



(51) International Patent Classification:

G01N 33/53 (2006.01) G01N 30/52 (2006.01)
G01N 30/89 (2006.01) G01N 30/88 (2006.01)

(21) International Application Number:

PCT/US2017/028856

(22) International Filing Date:

21 April 2017 (21.04.2017)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/326,783 24 April 2016 (24.04.2016) US

(71) Applicant: **WATERS TECHNOLOGIES CORPORATION** [US/US]; 34 Maple Street, Milford, MA 01757 (US).

(72) Inventors: **LAUBER, Matthew, A.**; 40 Greene Street, North Smithfield, RI 02896 (US). **MCCALL, Scott, A.**; 240 Mann School Road, Smithfield, RI 02917 (US). **OKANDEJI, Babajide**; 10 Burleigh Street, Apt. 13, Prov-

idence, RI 02908 (US). **IRANETA, Pamela, C.**; 6 Bigelow Circle, Brighton, MA 02135 (US).

(74) Agent: **DICEGLIE, Nicholas, J.** et al.; Locke Lord LLP, P.O. Box 55874, Boston, MA 02205 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,

(54) Title: CHARGED SURFACE REVERSED PHASE CHROMATOGRAPHIC MATERIALS METHOD FOR ANALYSIS OF GLYCANS MODIFIED WITH AMPHIPATHIC, STRONGLY BASIC MOIETIES

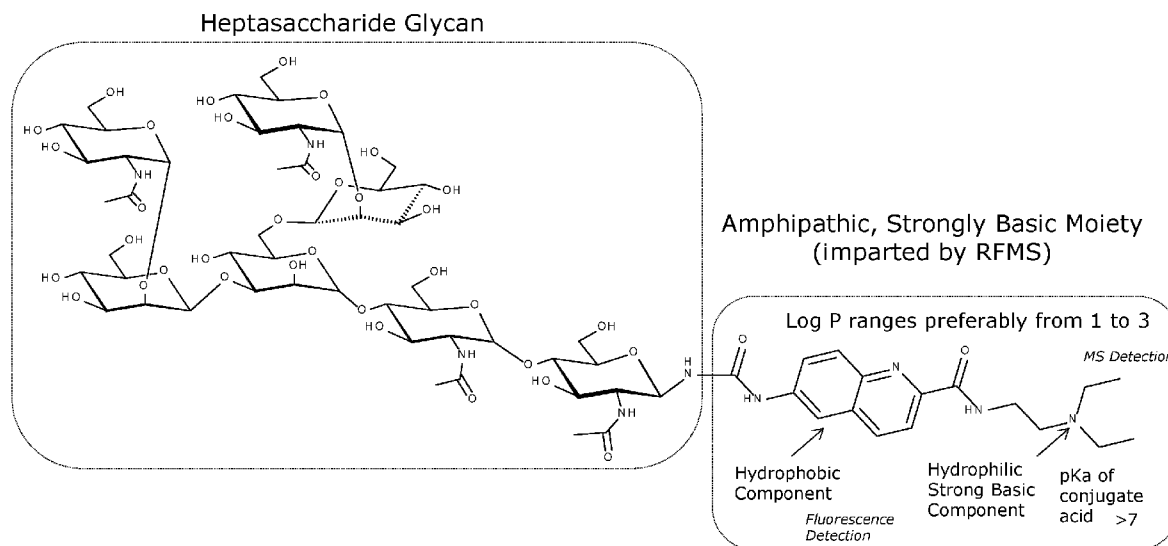


FIG. 1. Example chemical structure of a glycan modified with an amphipathic, strongly basic moiety. A heptasaccharide glycan labeled with RFMS.

(57) Abstract: The present invention provides novel methods for the chromatographic analysis of glycans using high purity chromatographic materials comprising a chromatographic surface wherein the chromatographic surface comprises a hydrophobic surface group and one or more ionizable modifier and a labeling reagent which is capable of providing amphipathic and strongly basic labeling moieties to a sample to be analyzed.



MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:

21 December 2017 (21.12.2017)

A. CLASSIFICATION OF SUBJECT MATTER**G01N 33/53(2006.01)i, G01N 30/89(2006.01)i, G01N 30/52(2006.01)i, G01N 30/88(2006.01)i**

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)

G01N 33/53; G01N 30/90; B01D 15/36; G01N 30/06; G01N 33/58; C07H 1/06; C07H 3/02; G01N 30/89; G01N 30/52; G01N 30/88

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal), STN(Registry, Caplus), Google & Keywords: glycan, labeling reagent, chromatographic analysis, surface modification, amphipathic, strongly basic labeling moiety, high purity, separation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2013-0319086 A1 (WATERS TECHNOLOGIES CORPORATION) 05 December 2013 See claims 1-17; paragraphs [0002], [0124]-[0126], [0259], [0294].	1-29
Y	US 2014-0242709 A1 (WATERS TECHNOLOGIES CORPORATION) 28 August 2014 See paragraphs [0008], [0024], [0048]-[0057], [0060]-[0063], [0070]-[0075], [0192].	1-29
A	WO 2015-166399 A1 (BECKMAN COULTER, INC.) 05 November 2015 See the whole document.	1-29
A	LAUBER, M. A. et al., "Rapid Preparation of Released N-Glycans for HILIC Analysis Using a Labeling Reagent that Facilitates Sensitive Fluorescence and ESI-MS Detection", Analytical chemistry, 2015, Vol. 87, No. 10, pages 5401-5409. See the whole document.	1-29
A	US 2015-0204824 A1 (WATERS TECHNOLOGIES CORPORATION) 23 July 2015 See the whole document.	1-29



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 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

20 November 2017 (20.11.2017)

Date of mailing of the international search report

20 November 2017 (20.11.2017)

Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

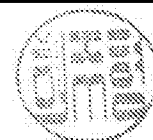
189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea

Facsimile No. +82-42-481-8578

Authorized officer

HEO, Joo Hyung

Telephone No. +82-42-481-8150



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2017/028856

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013-0319086 A1	05/12/2013	CN 102471513 A CN 105126792 A JP 2013-501243 A JP 2015-215354 A JP 6125230 B2 US 2012-0273404 A1 WO 2011-017418 A1	23/05/2012 09/12/2015 10/01/2013 03/12/2015 10/05/2017 01/11/2012 10/02/2011
US 2014-0242709 A1	28/08/2014	CN 103842818 A CN 105418586 A EP 2761296 A1 EP 2990401 A1 JP 2014-534176 A JP 2016-041686 A US 2014-0179011 A1 US 2014-0350263 A1 US 2016-0139136 A1 WO 2013-049622 A1	04/06/2014 23/03/2016 06/08/2014 02/03/2016 18/12/2014 31/03/2016 26/06/2014 27/11/2014 19/05/2016 04/04/2013
WO 2015-166399 A1	05/11/2015	CA 2945588 A1 CN 106459118 A EP 3137474 A1 JP 2017-514943 A US 2017-0045538 A1	05/11/2015 22/02/2017 08/03/2017 08/06/2017 16/02/2017
US 2015-0204824 A1	23/07/2015	DE 102014019372 A1 GB 2524361 A GB 2535658 A JP 2015-121539 A US 2015-0316515 A1	25/06/2015 23/09/2015 24/08/2016 02/07/2015 05/11/2015