

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
21 May 2004 (21.05.2004)

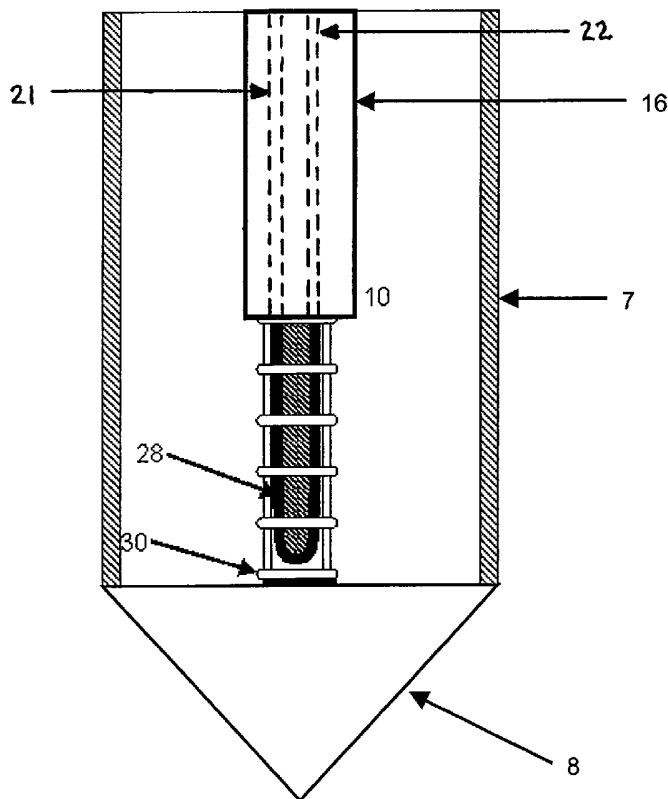
PCT

(10) International Publication Number
WO 2004/042355 A3

- (51) International Patent Classification⁷: **G01N 1/10**, B01D 61/00, 71/00
- (21) International Application Number: PCT/US2003/034645
- (22) International Filing Date: 31 October 2003 (31.10.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/422,515 31 October 2002 (31.10.2002) US
- (71) Applicant (for all designated States except US): **DAKOTA TECHNOLOGIES, INC.** [US/US]; 2201-A 12th Street North, Fargo, ND 58012-1801 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **ENGBRETSON**, Daniel, S. [US/US]; 2201 9th Street South, Fargo, ND 58013 (US).
- (74) Agents: **HEMPHILL, Stuart, R.** et al.; Intellectual Property Department, Suite 1500, 50 South Sixth Street, Minneapolis, MN 55402-1498 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, 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, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

(54) Title: SEMIPERMEABLE MEMBRANE-BASED SAMPLING SYSTEMS



(57) Abstract: The device and methods relate to a sampling device (2) for obtaining samples of analytes in a difficult-to-reach sampling location, such as below ground or underwater, and transporting the sample to an accessible delivery or collection site. The sampling device (2) comprises a semipermeable membrane-based sampling chamber (28), which can be positioned under the ground or water surface where analytes of interest can permeate into the chamber into the semipermeable membrane-based sampling chamber (28). Transfer channels (21, 22), which communicate with the semipermeable membrane-based sampling chamber (28), is used to transport the sample to the surface for analysis without removing the semipermeable membrane-based sampling chamber (28) from the sampling location.

WO 2004/042355 A3



ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE,
SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:
28 April 2005

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/34645

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(7) : G01N 1/10; B01D 61/00,71/00
 US CL : 73/863,863.21,863.23,863.71
 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. : 73/863,863.21,863.23,863.71

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 ITRC Website

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 U.S. Patents, U.S. Pre-Grant Patent Publications, DERWENT, JPO, EPO

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3,830,106 (Gardiner et al.) 20 August 1974, see entire document.	1, 2, 7-10, 12, 15-18
---		-----
Y		3, 4, 11, 12
Y	US 5,582,794 (Hagiwara et al.) 10 December 1996 (10.12.1996), column 6, lines 5-10.	11
Y	US 5,334,189 (Wade) 02 August 1994 (02.08.1994), figures 1-3, column 6, lines 54-64.	3, 4
Y	US 5,889,217 (Rossabi et al.) 30 March 1999 (30.03.1999), see entire document.	1-3, 6, 12-14
Y	US 5,465,628 (Timmons) 14 November 1995 (14.11.1995), see entire document.	1-3, 6, 12-14
Y	Vroblesky et al., "Field Tests of Diffusion Samplers for Inorganic Constituents in Wells and at a Ground-Waer-Discharge Zone", 2002,	12, 14
A	US 4,231,875 A (Carlsson et al.) 04 November 1980 (04.11.1980).	
A	US 4,759,227 A (Timmons) 26 July 1988 (26.07.1988).	

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"&"	document member of the same patent family
"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		

Date of the actual completion of the international search: 15 December 2004 (15.12.2004)
 Date of mailing of the international search report: 01 MAR 2005

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. (703) 305-3230
 Authorized officer: David A. Rogers, Telephone No. (703) 308-0956
J. Whitefield
 Far

INTERNATIONAL SEARCH REPORT

PCT/US03/34645

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 5,147,561 A (Burge et al.) 15 September 1992 (15.09.1992).	
A	US 5,639,956 A (Christy) 17 June 1997 (17.06.1997).	