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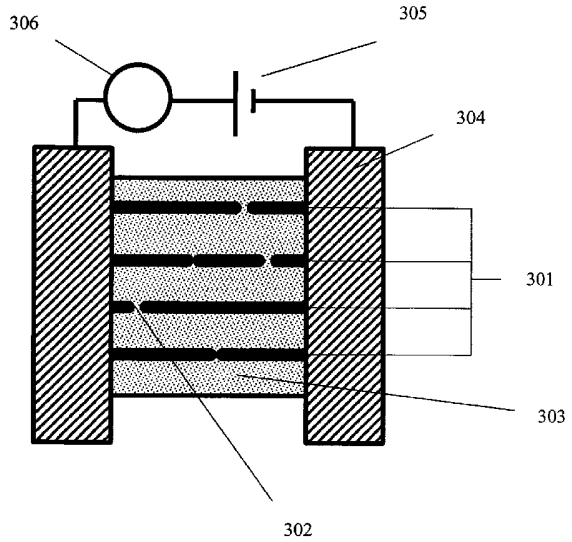
(54) Title: FORMATION OF METAL NANOWIRES FOR USE AS VARIABLE-RANGE HYDROGEN SENSORS




(57) Abstract: The present invention provides for variable-range hydrogen sensors (502) and methods for making same. Such variable-range hydrogen sensors (502) comprise a series of fabricated Pd-Ag (palladium-silver) nanowires (106, 301) - each wire of the series having a different Ag to Pd ratio-with nanobreakjunctions (302) in them and wherein the nanowires (106, 301) have predefined dimensions and orientation. When the nanowires (106, 301) are. exposed to $H_2$, their lattace swells when the $H_2$ concentration reaches a threshold value (unique to that particular ratio of Pd to Ag). This causes the nanobreakjunctions (302) to close leading to a 6-8 orders of magnitude decrease in the resistance along the length of the wire and providing a sensing mechanism for a range of hydrogen concentrations.

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/27083

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : G01N 7/00, 33/497

US CL : 73/19.01

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. : 73/19.01

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)

NONE

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | FAVIER, F. et al, Hydrogen Sensors and Switches from Electrodeposited Palladium Mesowire Arrays, Science Magazine, Volume 293, 21 September 2001, pages 2227-2231. | 1-20 |
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| Y, P | US 2003/0079999 A1 (PENNER et al) 01 May 2003 (01.05.2003), entire document. | 1-20 |
| Y, P | WALTER, E. C., et al, Sensors from electrodeposited metal nanowires, Surface and Interface Analysis 2002; 34: 409-412. | 1-20 |
| A | US 2003/0135971 A1 (LIBERMAN et al) 24 July 2003 (24.07.2003), paragraph 0012. | 1-20 |

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