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(71) Applicant *(for all designated States except US)*: **APPLIED BIOSYSTEMS** [US/US]; 850 Lincoln Centre Drive, Foster City, California 94404 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **REEL, Richard, T.** [US/US]; 850 Lincoln Centre Drive, Foster City, California 94404 (US). **OLDHAM, Mark, F.** [US/US]; 850 Lincoln Centre Drive, Foster City, California 94404 (US). **NORDMAN, Eric** [US/US]; 850 Lincoln Centre Drive, Foster City, California 94404 (US). **BOEGE, Steven, J.** [US/US]; 850 Lincoln Centre Drive, Foster City, California 94404 (US). **WOUDENBURG, Timothy** [US/US]; 850 Lincoln Centre Drive, Foster City, California 94404 (US). **MENCHEN, Steve** [US/US]; 850 Lincoln Centre Drive, Foster City, California 94404 (US).

(74) Agent: **CHEN, Anderson, I.**; MH2 Technology Law Group, 1951 Kidwell Drive, Suite 550, Tysons Corner, Virginia 22182 (US).

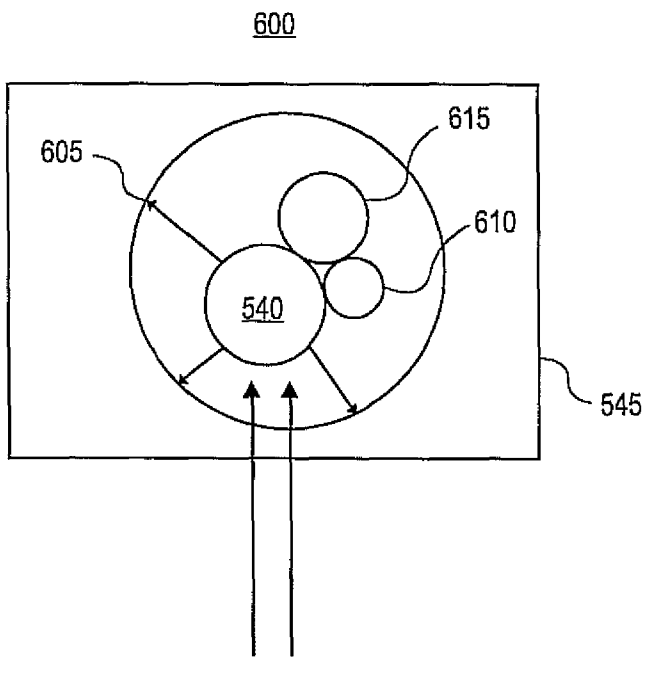
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Published:
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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

[Continued on next page]

(54) Title: SYSTEMS, METHODS, AND APPARATUS FOR SINGLE MOLECULE SEQUENCING



(57) Abstract: An embodiment generally relates to a system for analysis of an analyte. The system can include a transparent substrate. The system also includes an excitation light source configured to induce an evanescent wave excitation of a fluorescently labeled molecule near the access to the transparent substrate and a detector for detecting the fluorescently labeled molecule.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - C12Q 1/00; C12Q 1/68; C12M 1/34, C12M 3/00 (2007.10)
USPC - 435/6, 435/287.2; 435/4; 385/12
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)
USPC - 435/6, 435/287.2; 435/4; 385/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 385 (text search, see terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST (PGPB,USPT,EPAB,JPAB); Google/Scholar (text search, see terms below)
Search Terms: Inorganic absorber, energy transfer, fluorescent, quantum dot, upconverter phosphor, analyte, evanescent wave, nucleotide, sequence, substrate, refraction, reflection.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Axelrod, "Total internal reflection fluorescence microscopy in cell biology", Traffic, 2001, vol 2, pp 764-774, 20 August 2001 (20.08.2001), page 764, paras 3,5; page 765, para 3; page 766, para 2; page 772, paras 2,3; Figure 1 legend	1-10
Y	US 2005/0221279 A1 (CARTER et al.) 06 October 2005 (06.10.2005), para [0067], [0068], [0070], [0076]	1-10
Y	US 2003/0044781 A1 (KORLACH et al.) 06 March 2003 (06.03.2003), para [0067], [0077], [0039]-[0049]; claim 27	7-10

☐ Further documents are listed in the continuation of Box C. ☐

* 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	Date of mailing of the international search report
13 December 2007 (13.12.2007)	30 JAN 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 07/69026

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:
Group I: claims 1-10
Group II: claims 11-14
Group III: claims 15-20

This application contains the following inventions or groups of inventions which are not so linked as to from a single general inventive concept under PCT Rule 13.1.

Group I: claims 1-10 are directed to a system for analysis of an analyte comprising: a substrate; a fluid sample configured to contact the substrate; an excitation light source configured to energize a fluorescently labeled molecule by an inorganic absorber bound to the substrate; and a detector configured to detect the fluorescently labeled molecule.

--------see continuation 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 additional fees, this Authority did not invite payment of 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.:
1-10

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

International application No.
PCT/US 07/69026

Continuation of Box No. III

Group II: claims 11-14 are directed to a system for analysis of analyte comprising: a transparent substrate coated with a metal layer; an exclusion coating deposited on the metal layer; a fluorescently labeled molecule configured to diffuse into holes in the exclusion coating; and an excitation light source configured to produce plasmon-coupled emission at a substrate side of the exclusion coating.

Group III: claims 15-20 are directed a luminescence detection system, the system comprising a resonant optical cavity, wherein luminophore emission is elicited by evanescent excitation established at the boundary of the resonant optical cavity.

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because under PCT Rule 13.2 they lack the same or corresponding technical features for the following reasons:

Groups II-III do not include the inventive concept of the inorganic absorber bound to the substrate; and a detector configured to detect a fluorescently labeled molecule by the absorber, of Group I.

Groups I and III do not include the inventive concept of an exclusion coating deposited on a metal layer and a fluorescently labeled molecule configured to diffuse into holes in the exclusion coating, of Group II. Note, US 20050276535 A1 to Levene et al. discloses a transparent substrate with a metal film (para [0041]) with holes for containing a labeled target material for spectroscopic analysis (para [0047]-[0048]).

Groups I and II do not include the inventive concept of a resonant optical cavity, wherein luminophore emission is elicited by evanescent excitation established at the boundary of the resonant optical cavity, of Group III.

None of these technical features are common to the other groups, nor do they correspond to a special technical feature in the other groups. Therefore, unity of invention is lacking.