(54) Title: METHOD AND APPLICATIONS TO ENHANCE AND IMAGE OPTICAL SIGNALS FROM BIOLOGICAL OBJECTS

(57) Abstract: A method and apparatus for imaging biological objects (100). A SERS surface (102) is provided having enhancing structures uniformly distributed on the surface. The surface includes a two dimensional area of at least 5 x 105 nm. The enhancing structures may have a size, in at least one dimension of height, width and length, ranging from 100 nm to 1000 nm. A biological material (100) is deposited on the SERS surface (102). The biological material on the SERS surface is illuminated using a monochromatic light source (110) producing Raman scattered photons. The Raman scattered photons are filtered using a tunable filter (135) into a plurality of predetermined wavelength bands. A two-dimensional array detector (145) detects the filtered Raman scattered photons, in a spatially accurate manner. The results of filtering and detecting steps are combined to produce a plurality of spectrally resolved Raman images of the biological material.
Published:
— with international search report

(88) Date of publication of the international search report:
13 December 2007

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.
A. **CLASSIFICATION OF SUBJECT MATTER**

**IPC:**  G01J 3/44 (2006.01)

**USPC:** 356/301

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.: 356/301; 250/201.5

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

NONE

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

EAST

C. **DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 6,583,397 B (Vu-Dinh) 24 June 2003 (24.06.2003), See entire document.</td>
<td>1-18</td>
</tr>
</tbody>
</table>

See patent family annex

<table>
<thead>
<tr>
<th>Special categories of cited documents:</th>
<th>See patent family annex</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot; document defining the general state of the art which is not considered to be of particular relevance</td>
<td>&quot;I&quot; 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</td>
</tr>
<tr>
<td>&quot;E&quot; earlier application or patent published on or after the international filing date</td>
<td>&quot;X&quot; 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</td>
</tr>
<tr>
<td>&quot;L&quot; 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)</td>
<td>&quot;Y&quot; 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</td>
</tr>
<tr>
<td>&quot;O&quot; document referring to an oral disclosure, use, exhibition or other means</td>
<td>&quot;&amp;&quot; document member of the same patent family</td>
</tr>
<tr>
<td>&quot;P&quot; document published prior to the international filing date but later than the priority date claimed</td>
<td></td>
</tr>
</tbody>
</table>

**Date of the actual completion of the international search**

20 August 2007 (20.08.2007)

**Date of mailing of the international search report**

24 SEP 2007

**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. (571) 273-3201

**Authorized officer**

Tu T. Nguyen

**Telephone No.** (703) 308-0956

Form PCT/ISA/210 (second sheet) (April 2005)