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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

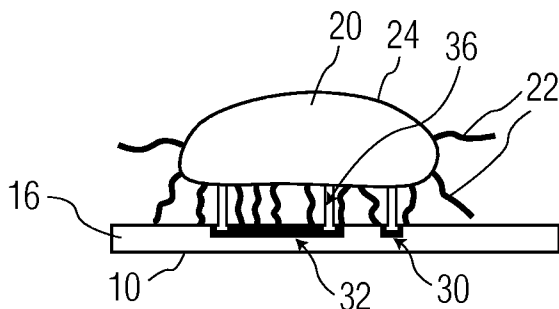
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19 April 2007

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.

(54) Title: APPARATUS AND METHOD FOR COUPLING IMPLANTED ELECTRODES TO NERVOUS TISSUE



(57) Abstract: An apparatus and method for improving electrical contact between an implanted device (10) for recording or stimulating neuronal activity and surrounding tissue (12) (e.g., brain tissue, nerve fibers, etc.). In an exemplary embodiment, a nanometer sized topographic structure (36, 136) (e.g., a nanometer scale pillar) is processed for electrical connection with a corresponding electrode (30, 32) of the implanted device (10). The nanometer scale topographic structure (36, 136) bridges a gap (26) between the implanted device (10) and surrounding tissue (12), thus improving neuron-electrode coupling therebetween. The present disclosure can also be extended to any application where capacitive coupling to single or multiple cells (20) can be used for sensing and/or stimulation thereof.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2006/052348A. CLASSIFICATION OF SUBJECT MATTER
INV. A61N1/05 A61N1/36 A61B5/04

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)
A61N A61B

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 969 468 A (BYERS CHARLES L [US] ET AL) 13 November 1990 (1990-11-13)	1-3, 7, 8, 12-14
Y	the whole document	4-6
X	WO 2004/041996 A2 (UNIV RAMOT [IL]; BEN-JACOB ESHEL [IL]; SEGEV RONEN [IL]; BARUCHI ITAY) 21 May 2004 (2004-05-21)	1-7, 12-14
Y	the whole document	4-6
X	US 2004/182707 A1 (JARDEMARK KENT [SE] ET AL) 23 September 2004 (2004-09-23)	1-8, 12-14
	the whole document	
A	US 2002/028991 A1 (THOMPSON DAVID L [US]) 7 March 2002 (2002-03-07)	1-7
	the whole document	
	-/--	

 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
- *E* earlier document but published on or after the international filing date
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- *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

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- *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
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- * & * document member of the same patent family

Date of the actual completion of the international search

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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.
P, A	WO 2005/070495 A2 (UNIV LELAND STANFORD JUNIOR [US]) 4 August 2005 (2005-08-04) the whole document -----	1-8, 12-14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2006/052348

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.: 15-20
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
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:

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.

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2006/052348

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4969468	A	13-11-1990	NONE	
WO 2004041996	A2	21-05-2004	AU 2003278586 A1	07-06-2004
US 2004182707	A1	23-09-2004	NONE	
US 2002028991	A1	07-03-2002	NONE	
WO 2005070495	A2	04-08-2005	AU 2005206206 A1 CA 2554248 A1 EP 1718364 A2	04-08-2005 04-08-2005 08-11-2006