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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,

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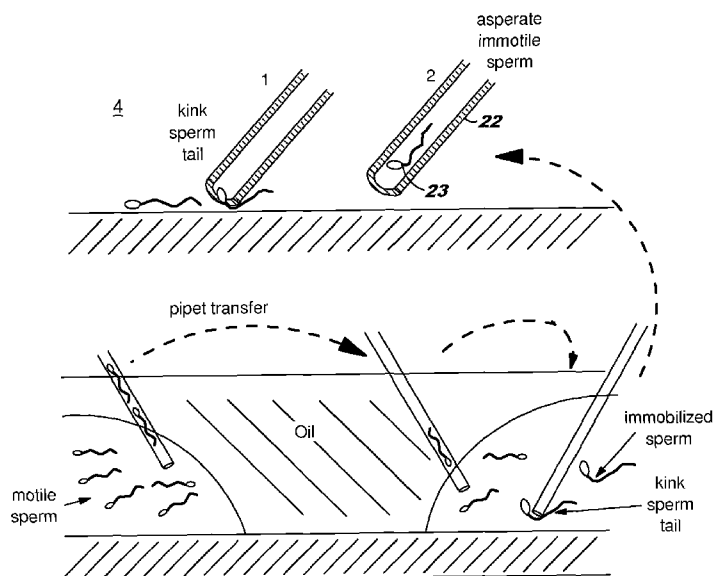
- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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

9 December 2010

(54) Title: MICROFLUIDIC EMBRYO AND GAMETE CULTURE SYSTEMS

FIG. 3



(57) Abstract: A robotic microfluidic incubator system has a thin transparent sidewall and close proximity of the embryo/oocyte/cultured cells to the sidewall allow close approach of a side view microscope with adequate focal length for mid to high power. This arrangement permits microscopic examination of multiple culture wells when arranged in rows (linear or along the circumference of a carousel). Manual or automated side to side movement of the linear well row, or rotation of the carousel, allows rapid inspection of the contents each well. Automated systems with video capability also allow remote inspection of wells by video connection or Internet connection, and automated video systems can record off-hours inspections or time lapse development in culture (i.e. embryo cell division progression, or axon growth in neuron cell cultures).

**A. CLASSIFICATION OF SUBJECT MATTER**

*C12M 3/10(2006.01)i, C12N 5/073(2010.01)i, C12Q 1/24(2006.01)i, A01N 1/02(2006.01)i, C12N 5/075(2010.01)i, C12N 5/076(2010.01)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)

C12M 3/10; C12M 1/00; A61B 17/43; A61D 7/00; A01N 1/02; C12N 5/00; C12Q 3/00; C12N 5/02; B01F 3/00; C12M 3/00; B01D 17/00; C12Q 1/24; C12M 1/34

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: micromanipulator, culture media supply, freezing stem, embryo incubation system, sperm separation, oocyte having a cumulus mass

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003-0059936 A1 (WERNER BAUMANN et al.) 27 March 2003 See abstract; page 4, paragraph 0036, 0052; claims 1-31; figures 1-3, 6, 8, 9.	1-3,135-146
X	WO 2008-024575 A2 (THE CURATORS OF THE UNIVERSITY OF MISSOURI et al.) 28 February 2008 See abstract; claims 1, 3, 10, 12, 15, 16; figures 5-11; page 4,5, paragraph 0010.	61-63
A		46-49,69-73
X	US 2008-0230490 A1 (WELLE RICHARD P.) 25 September 2008 See abstract; claims 1-3, 40, 55-58, 68, 75, 76; figures 1, 2, 10; page 2, paragraph 0021.	61-63
A		46-49,69-73
X	US 2006-0270021 A1 (SHUICHI TAKAYAMA et al.) 30 November 2006 See abstract; claim 1; figures 1, 2, 4; pages 3, 4, 9; paragraphs 0032, 0033, 0043, 0073, 0076.	82,147-149,151,152
Y		83-88,98-100,105-109,150,153

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

13 OCTOBER 2010 (13.10.2010)

Date of mailing of the international search report

**14 OCTOBER 2010 (14.10.2010)**

Name and mailing address of the ISA/KR



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Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea

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**INTERNATIONAL SEARCH REPORT**

International application No.

**PCT/US2009/064045****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.: 42-45  
because they relate to subject matter not required to be searched by this Authority, namely:  
Claims 42-45 pertain to methods for treatment of the human body by surgery or therapy as well as diagnostic methods, and thus relate to a subject matter which this International Searching Authority is not required, under Article 17(2)(a)(i) of the PCT and Rule 39.1(iv) of the Regulations under the PCT, to search.
2.  Claims Nos.: 60,76,96  
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:  
Claims 60,76,96 are unclear because they are dependent claims referring to a dependent claim which is not drafted in accordance with the second and third sentence of Rule 6.4(a).
3.  Claims Nos.: 4,9-18,23-30,33-38,50-59,64-68,74,75,77-81,89-95,97,101-104,110-115  
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 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.:

**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

International application No.

**PCT/US2009/064045**

Continuation of Box No. III

Group 1(claims 1-4) is directed to a micromanipulator system.

Group 2(claims 5-18) is directed to a microfluidic chip system.

Group 3(claims 19-38) is directed to a culture media supply and a method for supplying culture media.

Group 4(claims 39-41) is directed to a microfluidic chip incubation system.

Group 5(claims 46-81) is directed to a freezing stem, system and a method for freezing a specimen.

Group 6(claims 116-134) is directed to a stripping method for use with an oocyte and apparatus for use in stripping an oocyte.

Group 7(claims 135-146) is directed to a method for use with a specimen and apparatus for use with a specimen.

Group 8(claims 82-115, 147-153) is directed to a sperm separation.

The inventions listed as Groups 1-8 do not relate to one invention or to a single general inventive concept.

## INTERNATIONAL SEARCH REPORT

International application No.

**PCT/US2009/064045**

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Ronald S.Suh et al. Human Reproduction Update, 2003, Vol.9, No.5 pp.451-461 See abstract; figures 2-5; page 452, column 1; page 455, column 1 line 14-line 17, line 31-line 34.	82, 147-149, 151
Y		83-88, 98-100 , 105-109, 150, 153
Y	Chung B.G.et al. Journal of Visualized Experiments. 2007. See abstract; protocol.	83-88, 98-100 , 105-109, 150, 153
Y	US 6695765 B1 (BEEBE; DAVID J. et al.) 24 February 2004 See abstract; claims 7-9, 11; figures 2, 7-9.	116-134
Y	Barros A. et al. J Assist Reprod Genet. 1997 Feb;14(2):97-101. (-) See abstract.	116-134
A	US 2004-0142411 A1 (GREGORY L. KIRK et al.) 22 July 2004 See abstract; claim 1; figures 1, 3, 4, 10, 14.	5-8, 39-41
A	US 5316905 A1 (MORI; JUNICHI et al.) 31 May 1994 See abstract; claim 1; figures 2, 3; column 6, lines 35-68.	19-22, 31-32

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