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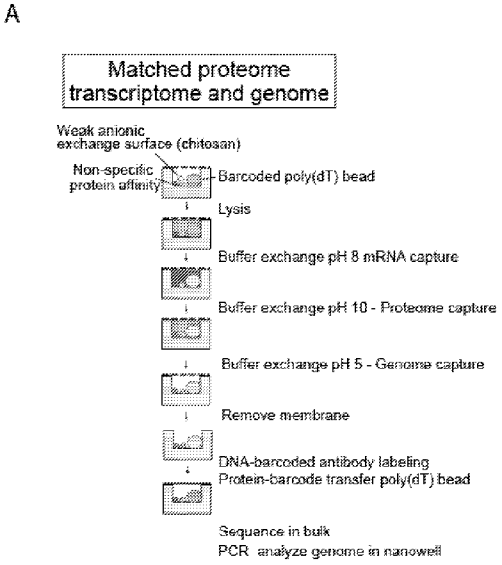
[Continued on next page]

(54) Title: SEMI-PERMEABLE ARRAYS FOR ANALYZING BIOLOGICAL SYSTEMS AND METHODS OF USING SAME



Figs. 1A

(57) Abstract: The present application provides a method of assembling a container for one or multiple parallel steps of biochemical analysis on one or more cells comprising performing molecular bonding of a porous membrane on an apical or basal surface of an array having a plurality of wells, wherein the molecular bonding substantially isolates each well from adjacent wells.

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Published:

— *with international search report (Art. 21(3))*

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(88) **Date of publication of the international search report**:
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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/013791

A. CLASSIFICATION OF SUBJECT MATTER
INV. C12Q1/68
ADD. G01N35/00

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 C12Q

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 practicable, search terms used)
EPO-Internal, EMBASE, FSTA, 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	WO 2015/031691 A1 (CELLULAR RES INC [US]) 5 March 2015 (2015-03-05)	1-7,14, 15, 21-25, 33,34, 40-45
Y	Par.9, 177, 26, 138, 171, 175, Fig.8	8-13, 16-20, 26-32, 35-39,46

Y	US 2011/116992 A1 (NORTH STELLA H [US] ET AL) 19 May 2011 (2011-05-19)	8-13, 16-20, 26-32, 35-39,46
	Par.32, 47, 48	

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[X] Further documents are listed in the continuation of Box C.

[X] 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	Date of mailing of the international search report
28 April 2017	12/07/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Bonello, Steve

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FENG XU ET AL: "Microengineering methods for cell-based microarrays and high-throughput drug-screening applications", BIOFABRICATION, vol. 3, no. 3, 1 September 2011 (2011-09-01), page 034101, XP055226623, UK ISSN: 1758-5082, DOI: 10.1088/1758-5082/3/3/034101 p.1-2 col.1 par.1, p.4 col.2 par.2, p.5 col.2, p.9 col.2 par.2 -----	8-13, 16-20, 26-32, 35-39,46
Y	HAN SHENG ET AL: "Different Strategies of Covalent Attachment of Oligonucleotide Probe onto Glass Beads and the Hybridization Properties", APPLIED BIOCHEMISTRY AND BIOTECHNOLOGY ; PART A: ENZYME ENGINEERING AND BIOTECHNOLOGY, vol. 152, no. 1, 20 May 2008 (2008-05-20), pages 54-65, XP055368287, New York ISSN: 0273-2289, DOI: 10.1007/s12010-008-8245-9 p.55 par.2, 3, p.56 par.5- p.58 par.5, p.60 par.1, p.64 -----	8-13, 16-20, 26-32, 35-39,46
A	HIDEAKI YAMAMOTO ET AL: "In situ modification of cell-culture scaffolds by photocatalytic decomposition of organosilane monolayers", BIOFABRICATION, vol. 6, no. 3, 1 September 2014 (2014-09-01), page 035021, XP055368244, UK ISSN: 1758-5082, DOI: 10.1088/1758-5082/6/3/035021 p.1-2 col.1 par.1 -----	1-46

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/013791

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 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 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.:

1-46

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-46

   Directed towards a method for high-throughput parallel single cell biochemical analysis in an array of wells or containers comprising a first functionalised surface comprising an affinity resin and a second functionalised surface providing accessible ionic functional groups.

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2. claims: 47-49

   Directed towards a method for high-throughput parallel single cell biochemical analysis in an array of wells or containers comprising a functionalised inner surface and top surface and delivering a reagent by transfer through a membrane.

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3. claims: 50, 51

   Directed towards transmitting data over a network or connection for receipt by an electronic data system.

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4. claims: 52-338

   Directed towards methods for assembly (cl.52), methods for massively parallel single cell biochemical analysis (cl.139), kits for massively parallel single cell biochemical analysis (cl.210) and containers for multiple parallel single-cell biochemical analysis (cl.276) and selective manipulation of cells (cl.338), comprising a container having a porous or semi-permeable membrane.

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5. claims: 339-342

   Directed towards methods of identifying cellular heterogeneity comprising the step of sequencing a nucleic acid sample and analysis.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2017/013791

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		US 2016010151 A1	14-01-2016
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