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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: METHOD AND APPARATUS FOR DE-CONVOLUTING A CONVOLUTED SPECTRUM

(57) Abstract: Embodiments of the present invention relate to methods and systems suitable for de-convoluting a convoluted spectrum, such as by way of example, data obtained from a mass spectrometer.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/39301

A. CLASSIFICATION OF SUBJECT MATTER

IPC: H01J 49/00(2006.01);G06F 19/00(2006.01)

USPC: 250/282;702/23;436/173

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. : 250/282; 702/23; 436/173

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)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0192708 A1 (STEEN et al.) 19 December 2002 (19.12.2002), paragraph [0077], lines 17-23.	63, 64
A	US 6,524,803 B2 (OVERNEY et al.) 25 February 2003 (25.02.2003).	1-62, 65-67
A	US 2005/0061967 A1 (SHVARTSBURG et al.) 24 March 2005 (24.03.2005).	1-62, 65-67
A	US 2005/0153456 A1 (PAPPIN) 14 July 2005 (14.07.2005).	1-62, 65-67
A	US 2005/0228591 A1 (HUR et al.) 13 October 2005 (13.10.2005).	1-62, 65-67

☐ 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	"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
"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
"I" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

02 May 2006 (02.05.2006)

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/39301

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.:

- 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/US04/39301

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) 1-62, drawn to a method for normalizing a mass spectrum.

Group II, claim(s) 63-67, drawn to a method for mass analyzing an analyte.

The inventions listed as Groups I and II 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 invention of Group I relates to a method for processing the data output of a mass spectrometer while the invention of Group II relates to a method of using a mass spectrometer to analyze a sample.

Continuation of B. FIELDS SEARCHED Item 3:

EAST

search terms: isotop\$2, mass spectr\$2, convolut\$3, correlat\$3, normaliz\$5, label\$4, fragment, energy, overlap\$4, ((up or down) adj mass) peak, reporter ion, signature ion, (reporter or signature), (fragment or daughter), scan