Title: NEURAL STIMULATION ARRAY PROVIDING PROXIMITY OF ELECTRODES TO CELLS VIA CELLULAR MIGRATION

Abstract: An interface for selective excitation or sensing of neural cells in a biological neural network is provided. The interface includes a membrane with a number of channels passing through the membrane. Each channel has at least one electrode within it. Neural cells in the biological neural network grow or migrate into the channels, thereby coming into close proximity to the electrodes. Once one or more neural cells have grown or migrated into a channel, a voltage applied to the electrode within the channel selectively excites the neural cell(s) in that channel. The excitation of these neural cell(s) will then transmit throughout the neural network (i.e. cells and axons) that is associated with the neural cell(s) stimulated in the channel. An alternative interface provides cell excitation via an array of electrically conductive pillars on a substrate. The pillars have electrically insulated sides and exposed top surfaces, to provide selective cell excitation.
**INTERNATIONAL SEARCH REPORT**

### A. CLASSIFICATION OF SUBJECT MATTER

<table>
<thead>
<tr>
<th>IPC(7)</th>
<th>US CL.</th>
</tr>
</thead>
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<tr>
<td>A61N 1/36</td>
<td>607/054</td>
</tr>
</tbody>
</table>

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. : 607/054, 053. 001, 002, 116, 148

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)

EAST search terms: retina, substrate, neural, channel, electrode, silicon, photoresist, array

### 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>
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<tbody>
<tr>
<td>X</td>
<td>US 5,109,844 A (de JUAN, JR. et al.) 05 May 1992 (05.05.1992), entire document.</td>
<td>1-5 and 7-9</td>
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<tr>
<td>X</td>
<td>US 4,837,049 A (BYERS et al.) 06 June 1989 (06.06.1989), entire document.</td>
<td>13 and 17</td>
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</tbody>
</table>

- **X** special categories of cited documents:
  - "*" document defining the general state of the art which is not considered to be of particular relevance
  - "E" earlier publication or patent published on or after the international filing date
  - "L" document which may throw doubts on priority claims or which is cited to establish the publication date of another citation or other special reason (as specified)
  - "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
  - "A" document member of the same patent family
  - "Y" 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
  - "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
  - "T" document of particular relevance; the claimed invention cannot be considered novel or 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

Date of the actual completion of the international search

11 May 2005 (11.05.2005)

Date of mailing of the international search report

17 JUN 2005

Name and mailing address of the ISA/US

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