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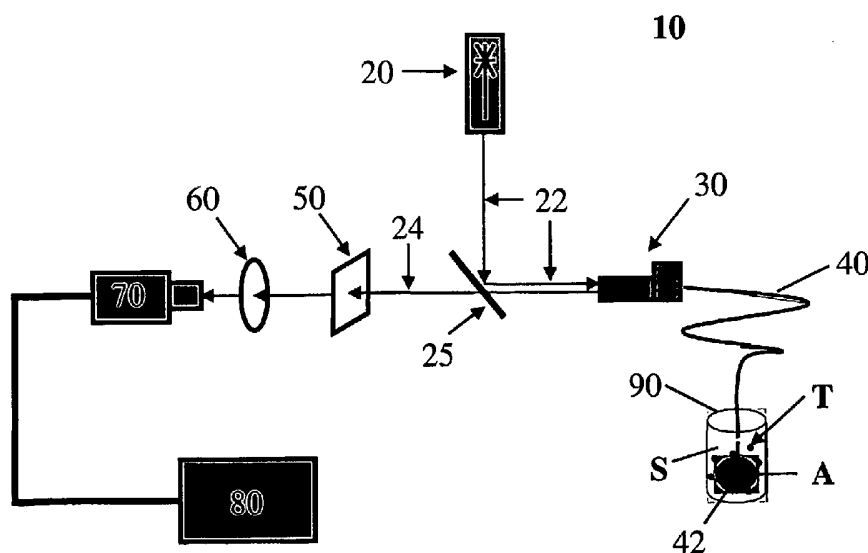
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- Published:
— with international search report

[Continued on next page]

(54) Title: SINGLE ANALYTE MOLECULE DETECTION BY FIBRE FLUORESCENCE PROBE



(57) Abstract: An apparatus for single analyte molecule detection includes: a light source (20) for generating excitation light; a dichroic mirror (22) disposed on a first path of excitation light generated by the light source, wherein the mirror directs excitation light into a fiber aligner (30); an optical transducer coupled to the light source by the fiber aligner, the optical transducer comprising an optical waveguide (40) made of dielectric material having a first dielectric index; a photon detector (70) disposed to receive fluorescent back radiation, wherein when a test solution having a second dielectric index lower than the first index is provided and comprises one or more target molecules, excitation light is transmitted by the waveguide and exits a waveguide tip disposed in the test solution so as to excite one or more target molecules; subsequently, the waveguide transmits back radiation along a second path to the photon detector that detects the transmitted back radiation.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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.

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

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2005/002444

A. CLASSIFICATION OF SUBJECT MATTER

G01N21/64 G01N21/77

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)

G01N

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, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GOLDEN J P ET AL: "FLUOROMETER AND TAPERED FIBER OPTIC PROBES FOR SENSING IN THE EVANESCENT WAVE" OPTICAL ENGINEERING, SOC. OF PHOTO-OPTICAL INSTRUMENTATION ENGINEERS. BELLINGHAM, US, vol. 31, no. 7, 1 July 1992 (1992-07-01), pages 1458-1462, XP000289263 ISSN: 0091-3286 page 1458, column 2, last paragraph - page 1460, column 1, paragraph 2 page 1460, column 1, last paragraph - column 2, paragraph 1; figures 1,2	1-9,11, 13-18
Y	----- -/--	10

☒ 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 document 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

4 November 2005

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16. 02. 2006

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INTERNATIONAL SEARCH REPORT

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PCT/IB2005/002444

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	THOMPSON R B ET AL: "COMPONENT SELECTION FOR FIBER-OPTIC FLUOROMETRY" APPLIED SPECTROSCOPY, THE SOCIETY FOR APPLIED SPECTROSCOPY. BALTIMORE, US, vol. 44, no. 1, January 1990 (1990-01), pages 117-122, XP000085848 ISSN: 0003-7028 page 118, column 1, paragraph 2 - page 119, column 2, paragraph 1 -----	1-10, 13-18
Y	EP 0 383 912 A (TERUMO KABUSHIKI KAISHA) 29 August 1990 (1990-08-29) page 18, paragraph 2 - page 20, paragraph 1; figure 1 -----	1-11, 13-18
Y	US 5 141 312 A (THOMPSON ET AL) 25 August 1992 (1992-08-25) the whole document -----	1-11, 13-18
A	HARMS GREG S ET AL: "Probing conformational changes of gramicidin ion channels by single-molecule patch-clamp fluorescence microscopy" BIOPHYSICAL JOURNAL, NEW YORK, US, US, vol. 85, no. 3, September 2003 (2003-09), pages 1826-1838, XP002304864 ISSN: 0006-3495 page 1829, column 1, last paragraph - page 1831, column 2, paragraph 2 -----	1-11, 13-18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2005/002444

Box 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 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 additional sheet

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 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.:

1-11, 13-18

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-11-13-18

Subject 1 relates to an apparatus for detecting the fluorescence radiation emitted by target particles, excited by light emitted from a fibre tip and collected by the same tip, and to a corresponding method.

2. claim: 12

Subject 2 also relates to an apparatus for detecting the fluorescence emitted by target particles and excited by light emitted from a plurality of parallel integrated optical waveguides and collected by them.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2005/002444

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0383912	A	29-08-1990	DE 3852108 D1	15-12-1994
			DE 3852108 T2	23-03-1995
			WO 8902072 A1	09-03-1989
			JP 1063842 A	09-03-1989
			US 5151603 A	29-09-1992
US 5141312	A	25-08-1992	NONE	