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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, 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, 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.

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[Continued on next page]

(54) Title: APPARATUS AND METHOD FOR SURGICAL INSTRUMENT WITH INTEGRAL AUTOMATED TISSUE CLASSIFIER

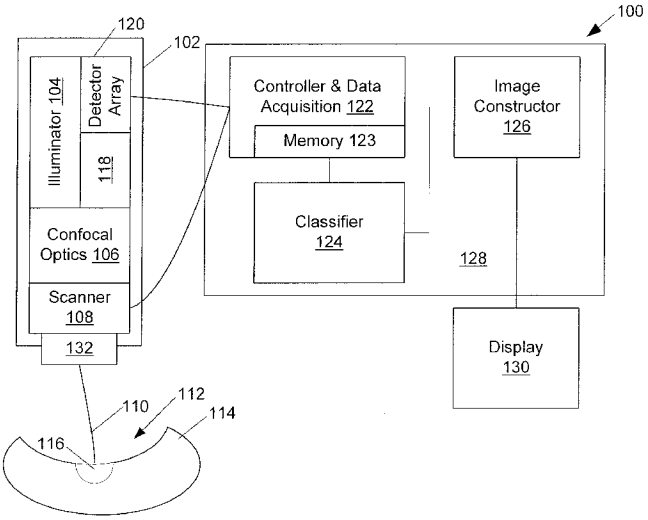

Figure 1

(57) Abstract: A method and apparatus is described for optically scanning a field of view, the field of view including at least part of an organ as exposed during surgery, and for identifying and classifying areas of tumor within the field of view. The apparatus obtains a spectrum at each pixel of the field of view, and classifies pixels with a kNN-type or neural network classifier previously trained on samples of tumor and organ classified by a pathologist. Embodiments use statistical parameters extracted from each pixel and neighboring pixels. Results are displayed as a color- encoded map of tissue types to the surgeon. In variations, the apparatus provides light at one or more fluorescence stimulus wavelengths and measures the fluorescence light spectrum emitted from tissue corresponding to each stimulus wavelength. The measured emitted fluorescence light spectra are further used by the classifier to identify tissue types in the field of view.

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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, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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A. CLASSIFICATION OF SUBJECT MATTER

A61B 19/00(2006.01)i, A61B 17/00(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 19/00; A61B 6/00; G01B 9/02; G06K 9/00

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: optic, light, scanner, detector, classifier, display, pixels

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 2007-0167839 A1 (GARY CARVER) 19 July 2007 See Abstract, Paragraphs[0023, 0024, 0026, 0033, 0034], Fig. 1, Claim 1	1-3,7,10 4-6,8-9,11-14,25-35
Y A	US 5991028 A1 (CABIB; DARIO et al.) 23 November 1999 See Abstract, Figs. 1-4, Claim 1,17-19, Col. 15 Line 35-Col.17 Line 58	1-3,7,10 4-6,8-9,11-14,25-35
A	US 5987346 A1 (BENARON DAVID A. et al.) 16 November 1999 See Abstract, Figs. 1,7,11,12, Col.1-5, Claim 1	1-14,25-35
A	US 6198838 B1 (ROEHRIG; JIMMY R. et al.) 06 March 2001 See Abstract, Figs. 2A,3,4, Col.1,3-5, Claim 1	1-14,25-35
A	US 2007-0160276 A1 (SHOUPU CHEN et al.) 12 July 2007 See Abstract, Figs. 2,3,8, Paragraphs [0003,0011,0023,0026,0042,0088,0089], Claims 1,5,11	1-14,25-35

☐ 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
16 AUGUST 2010 (16.08.2010)	**16 AUGUST 2010 (16.08.2010)**

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

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Telephone No. 82-42-481-8469

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/068718

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.: 15-24
because they relate to subject matter not required to be searched by this Authority, namely:

The subject matter of claim 15 relates to a method of performing tumor removal from tissue of an organ including the step for removing. This method falls into the category of a method for treatment of the human body by surgery, therapy or diagnostic methods. The same reasoning applies to claims 16-24, which are dependent on claim 15 [Article 17(2)(a)(i), Rule 39.1(iv) PCT].

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:

1. ☐ As all required addtional 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 fee, this Authority did not invite payment of any additional fee.

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.:

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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

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