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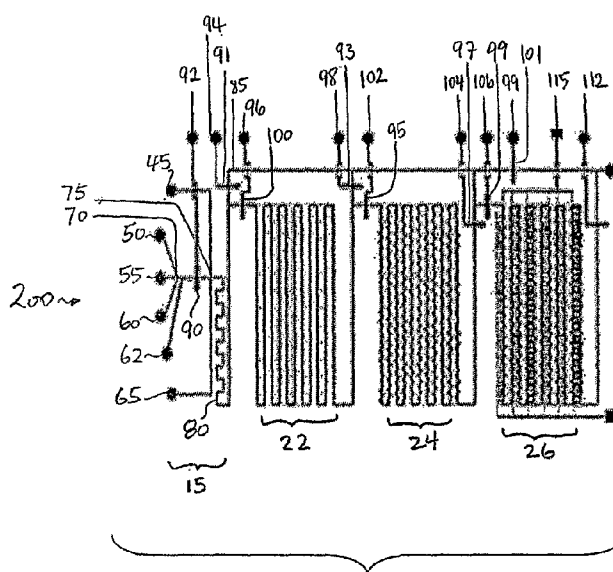
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[Continued on next page]

(54) Title: MICROFLUIDIC MANIPULATION OF FLUIDS AND REACTIONS



(57) Abstract: The present invention relates generally to microfluidic structures, and more specifically, to microfluidic structures and methods including microreactors for manipulating fluids and reactions. In some embodiments, structures and methods for manipulating many (e.g., 1000) fluid samples, i.e., in the form of droplets, are described. Processes such as diffusion, evaporation, dilution, and precipitation can be controlled in each fluid sample. These methods also enable conditions within the fluid samples (e.g., concentration) to be controlled. Manipulation of fluid samples can be useful for a variety of applications, including testing for reaction conditions, e.g., in crystallization, chemical, and biological assays.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/34659

A. CLASSIFICATION OF SUBJECT MATTER

IPC: C 30 B 13/02,15/26,11/00,15/30

USPC: 117/53,200,201,204

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. : 117/53, 200, 201, 204

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004/0234966 A1 (BRYNING et al) 25 November 2004 (25.11.2004), entire document	1-12;73-76
A	US 2003/0061687 A1 (HANSEN et al) 3 April 2003 (03.04.2003), entire document.	1-12; 73-76

☐ 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 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

25 June 2007 (25.06.2007)

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/34659

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.: 1-12 and 73-76

- 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/US06/34659

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

Group I, claim(s) 1-12 and 73-76, drawn to precipitate formation and dissolution.

Group II, claim(s) 13-72, drawn to crystallization involving a change in concentration and a concentration dependent process.

Group III, claim(s) 77-94, drawn to a microfluidic device with two immiscible fluids.

1. 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 special technical features for the following reasons: each Group has a special technical feature different from the other Group. Group I's special technical feature is reformation of the same precipitate. Group II's special technical feature is forming crystals by a change in concentration. Group III's special technical feature is a microfluidic device using two immiscible fluids.