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(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, BN, 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, IR, IS, JP, KE, KG, KN, KP, KR,

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[Continued on next page]

(54) Title: OPTICAL TOMOGRAPHY SENSOR AND RELATED APPARATUS AND METHODS

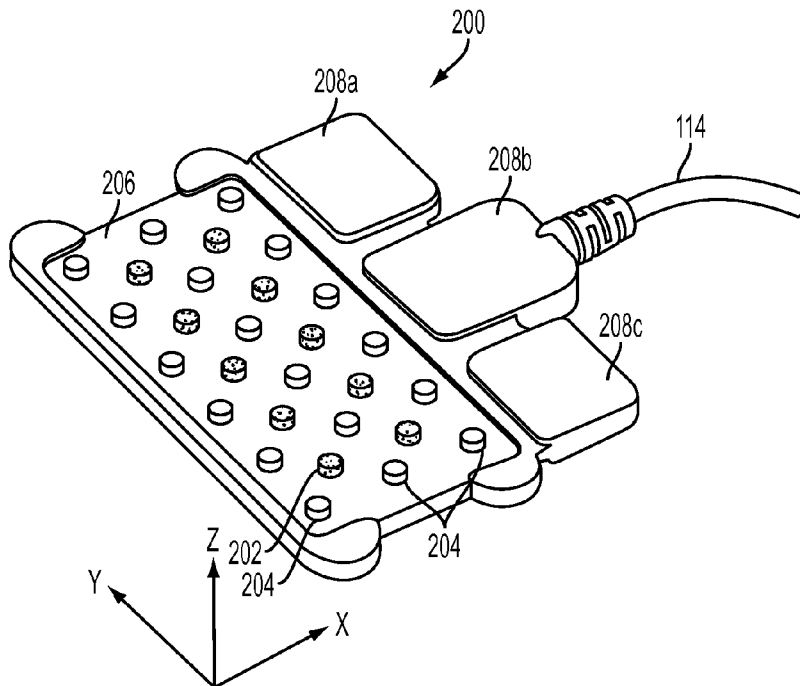


FIG. 2A

(57) Abstract: Optical sensors, systems, and methods are described, which may be used to provide or analyze information about a subject. The optical sensor may be placed in proximity to the subject and may include optical sources and optical detectors. The optical sources may irradiate the subject with optical signals and the optical detectors can detect signals from the subject. Analysis of the detected signals can yield information about the subject.





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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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.

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**A. CLASSIFICATION OF SUBJECT MATTER**

A61B 5/00(2006.01)i, A61B 6/03(2006.01)i, A61B 5/103(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)  
A61B 5/00; A61B 5/0478; A61B 6/00; A61B 5/1455; A61B 05/00; A61B 6/03; A61B 5/103Documentation 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 modelsElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
eKOMPASS(KIPO internal) & Keywords: optical sensor, analog-to-digital converter, wavelengths, flexible support structure**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US 2010-0241006 A1 (JEE HYUN CHOI et al.) 23 September 2010 See abstract, paragraphs [0021]-[0065] and figures 1-6.	1-55, 243-245 56-78, 104-121 , 238-240, 242
X Y	US 2010-0234706 A1 (BRUCE GILLAND) 16 September 2010 See abstract, paragraphs [0017]-[0050] and figures 1-7.	104-105 1-38, 243
Y	US 5584296 A (WEIJIA CUI et al.) 17 December 1996 See abstract, column 4, line 27 - column 6, line 64 and figures 1-8.	23
Y	US 2003-0236452 A1 (RICHARD MELKER et al.) 25 December 2003 See abstract, paragraphs [0022],[0048]-[0049] and figure 1.	39-55
X Y	US 2010-0317939 A1 (JONATHAN L. KUHN et al.) 16 December 2010 See abstract, paragraphs [0024]-[0047] and figure 1A.	242 244-245
A	US 2008-0242958 A1 (AMMAR AL-ALI et al.) 02 October 2008 See abstract, paragraphs [0066]-[0067] and figures 15A-15B.	1-78, 104-121 , 238-240, 242-245

 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 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

25 September 2014 (25.09.2014)

Date of mailing of the international search report

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**INTERNATIONAL SEARCH REPORT**International application No.  
**PCT/US2014/024157**

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 2006-0211924 A1 (DAVID DALKE et al.) 21 September 2006 See abstract, paragraphs [0061]-[0068] and figures 5-8.	1-78, 104-121 , 238-240, 242-245

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

See Extra page

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-78,104-121,238-240,242-245

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

Continuation of Box No.III

Group I. Claims 1-78, 104-121, 238-240, 242-245 are directed to an optical sensor, a system comprising the optical sensor of claim 1, an optical apparatus, a optical system comprising the optical sensor of claim 58, a method of operating an optical sensor, and a system comprising an optical sensor array.

Group II. Claims 79-103, 179-188 are directed to a support, a method of coupling a support to a subject's head, and a method of treating a plurality of subjects comprising performing the method of claim 184.

Group III. Claims 122-153, 234-237 are directed to an optical component and an apparatus comprising an optical sensor which comprises at least one optical component.

Group IV. Claims 154-178, 241 are directed to a method of operating a diffuse optical tomography (DOT) sensor.

Group V. Claims 189-225 are directed to an apparatus, comprising a flexible sheet having an array of indentations.

Group VI. Claims 226-233 are directed to a device, comprising a substantially rigid support structure having a plurality of openings.

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