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26 May 2005

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.

(54) Title: PROMOTED IONIZATION FOR SECONDARY ION MASS SPECTROMETRY

(57) Abstract: An information acquisition method for acquiring information on a target object, that includes a step of promoting ionization of the target object using a substance for promoting ionization of the target object to cause the target object to emit, and a step of acquiring information on the mass of the flew target object using time-of-flight secondary ion mass spectrometry.



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INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP2004/009788

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01N33/68

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 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, BIOSIS, EMBASE, COMPENDEX, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	MICHEL ROGER ET AL: "Self-assembled monolayers for polymer and protein cationization with time-of-flight secondary ion mass spectrometry" JOURNAL OF VACUUM SCIENCE AND TECHNOLOGY A. VACUUM, SURFACES AND FILMS, vol. 18, no. 4, July 2000 (2000-07), pages 1114-1118, XP012005097 abstract page 1114, left-hand column, line 17 - line 26 page 1114, right-hand column, paragraph B page 1115, left-hand column, paragraph E page 1116, right-hand column, paragraph C - page 1117, left-hand column, last line figure 4	1-16
Y	----- -/--	17,18

☒ 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

3 February 2005

Date of mailing of the international search report

24.02.2005

Name and mailing address of the ISA

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Weber, P

INTERNATIONAL SEARCH REPORT

Inter ial Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DELCORTE A ET AL: "Organic secondary ion mass spectrometry: sensitivity enhancement by gold deposition." ANALYTICAL CHEMISTRY. 1 OCT 2002, vol. 74, no. 19, 1 October 2002 (2002-10-01), pages 4955-4968, XP002303539 ISSN: 0003-2700 abstract figures 5a,5b,6,7 page 4956, right-hand column, paragraph 2 - page 4957, left-hand column, paragraph 1</p>	1-5,7-9, 14-16
Y	-----	17,18
X	<p>WU K J ET AL: "Matrix-enhanced secondary ion mass spectrometry: A method for molecular analysis of solid surfaces" ANALYTICAL CHEMISTRY 1996 UNITED STATES, vol. 68, no. 5, 1996, pages 873-882, XP002303540 ISSN: 0003-2700 abstract page 874, right-hand column, last paragraph - page 875, right-hand column, paragraph 1 figure 1</p>	1-5, 7-11, 14-16
Y	-----	17,18
X	<p>GUSEV A I ET AL: "Improvement of signal intensities in static secondary-ion mass spectrometry using halide additives and substrate modification" JOURNAL OF MASS SPECTROMETRY 1998 UNITED KINGDOM, vol. 33, no. 5, 1998, pages 480-485, XP008037909 ISSN: 1076-5174 abstract page 480, right-hand column, last paragraph - page 481, left-hand column, paragraph 1 page 481, right-hand column, last paragraph - page 482, left-hand column, paragraph 1 figure 1</p>	1-5, 7-11, 14-16
Y	-----	17,18
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INTERNATIONAL SEARCH REPORT

Intel Application No
PCT/JP2004/009788

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NICOLA A J ET AL: "Enhancement of Ion Intensity in Time-of-Flight Secondary-Ionization Mass Spectrometry" JOURNAL OF THE AMERICAN SOCIETY FOR MASS SPECTROMETRY, ELSEVIER SCIENCE INC, US, vol. 7, no. 5, 1 May 1996 (1996-05-01), pages 467-472, XP004051883 ISSN: 1044-0305 abstract page 468, left-hand column, last paragraph - right-hand column, paragraph 4 figure 1	1-5, 7-11, 14-16
Y	-----	17,18
X	US 2002/195558 A1 (MUTZ MITCHELL W ET AL) 26 December 2002 (2002-12-26) page 9, left-hand column, line 16 - line 18 paragraphs '0002!, '0051!, '0071!, '0072! claims 1-3,14,16-20,28-33,42,43,45	7,17-22, 28
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X	TODD PETER J ET AL: "Organic ion imaging of biological tissue with secondary ion mass spectrometry and matrix-assisted laser desorption/ionization" JOURNAL OF MASS SPECTROMETRY, vol. 36, no. 4, April 2001 (2001-04), pages 355-369, XP008037954 ISSN: 1076-5174 abstract page 355, left-hand column, line 1 - line 14 figure 6	8,10,11, 14,15, 22,28
Y	-----	17,18, 22-28
X	US 5 808 300 A (CAPRIOLI RICHARD M) 15 September 1998 (1998-09-15) column 19, line 1 - line 5 column 21, line 28 - column 22, line 46	8,10,11, 14,15
Y	-----	22-25,28
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INTERNATIONAL SEARCH REPORT

