



(51) International Patent Classification:
G01J 3/40 (2006.01) *G01N 21/25* (2006.01)
G02F 1/01 (2006.01) *A61B 6/02* (2006.01)

(21) International Application Number:
PCT/US2009/037706

(22) International Filing Date:
19 March 2009 (19.03.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/037,780 19 March 2008 (19.03.2008) US

(71) Applicant (for all designated States except US): **HYPERMED, INC.** [US/US]; 59 Ash Street, Weston, MA 02493 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LIFSITZ, Rick** [US/US]; 54 Hundreds Road, Wellesley, MA 02481 (US). **GUSYATIN, Oleg** [US/US]; 59 Ash Street, Weston, MA 02493 (US). **STONEHAM, Marie** [US/US]; 59 Ash Street, Weston, MA 02493 (US). **SHUBENTSOV, Llya** [US/US]; 59 Ash Street, Weston, MA 02493 (US). **JIANG, Chunsheng** [US/US]; 59 Ash Street, Weston, MA 02493 (US).

(74) Agent: **REMENICK, James**; Novak Druce & Quigg LLP, 1300 I Street, NW, Suite 1000 West Tower, Washington, DC 20005 (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, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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, 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, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, 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 (Art. 21(3))

[Continued on next page]

(54) Title: MINIATURIZED MULTI-SPECTRAL IMAGER FOR REAL-TIME TISSUE OXYGENATION MEASUREMENT

100

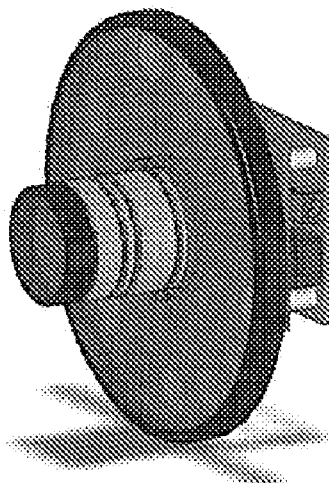


FIGURE 1

(57) Abstract: A portable multi-spectral imaging system and device is disclosed. The system includes at least one image acquisition device for acquiring an image from a subject, a filtering device to filter the light received by the image acquisition device, a processor for processing the image acquired by the image acquisition device, and a display. There is software running on the processor that determines oxgynation values of the subject based on the processed image.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:

7 January 2010

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/037706**A. CLASSIFICATION OF SUBJECT MATTER****G01J 3/40(2006.01)i, G02F 1/01(2006.01)i, G01N 21/25(2006.01)i, A61B 6/02(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)

IPC 8 : G01J A61B

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 since 1975
Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO Internal), ESPACENET, "Keywords : imaging oxygenation device, Multi-spectral image oxygenation, tissue, portable, handheld, blood, filter, vein, and similar terms"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/0024946 A1 (SVETLANA V. PANASYUK ET AL.) 01 FEBRUARY 2007 see abstract; figure 1; paragraphs [0051], [0106], [0108], [0109], [0114], [0182]; claims 1, 21;	1, 2, 4, 9, 10, 12-14, 16, 18, 20-22
A	US 05438989 A (DARRYL HOCHMAN ET AL.) 08 AUGUST 1995 see abstract; column 9, line 64-column 10 line61; column 11, lines 28-32; column 15, lines 24-29;	1, 12
A	US 06728561 B2 (MATTHEW H. SMITH ET AL.) 27 APRIL 2004 see abstract; figure 1; column 6, lines 62-65; column 12 49-65;	1, 12
A	US 04947850 A (JANE VANDERKOOI ET AL.) 14 AUGUST 1990 see abstract; figure 2; column 6, lines 1-5; column 6, lines 39-42;	1-22
A	US 2007/0268485 A1 (LEONID POLONSKIY ET AL.) 22 NOVEMBER 2007 see abstract; paragraph [0010];	1-22
A	DAISUKE NAKAO et al., 'Real time multi spectral image processing for mapping pigmentation in human skin', Med Imaging Technol, 2002, VOL. 20, NO. 2, pp. 123-133 see abstract; figure 1; page 3;	1-22



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

13 NOVEMBER 2009 (13.11.2009)

Date of mailing of the international search report

13 NOVEMBER 2009 (13.11.2009)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

SONG, Byoung Jun

Telephone No. 82-42-481-8475



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/037706

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007-024946 A1	01.02.2007	None	
US 05438989 A	08.08.1995	None	
US 06728561 B2	27.04.2004	US 2003-088165 A1	08.05.2003
US 04947850 A	14.08.1990	None	
US 2007-268485 A1	22.11.2007	CA 2590227 A1 EP 1836476 A2 WO 2007-084099 A2 WO 2007-084099 A3	07.06.2006 26.09.2007 26.07.2007 22.11.2007