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**WO 2005/034204 A3**

(54) Title: NANOBIOSENSOR AND CARBON NANOTUBE THIN FILM TRANSISTORS

(57) Abstract: The present invention is directed to systems and methods for detecting biological and chemical species in liquid and gaseous phase. The systems and methods utilize carbon nanotubes to enhance sensitivity and selectivity towards the reacting species by decreasing interference and detecting a wide range of concentrations.

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US04/32574

<p><b>A. CLASSIFICATION OF SUBJECT MATTER</b>                  IPC(7) : G01N 33/50; H01L 49/00                  US CL : 205/775,777.5; 257/253                  According to International Patent Classification (IPC) or to both national classification and IPC</p>																													
<p><b>B. FIELDS SEARCHED</b>                  Minimum documentation searched (classification system followed by classification symbols)                  U.S. : 205/775,777.5; 257/253</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)                  Please See Continuation Sheet</p>																													
<p><b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b></p> <table border="1"> <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>X</td> <td>Gao, M., Dai, L., Wallace, G.G. Biosensors Based on Aligned Carbon Nanotubes Coated with Inherently Conducting Polymers</td> <td>1-6, 8-15, 17, 18, 21-23</td> </tr> <tr> <td>Y</td> <td>Electroanalysis August 2003, Vol 15. No. 13, pages 1089-1094, especially pages 1089 and 1090.</td> <td>7, 16</td> </tr> <tr> <td>Y</td> <td>US 2002/0172963 (KELLY et al) 21 November 2002 (21.11.2002), abstract, paragraphs 0010 and 0011.</td> <td>7, 16</td> </tr> <tr> <td>X,E</td> <td>US 6,905,655 B2 (GABRIEL et al) 14 June 2005 (14.06.2005), figures 5 and 6, and columns 7 and 8.</td> <td>1, 10, 22-23</td> </tr> <tr> <td>Y,E</td> <td></td> <td>2-9, 11-18</td> </tr> <tr> <td>X</td> <td>REGE, K. et al Enzyme-Polymer-Single Walled Carbon Nanotube Composites as Biocatalytic Films Nano Letters April 2003, Vol. 3 No. 6, pages 829-832, especially page 829.</td> <td>19-20</td> </tr> <tr> <td>A, E</td> <td>US 6,894,359 B2 (BRADLEY et al) 17 May 2005 (17.05.2005) whole document</td> <td>1-23</td> </tr> <tr> <td>A</td> <td>EP 0 634 488 A2 (PARK et al) 18 January 1995 (18.01.1995) whole document</td> <td>1-23</td> </tr> </tbody> </table>			Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	Gao, M., Dai, L., Wallace, G.G. Biosensors Based on Aligned Carbon Nanotubes Coated with Inherently Conducting Polymers	1-6, 8-15, 17, 18, 21-23	Y	Electroanalysis August 2003, Vol 15. No. 13, pages 1089-1094, especially pages 1089 and 1090.	7, 16	Y	US 2002/0172963 (KELLY et al) 21 November 2002 (21.11.2002), abstract, paragraphs 0010 and 0011.	7, 16	X,E	US 6,905,655 B2 (GABRIEL et al) 14 June 2005 (14.06.2005), figures 5 and 6, and columns 7 and 8.	1, 10, 22-23	Y,E		2-9, 11-18	X	REGE, K. et al Enzyme-Polymer-Single Walled Carbon Nanotube Composites as Biocatalytic Films Nano Letters April 2003, Vol. 3 No. 6, pages 829-832, especially page 829.	19-20	A, E	US 6,894,359 B2 (BRADLEY et al) 17 May 2005 (17.05.2005) whole document	1-23	A	EP 0 634 488 A2 (PARK et al) 18 January 1995 (18.01.1995) whole document	1-23
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<p><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.      <input type="checkbox"/> See patent family annex.</p>																													
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"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</td> </tr> <tr> <td>"E" earlier application or patent published on or after the international filing date</td> <td>"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</td> </tr> <tr> <td>"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)</td> <td>"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</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"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	"P" document published prior to the international filing date but later than the priority date claimed																		
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"P" document published prior to the international filing date but later than the priority date claimed																													
<p>Date of the actual completion of the international search 09 January 2006 (09.01.2006)</p>		<p>Date of mailing of the international search report <b>07 FEB 2006</b></p>																											
<p>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</p>		<p>Authorized officer                  Nam Nguyen <i>f. W. Whiffled</i>                  Telephone No. (571) 272-6393  <i>tc</i></p>																											

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International application No.  
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**C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT**

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A	MARTEL, R. et al Single- and multi-wall carbon nanotube field-effect transistors Applied Physics Letters October 1998, Vol 73 No. 17, pages 2447-2449	1-23

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US04/32574

Continuation of B. FIELDS SEARCHED Item 3:  
Google scholar  
search terms: carbon, nanotubes, embedded, polymer, matrix