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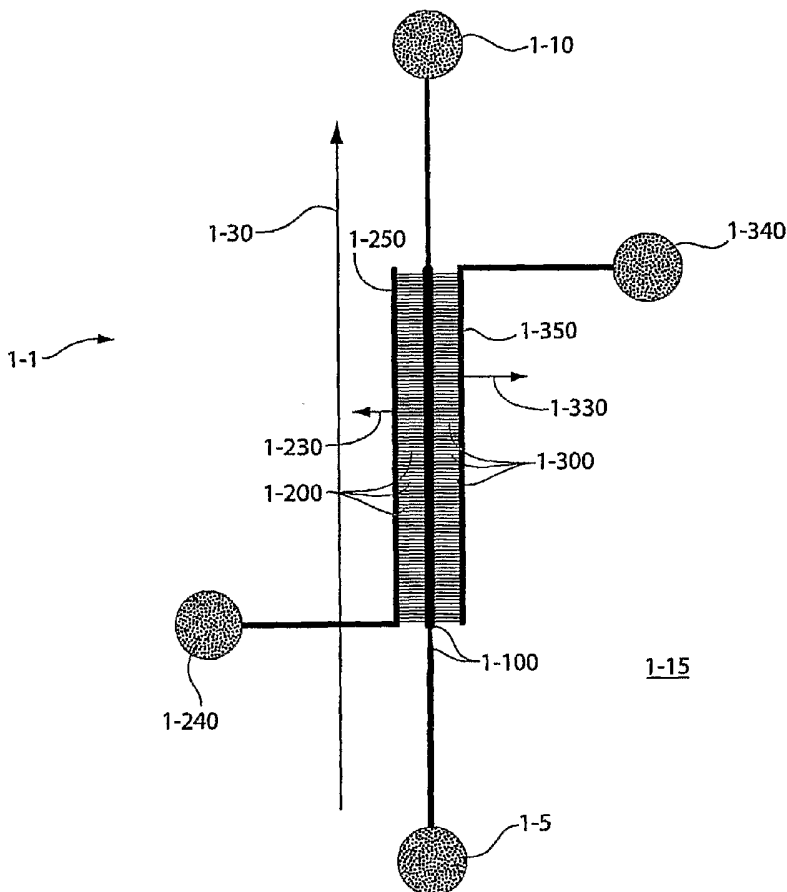
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- (71) Applicant (for all designated States except US): **PRESIDENT AND FELLOWS OF HARVARD COLLEGE** [US/US]; 17 Quincy Street, Cambridge, Massachusetts 02138 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **BALA SUBRAMANIAM, Anand** [MY/US]; 105 Pforzheimer House Mail Center, Cambridge, Massachusetts 02138 (US). **ABKARIAN, Manouk** [FR/FR]; 4, place Croix Luizet, F-69100 Villeurbanne (FR). **FABRE, Adrien** [FR/FR]; 74, rue de Gergovie, F-75014 Paris (FR). **DURAND, Marc** [FR/FR]; 85 Boulevard Brune, 5ème Etage, esc. E, F-75014 Paris (FR). **STONE, Howard, A.** [US/US]; 75 Francis Street, #1, Brookline, Massachusetts 02446 (US).
- (74) Agent: **OYER, Timothy, J.**; Wolf, Greenfield & Sacks, P.C., 600 Atlantic Avenue, Boston, Massachusetts 02210 (US).
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[Continued on next page]

(54) Title: MICROCONCENTRATOR/MICROFILTER



(57) Abstract: The present invention includes a microfluidic filter and concentrator that can separate a filtrate from a fluid containing components, e.g. a suspension of particles, to be removed from the fluid at least to some extent. The filter may employ principals of tangential flow filtration, also known as cross-flow filtration. In one aspect, a microfluidic filter described herein includes at least a first, main channel and one or more secondary, filtering channels that connect to the main channel. Filtration occurs when a fluid portion of a sample that is flowed through the main channel enters one or more of the filtering channels and at least some of the components in the sample do not enter or do not flow through the secondary, filtering channels. The secondary channels may be dimensioned to inhibit flow of components through them, and/or a porous material such as a layer may be positioned to inhibit flow of components through the secondary channels.

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NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/02229

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC: **B01D 35/00**( 2006.01),**63/00**( 2006.01)  
 B01D 61/00( 2006.01);B01D 57/00( 2006.01);B01D 15/34( 2006.01)  
 USPC: 210/498,321.6,323.1,198.2,199,203,500.21;204/450,600  
 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. : 210/498,321.6,323.1,198.2,199,203, 500.21;204/450,600

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.
X — Y	US 2002/0170825 A1 (LEE et al) 21. November 2002 (21.11.2002), entire document	1-25, 34, 36, 38-43 ----- 26-33, 35, 37
X — Y	US 6,387,290 B1 (Brody et al) 14 May 2002 (14.05.2002), entire document	1, 4-10, 15, 17, 22 ----- 2,3,11-14,16,18-21, 23-43
Y	US 2003/0134416 A1 (YAMANISHI et al) 17 July 2003 (17.07.2003), fig 18 A and B, para 44, 45; fig 5 for filter	1-43

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T"
"A" document defining the general state of the art which is not considered to be of particular relevance	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 06 July 2006 (06.07.2006)	Date of mailing of the international search report <b>08 AUG 2006</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 Krishnan S. Menon <i>[Signature]</i> Telephone No. 571-272-1700 <i>[Signature]</i>

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/02229

## 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.: 1-43

- 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/US06/02229

### 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) 1-43, drawn to microfluidic filter.

Group II, claim(s) 44-63, drawn to method of filtering through microfluidic filter.

Group III, claim(s) 64-107, drawn to microfluidic filter with porous material in channel.

Group IV, claim(s) 108-127, drawn to method of filtering with microfluidic filter having porous material in channel.

Group V, claim(s) 128-170, drawn to microfluidic filter with 3 channels.

Group VI, claim(s) 171-190, drawn to method of filtering with microfluidic filter with 3 channels.

Group VII, claim(s) 191-204, drawn to method of making filter.

The inventions listed as Groups I-VII 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:

The special technical feature of claim 1, microfluidic filter with first and second channels, the second channel having cross-sectional dimension less than that of the first channel, which is shown by the prior art Lee et al (US 2002/0170825 A1), an X reference, to lack novelty or inventive step and thus does not define a contribution over the prior art.