A1	18.05.2006	AT 422917 T	15.03.2009
		AT 464082 T	15.04.2010
		AU 2005-225136 A1	18.05.2006
		AU 2005-225136 B2	09.06.2011
		CA 2524877 A1	29.04.2006
		DE 602005012772 D1	02.04.2009
		DE 602005020698 D1	27.05.2010
		EP 1652542 A1	03.05.2006
		EP 1652542 B1	18.02.2009
		EP 1911477 A2	16.04.2008
		EP 1911477 A3	23.04.2008
		EP 1911477 B1	14.04.2010
		US 7437644 B2	14.10.2008
US 2002-0016568 A1	07.02.2002	CA 2396613 A1	02.08.2001
		CA 2396613 C	18.03.2008
		CA 2396749 A1	26.07.2001
		CA 2396749 C	19.07.2011
		EP 1248660 A2	16.10.2002
		EP 1248660 B1	11.04.2012
		EP 1248661 A1	16.10.2002
		JP 04703083 B2	15.06.2011
		JP 04812215 B2	09.11.2011
		JP 2003-520111 A	02.07.2003
		JP 2003-520648 A	08.07.2003
		US 2003-0176933 A1	18.09.2003
		US 2005-0010269 A1	13.01.2005
		US 2011-0125095 A1	26.05.2011
		US 2011-270045 A1	03.11.2011
		US 6974437 B2	13.12.2005
		US 7678071 B2	16.03.2010
		US 7831310 B2	09.11.2010
		WO 01-52935 A1	26.07.2001
		WO 01-54753 A2	02.08.2001
		WO 01-54753 A3	02.08.2001
US 2005-0288739 A1	29.12.2005	AT 474623 T	15.08.2010
		AU 2005-202334 A1	12.01.2006
		BR PI0502535 A	07.02.2006
		CA 2510074 A1	24.12.2005
		CN 1721013 A	18.01.2006
		CN 1721013 C0	18.01.2006
		DE 602005022383 D1	02.09.2010

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/065463

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		EP 1609501 A1	28.12.2005
		EP 1609501 B1	21.07.2010
		JP 0467598 B2	07.09.2011
		JP 2006-006948 A	12.01.2006
		KR 10-2006-0049664 A	19.05.2006
		MX PA05006878 A	11.01.2006
		RU 2005119614 A	27.12.2006
US 2006-0247737 A1	02.11.2006	EP 1904153 A1	02.04.2008
		EP 2243509 A1	27.10.2010
		US 2010-0268305 A1	21.10.2010
		US 2011-301669 A1	08.12.2011
		US 7774069 B2	10.08.2010
		US 8024047 B2	20.09.2011
		WO 2006-118631 A1	09.11.2006