International Application No
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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>JOHN C M ET AL: "Static secondary ion mass spectrometry (SSIMS) of biological compounds in tissue and tissue-like matrices"</p> <p>INTERNATIONAL JOURNAL OF MASS SPECTROMETRY AND ION PROCESSES, ELSEVIER SCIENTIFIC PUBLISHING CO. AMSTERDAM, NL, vol. 161, no. 1, 1 February 1997 (1997-02-01), pages 47-67, XP004058797</p> <p>ISSN: 0168-1176</p> <p>the whole document</p>	1-21
A	<p>RODDY THOMAS P ET AL: "Identification of cellular sections with imaging mass spectrometry following freeze fracture."</p> <p>ANALYTICAL CHEMISTRY. 15 AUG 2002, vol. 74, no. 16, 15 August 2002 (2002-08-15), pages 4020-4026, XP002303725</p> <p>ISSN: 0003-2700</p> <p>the whole document</p>	1-21
A	<p>BELU A M ET AL: "Enhanced TOF-SIMS imaging of a micropatterned protein by stable isotope protein labeling."</p> <p>ANALYTICAL CHEMISTRY. 15 JAN 2001, vol. 73, no. 2, 15 January 2001 (2001-01-15), pages 143-150, XP002303726</p> <p>ISSN: 0003-2700</p> <p>cited in the application</p> <p>the whole document</p>	1-21
P,X	<p>NYGREN H ET AL: "Bioimaging TOF-SIMS: localization of cholesterol in rat kidney sections"</p> <p>FEBS LETTERS, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 566, no. 1-3, 21 May 2004 (2004-05-21), pages 291-293, XP004509365</p> <p>ISSN: 0014-5793</p> <p>abstract</p> <p>figures 1,3</p> <p>page 291, right-hand column, line 19 -</p> <p>page 292, left-hand column, line 14</p>	1-5,7-9, 14-16

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SJOEVALL P ET AL: "IMAGING OF MEMBRANE LIPIDS IN SINGLE CELLS BY IMPRINT-IMAGING TIME-OF-FLIGHT SECONDARY ION MASS SPECTROMETRY" ANALYTICAL CHEMISTRY, AMERICAN CHEMICAL SOCIETY. COLUMBUS, US, vol. 75, no. 14, 6 June 2003 (2003-06-06), pages 3429-3434, XP001176022 ISSN: 0003-2700	22-24, 28
Y	the whole document	26, 27
P, X	----- WO 03/104794 A1 (SP SVERIGES PROVNINGS OCH FORSKNINGSINSTITUT AB; LAUSMAA, JUKKA; SJOEV) 18 December 2003 (2003-12-18) the whole document	22-24, 28
A	----- US 5 453 199 A (AFEYAN ET AL) 26 September 1995 (1995-09-26) the whole document -----	22-25

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte 1al Application No
PCT/JP2004/009788

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002195558	A1	26-12-2002	US 2002171037 A1 21-11-2002
			US 2002125424 A1 12-09-2002
			US 2002109084 A1 15-08-2002
			AU 2003217875 A1 16-09-2003
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			WO 9319844 A1 14-10-1993

INTERNATIONAL SEARCH REPORT

International application No.

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Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.b of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:
 - a. type of material
 - ☒ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material
 - ☒ in written format
 - ☒ in computer readable form
 - c. time of filing/furnishing
 - ☒ contained in the international application as filed
 - ☒ filed together with the international application in computer readable form
 - ☐ furnished subsequently to this Authority for the purpose of search
2. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
3. Additional comments:

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Box 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 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 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: 1-21 (completely), 26,27 (partially)

Promotion of TOF-SIMS ionization using substances that promote ionization

2. claims: 22-25,28 (completely) 26,27 (partially)

Promotion of TOF-SIMS ionization by sample transfer to substrate.
