(19) World Intellectual Property Organization International Bureau





(43) International Publication Date 11 July 2002 (11.07.2002)

PCT

(10) International Publication Number WO 02/053025 A3

(51) International Patent Classification⁷: A61B 5/00, 5/026, G01N 21/03

(21) International Application Number: PCT/US01/48562

(22) International Filing Date:

20 December 2001 (20.12.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 09/750,076 29 December 2000 (29.12.2000) US

(71) Applicant: HEMA METRICS, INC. [US/US]; 695 North 900 West, Kaysville, UT 84037 (US).

(72) Inventors: STEUER, Robert, R.; 4157 North 900 West, Pleasant View, UT 84414 (US). BELL, David, A.; 537 East 500 South, Farmington, UT 84025 (US). MILLER, David, R.; 6551 N. Trapper's Loop, Morgan, UT 84050 (US).

(74) Agents: MELSER, Allen, S. et al.; Jacobson Holman, PLLC, The Jenifer Building, 400 Seventh Street, NW, Washington, DC 20004 (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, EC, 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, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

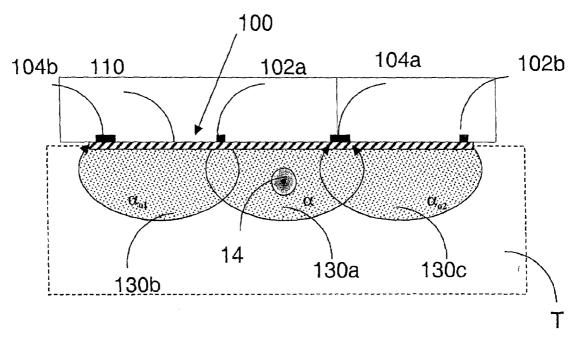
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

with international search report

[Continued on next page]

(54) Title: SENSOR FOR TRANSCUTANEOUS MEASUREMENT OF VASCULAR ACCESS BLOOD FLOW



(57) **Abstract:** An optical sensor includes photoemitter and photodetector elements at multiple spacings (d_1, d_2) for the purpose of measuring the bulk absorptivity (α) of an area immediately surrounding and including a hemodialysis access site, and the absorptivity (α_0) of the tissue itself. At least one photoemitter element and at least one photodetector element are provided, the total number of photoemitter and photodetector elements being at least three. The photoemitter and photodetector elements are collinear and alternatingly arranged, thereby allowing the direct transcutaneous determination of vascular access blood flow.

O 02/053025 A3

WO 02/053025 A3



(88) Date of publication of the international search report: 7 November 2002

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.

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/US 01/48562

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 A6185/00 A618 A61B5/026 G01N21/03 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 A61B G01N A61M 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, WPI Data, PAJ C. DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. P,X US 2001/003793 A1 (BELL DAVID A ET AL) 1-1214 June 2001 (2001-06-14) page 3, left-hand column, line 7 -page 10, right-hand column, line 49; tables 1-36 & US 5 372 136 A 13 December 1994 (1994-12-13) cited in the application WO 99 39631 A (IN LINE DIAGNOSTICS CORP) Α 1,2,10, 12 August 1999 (1999-08-12) abstract page 3, column 19, line 20page 5, line 18 -page 15, line 3 page 23, line 5 -page 26, line 2; tables 1,1B,1C,1D, Further documents are listed in the continuation of box C. X Patent family members are listed in annex. ° Special categories of cited documents: "T" later document published after the international filling date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the "A" document defining the general state of the art which is not considered to be of particular relevance invention *E* earlier document but published on or after the international *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 "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) "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 docu-"O" document referring to an oral disclosure, use, exhibition or ments, such combination being obvious to a person skilled in the art. other means *P* document published prior to the international filing date but later than the priority date claimed "&" document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 15 July 2002 23/07/2002 Name and mailing address of the ISA Authorized officer 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 Weihs, J

INTERNATIONAL SEARCH REPORT

Inte onal Application No PCT/US 01/48562

C.(Continu	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	FC1703 01748302		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	US 5 520 177 A (OGAWA KEIKITSU ET AL) 28 May 1996 (1996-05-28) column 1, line 15 - line 30 column 2, line 6 -column 3, line 29; tables 1-3	8,9		
A	column 2, line 6 -column 3, line 29; tables 1-3 EP 0 928 614 A (FRESENIUS MEDICAL CARE NORTH A) 14 July 1999 (1999-07-14) abstract page 6, line 14 -page 7, line 21; table 1			

INTERNATIONAL SEARCH REPORT

information on patent family members

Inte_ onal Application No PCT/US 01/48562

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 2001003793	A1	14-06-2001	US	6266546 B1	24-07-2001
			US	5803908 A	08-09-1998
			US	5499627 A	19-03-1996
			US	5372136 A	13-12-1994
			US	6181958 B1	30-01-2001
			US	2002038079 A1	28-03-2002
			US	6246894 B1	12-06-2001
			US	2001020122 A1	06-09-2001
			US	5351686 A	04-10-1994
			US	5456253 A	10-10-1995
			US	2001039376 A1	08-11-2001
			ΑU	2660699 A	23-08-1999
			CA	2319480 A1	12-08-1999
			EP	1052930 A1	22-11-2000
			JP	2002501803 T	22-01-2002
			WO	9939631 A1	12-08-1999
WO 9939631	Α	12-08-1999	AU	2660699 A	23-08-1999
			CA	2319480 A1	12-08-1999
			EΡ	1052930 A1	22-11-2000
			JP	2002501803 T	22-01-2002
			WO	9939631 A1	12-08-1999
			US	6181958 B1	30-01-2001
			US	2001003793 A1	14-06-2001
			US	2001039376 A1	08-11-2001
US 5520177	Α	28-05-1996	JP	6327658 A	29-11-1994
EP 0928614	Α	14-07-1999	EP	0928614 A1	14-07-1999
			JP	11262520 A	28-09-1999