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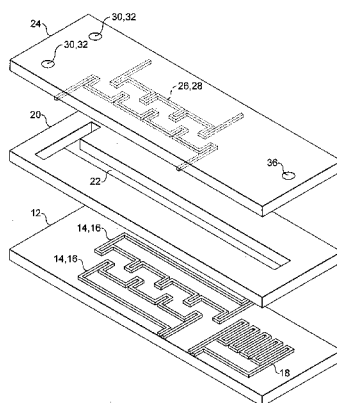
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[Continued on next page]

(54) **Title:** MICROFLUIDIC DEVICE



(57) **Abstract:** A microfluidic device comprising; i) an inlet; ii) a first layer comprising at least first and second current carrying structures, wherein the at least first and second current carrying structures each comprise a plurality of teeth, and wherein the teeth of the first and second current carrying structures are optionally offset such that the teeth of the first current carrying structure are positioned between the teeth of the second current carrying structure; iii) a second layer comprising a first microfluidic chamber in fluid communication with the inlet positioned above the at least first and second current carrying structures of the first layer; and iv) a third layer comprising at least third and fourth current carrying structures wherein the at least third and fourth current carrying structures each comprise a plurality of teeth, and wherein the teeth of the third and fourth current carrying structures are optionally offset such that the teeth of the third current carrying structure are positioned between the teeth of the fourth current carrying structure; and wherein the at least third and fourth current carrying structures are positioned in the third layer so as to be above the first microfluidic chamber and such that the teeth of the third current carrying structure are positioned substantially vertically above or offset from the teeth of the first current carrying structure and the teeth of the fourth current carrying structure are positioned substantially vertically above or offset from the teeth of the second current carrying structure; wherein the teeth have a stem having substantially elliptical tip.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2008/000094

A. CLASSIFICATION OF SUBJECT MATTER
INV. B01L3/00 B01F13/00

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)

B01L B01F

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/036141 A1 (GASCOYNE PETER R C [US] ET AL) 28 March 2002 (2002-03-28) paragraphs [0071] - [0076]	1-6,9-53
X	HO C-M ET AL: "A Chaotic Mixer for Magnetic Bead-Based Micro Cell Sorter" JOURNAL OF MICROELECTROMECHANICAL SYSTEMS, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 13, no. 5, 1 October 2004 (2004-10-01), pages 779-790, XP011119856 ISSN: 1057-7157 cited in the application abstract figures 4,5 *III. FABRICATION*	1-3,24,25

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 document 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.

Z document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2008/000094

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with Indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>QIAN S ET AL: "Magneto-hydrodynamic stirrer for stationary and moving fluids" SENSORS AND ACTUATORS B, ELSEVIER SEQUOIA S.A., LAUSANNE, CH, vol. 106, no. 2, 13 May 2005 (2005-05-13), pages 859-870, XP004867950 ISSN: 0925-4005 *Introduction* *Experimental set-up* figures 1,12</p>	1-53
A	<p>WU H-Y ET AL: "A novel electrokinetic micromixer" SENSORS AND ACTUATORS A, ELSEVIER SEQUOIA S.A., LAUSANNE, CH, vol. 118, no. 1, 31 January 2005 (2005-01-31), pages 107-115, XP004656660 ISSN: 0924-4247 *2.2 Fabrication of micromixer*</p>	1-53
A	<p>US 2004/229381 A1 (WIRIX-SPEETJENS ROEL [BE]) 18 November 2004 (2004-11-18) paragraphs [0012], [0013], [0034], [0065]</p>	1-53
A	<p>EP 1 658 890 A (SAMSUNG ELECTRONICS CO LTD [KR]) 24 May 2006 (2006-05-24) paragraphs [0005] - [0010]; figures 7,8</p>	1-53

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2008/000094

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 allsearchable 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 reportcovers 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 - 53

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: 1-53

A microfluidic device suitable for mixing a fluid using electrodes to influence the movement of magnetic particles in the fluid.

2. claims: 54-61

A detector suitable for detecting the presence of an analyte in a sample.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/GB2008/000094

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2002036141	A1	28-03-2002	NONE	
US 2004229381	A1	18-11-2004	US 2007031980	A1 08-02-2007
EP 1658890	A	24-05-2006	CN 1779430	A 31-05-2006
			JP 2006142294	A 08-06-2006
			KR 20060057093	A 26-05-2006
			TW 276462	B 21-03-2007
			US 2006140051	A1 29-06-2006