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[Continued on next page]

(54) Title: DROPLET-BASED MULTIWELL OPERATIONS

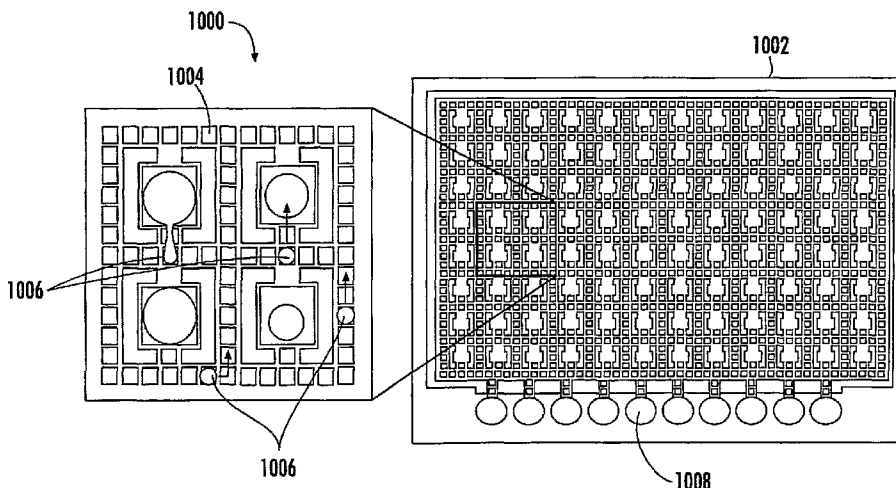


FIG. 10

(57) Abstract: The present invention relates to droplet-based multiwell operations. One aspect of the present invention relate to droplet-based protein crystallization including embodiments related to a screening chip (1000), an optimization chip, and a method of testing conditions for growing a crystal. Another aspect of the present invention relates to a droplet-based multiwell plate including embodiments related to a substrate including one or more input ports, a regular array of processing wells (1002), and a network of droplet transport pathways that provide direct or indirect droplet transport from each of the input ports to each of the one or more processing wells. Yet another aspect of the present invention relates to a droplet-microactuator (1500) or stamping platform including embodiments related to a stamping device comprising a droplet microactuator and a system regarding the same.



WO 2007/123908 A3



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

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16 October 2008

**INTERNATIONAL SEARCH REPORT**

International application No.  
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**A. CLASSIFICATION OF SUBJECT MATTER**  
**IPC:** B01L 3/02( 2006.01);B01D 9/00( 2006.01);C25B 9/00( 2006.01),11/00( 2006.01)  
  
**USPC:** 422/100,68.1,67,245.1;204/600,601  
 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)  
 U.S. : 422/ 100, 68.1, 67, 245.1; 204/600, 601

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)  
 Please See Continuation Sheet

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2004/0141884 A1 (UNNO et al.) 22 June 2004, entire document	1-2, 32-34, 35-38, 44-46, 49-54, 56, 66-72, 79-83, 94-95, 102-105 ----- 57-65

<input type="checkbox"/> Further documents are listed in the continuation of Box C.	<input type="checkbox"/> 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	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 04 August 2008 (04.08.2008)	Date of mailing of the international search report <b>18 AUG 2008</b>
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 <i>Brian R. Gordon</i> Telephone No. 571-273-8300

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/09379

## 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:  
Please 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 any 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.:
- 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/US07/09379

### BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-48, drawn to a screening chip.

Group II, claim(s) 49-55, drawn to a microactuator chip.

Group III, claim(s) 56-93, drawn to a substrate.

Group IV, claim(s) 94-108, drawn to a stamping device.

The inventions listed as Groups I and (II-IV) 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 special technical features for the following reasons: Groups II-IV do not include the corresponding special technical feature of electric field mediated microfluidics of Group I.

The inventions listed as Groups II and (I, III-IV) 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 special technical features for the following reasons: Groups I, and III-IV do not include the corresponding special technical feature of the two or more processing reservoirs and dispensing reservoirs of Group II.

The inventions listed as Groups III and (I-II, and IV) 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 special technical features for the following reasons: Groups I-II, and IV do not include the corresponding special technical feature of a network of droplet transport pathways of Group III.

The inventions listed as Groups I-III and IV 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 special technical features for the following reasons: Groups I-III do not include the corresponding special technical feature of first and second plates and reference electrodes.

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US07/09379

Continuation of B. FIELDS SEARCHED Item 3:

East:

Keywords: electr\$8, well, reservoir, input, chip, microfluidic, substrate, protein, crystal\$9