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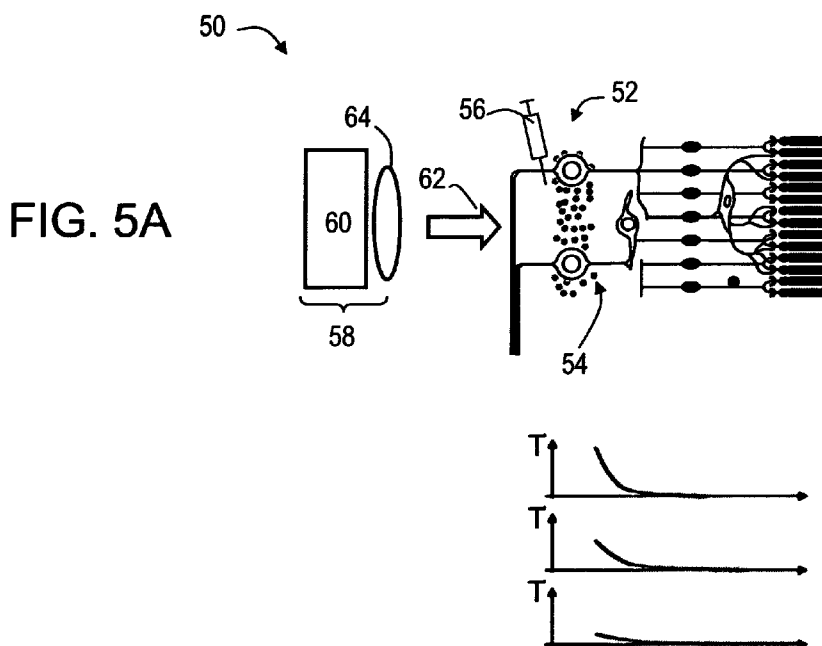
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Published:

— with international search report

[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR OPTICAL STIMULATION OF NEURONS



(57) Abstract: A method of stimulating neurons present in a living body is disclosed. The method comprises directing light to an artificial light absorbing medium implanted extracellularly at a target location having the neurons therein, wherein wavelengths and intensities of the light are selected so as to heat the light absorbing medium by light absorption. The heating is sufficient to stimulate neurons nearby the light absorbing medium. In some embodiments, the light is spatially modulating so as to encode a stimulation pattern therein.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:

23 July 2009

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2008/001574

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61N5/06

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

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, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ALEXANDER M ARAVANIS ET AL: "An optical neural interface: in vivo control of rodent motor cortex with integrated fiberoptic and optogenetic technology" JOURNAL OF NEURAL ENGINEERING, INSTITUTE OF PHYSICS PUBLISHING, BRISTOL, GB, vol. 4, no. 3, 1 September 2007 (2007-09-01), pages S143-S156, XP020123750 ISSN: 1741-2552 abstract; figure 1 ----- -/--	5,6,8

☒ 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
- *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)
- *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

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

Date of the actual completion of the international search

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International application No

PCT/IL2008/001574

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WELLS J ET AL: "Biophysical mechanisms of transient optical stimulation of peripheral nerve" BIOPHYSICAL JOURNAL BIOPHYSICAL SOCIETY USA, vol. 93, no. 7, 1 October 2007 (2007-10-01), pages 2567-2580, XP002529607 ISSN: 0006-3495 cited in the application abstract; figure 1	6
Y	US 3 900 034 A (KATZ JOSEPH J ET AL) 19 August 1975 (1975-08-19) column 5, line 25 - line 48 column 6, line 14 - line 19	6,7,10, 18-22
X	WO 2006/055582 A (DECHARMS CHRISTOPHER [US]) 26 May 2006 (2006-05-26) paragraph [0113] - paragraph [0114] paragraph [0119] paragraph [0157]	5,8,9, 14-17, 23-25, 32-37
Y		6,7,10, 18-22
X	WANG SHENG ET AL: "All optical interface for parallel, remote, and spatiotemporal control of neuronal activity." NANO LETTERS DEC 2007, vol. 7, no. 12, 23 November 2007 (2007-11-23), pages 3859-3863, XP007908648 ISSN: 1530-6984 cited in the application abstract; figure 1	5,8,9, 11-13, 17,32
X	NAIROUZ FARAH ET AL: "Patterned Optical Activation of Retinal Ganglion Cells" ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY, 2007. EMBS 2007. 29TH ANNUAL INTERNATIONAL CONFERENCE OF THE IEEE, IEEE, PISCATAWAY, NJ, USA, 1 August 2007 (2007-08-01), pages 6368-6370, XP031150969 ISBN: 978-1-4244-0787-3 the whole document	5,8,9, 11-13, 17,32
A	US 2003/208245 A1 (MAHADEVAN-JANSEN ANITA [US] ET AL) 6 November 2003 (2003-11-06) cited in the application abstract	6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL2008/001574

Box No. 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.: 1-4, 26-31
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 therapy and/or 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 No. 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:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
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 and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 5, 8, 11, 12

selectively stimulating neurons by spatially modulated light

2. claim: 6

stimulating neurons by optically heating an artificial light
medium

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IL2008/001574

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
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