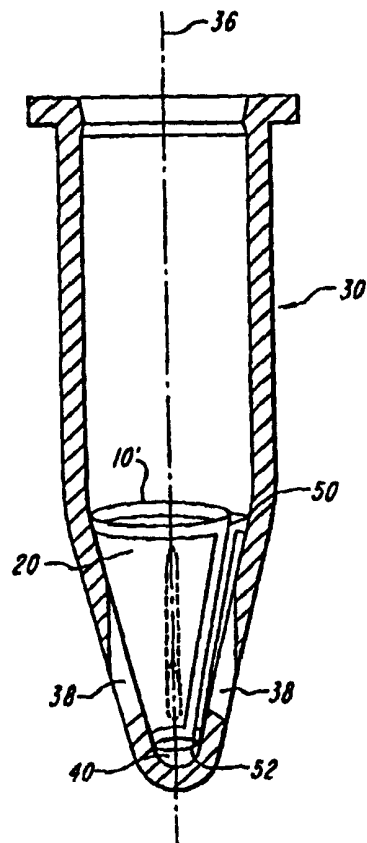




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : B01D 61/18, G01N 1/28, B01D 65/00	A3	(11) International Publication Number: WO 00/35565 (43) International Publication Date: 22 June 2000 (22.06.00)
(21) International Application Number: PCT/US99/28757 (22) International Filing Date: 3 December 1999 (03.12.99) (30) Priority Data: 60/111,068 4 December 1998 (04.12.98) US 60/116,890 22 January 1999 (22.01.99) US (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Applications US 60/111,068 (CIP) Filed on 4 December 1998 (04.12.98) US 60,116,890 (CIP) Filed on 22 January 1999 (22.01.99) (71) Applicant (for all designated States except US): ORBITAL BIOSCIENCES, LLC [US/US]; P.O. Box 304, Topsfield, MA 01983 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): BOWERS, William, F. [US/US]; 4 Winsor Lane, Topsfield, MA 01983 (US). YANKOPOULOS, Basil [US/US]; 34 Buttonwood Lane, Peabody, MA 01960 (US). TOWLE, Timothy [US/US]; 145 Concord Road, Lee, NH 03824 (US).		(74) Agents: FALKOFF, Michael, I. et al.; Nutter, McClen-nen & Fish, LLP, One International Place, Boston, MA 02110-2699 (US). (81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> (88) Date of publication of the international search report: 23 November 2000 (23.11.00)
(54) Title: ULTRAFILTRATION DEVICE AND METHOD OF FORMING SAME (57) Abstract An ultrafiltration device has a filter membrane sealed inside a reservoir, such as a tube. The tube has one or more ports and a closed portion distal to the port(s), and the filter membrane is sealed to the body along a closed contour widely surrounding the port(s) to provide a large area filtered outflow path. The method is effective to rapidly isolate a predetermined amount of a desired retentate in the distal portion of the tube. The method and device are also useful for quantitative transfer of smaller molecules and for multi-step processing of sample arrays. The vessels have a high filter area to volume ratio, maintain open filter surfaces and high rates of filtration throughout the spin, and are fully compatible with robotic loading, multistage operation and <i>Si(in situ)</i> multiwell plate filtrate and/or retentate assay or transfer. Attachment of the filter may be effected by heat welding. Preferably the vessel and filter are positioned between a press member and a heat sink and a superheated tool contacts the press member to selectively deliver a defined bolus of heat to the weld areas.		



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/28757

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B01D61/18 G01N1/28 B01D65/00

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)

IPC 7 B01D G01N

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, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 722 792 A (MIYAGI TOKUYA ET AL) 2 February 1988 (1988-02-02) claim 7; figures 14-17 ---	1-26, 32-38
A	US 3 488 768 A (RIGOPULOS PETER N) 6 January 1970 (1970-01-06) column 5, line 3 - line 12; figure 7 ---	1-26, 32-38
A	EP 0 480 298 A (ZUK PETER JR) 15 April 1992 (1992-04-15) claims 1,14 ---	1-26, 32-38
A	US 5 647 990 A (VASSAROTTI VINCENZO) 15 July 1997 (1997-07-15) claim 7 ---	1-26, 32-38
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in 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.

"&" document member of the same patent family

Date of the actual completion of the international search

21 June 2000

Date of mailing of the international search report

3 0. 06. 00

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Faria, C

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/28757

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 373 620 A (ZINE ANTHONY R) 20 December 1994 (1994-12-20) column 2, line 10 - line 45 ---	29-31
A	US 3 801 405 A (CORKERY G ET AL) 2 April 1974 (1974-04-02) column 1, line 30 - line 54 ---	29-31
A	US 3 082 587 A (BRIMBERG, TORSTEN) 26 March 1963 (1963-03-26) claim 1 -----	27,28

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/28757

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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 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.
- ☒ 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: 1-26,32-38

Independent claim 1 and its dependent claim 2
Independent claim 3 and its dependent claims 4-7
Independent claim 8
Independent claim 9 and its dependent claims 10
Independent claim 11 and its dependent claims 12-15
Independent claim 16
Independent claim 17 and its dependent claims 18-20
Independent claim 21 and its dependent claims 22 and 23
Independent claim 24 and its dependent claims 25 and 26
Independent claim 32 and its dependent claims 33-38

This claims relate to an ultrafiltration device, method of forming an ultrafiltration device and method of forming a centrifugal separation device.

2. Claims: 27-31

Independent claim 27 and its dependent claim 28
Independent claim 29 and its dependent claim 30
Independent claim 31

This claims relate to methods of attaching a membrane to a substrate.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/28757

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4722792 A	02-02-1988	JP 1827080 C JP 5035027 B JP 62176560 A	28-02-1994 25-05-1993 03-08-1987
US 3488768 A	06-01-1970	DE 1906179 A FR 2001558 A GB 1258803 A JP 50022509 B NL 6901840 A,B, SE 366228 B	28-08-1969 26-09-1969 30-12-1971 31-07-1975 12-08-1969 22-04-1974
EP 0480298 A	15-04-1992	US 5112484 A DE 69126691 D DE 69126691 T	12-05-1992 07-08-1997 05-02-1998
US 5647990 A	15-07-1997	DE 69406523 D DE 69406523 T EP 0651675 A JP 8501727 T AT 159668 T WO 9427724 A	04-12-1997 09-04-1998 10-05-1995 27-02-1996 15-11-1997 08-12-1994
US 5373620 A	20-12-1994	AU 4167393 A CA 2093740 A EP 0577983 A JP 6117539 A MX 9304159 A	13-01-1994 11-01-1994 12-01-1994 26-04-1994 31-01-1994
US 3801405 A	02-04-1974	NONE	
US 3082587 A	26-03-1963	CH 387243 A DE 1201017 B FR 1250855 A GB 936396 A	10-04-1961