

PATENTS

Optogenetics

Recent patents related to the use of optogenetics for neural stimulation, interface for prosthetic devices and control of the secretion of polypeptides of interest.

Patent number	Description	Assignee	Inventor	Date
US 10,434,329	A power transmitter that can include a microwave cavity resonant at a desired operating frequency, a hexagonal mesh top to leak evanescent fields out of the cavity, and a plurality of orthogonal monopole feeds with 90 degree phase differences creating circularly polarized waves. The power transmitter can be configured to transmit energy to a wireless device implanted in an animal passing through the evanescent fields. Also, implantable devices that can receive wireless energy from the power transmitter and stimulate the animals (e.g., optogenetic or electrical stimulation).	Board of Trustees of Stanford University (Palo Alto, CA, USA)	Poon AS, Ho JS, Tanabe Y, Yeh AJ, Montgomery KL, Grosenick L, Ferenczi EA, Tsao V, Iyer SM, Delp SL	10/8/2019
US 10,371,776	Systems and methods involving the use of magnetic resonance imaging and optogenetic neural stimulation, including modifying a target neural cell population in a first region of a brain to express light-responsive molecules.	Board of Trustees of Stanford University (Palo Alto, CA, USA)	Deisseroth K, Lee JH	8/6/2019
US 10,350,246	The use of light-gated cation-selective channelrhodopsins (ChRs) for the optogenetic control of the secretion of a polypeptide of interest in adipocytes. Engineered adipocytes comprising a ChR polypeptide, and/or a nucleic acid encoding same, and a secretory polypeptide precursor comprising a bioactive polypeptide and a signal peptide suitable for secretion of the bioactive polypeptide by the engineered adipocytes, can be used for the management or treatment of diseases or conditions in which the secretion of a polypeptide of interest is beneficial, such as the secretion of insulin in patients with diabetes.	Governors of the University of Alberta (Edmonton, Alberta, Canada)	Light PE	7/16/2019
US 10,220,092	Devices, systems and methods for optogenetic modulation of action potentials in target cells, including light-generating devices, control devices, and delivery devices for delivering vectors to target cells; systems for light-activated proteins, response proteins, nucleic acids comprising nucleotide sequences encoding these proteins, and expression systems that facilitate expression of these proteins in target cells; and methods of using the subject devices and systems to optogenetically inhibit and intercept action potentials in target cells, e.g., to treat a neurological or psychiatric condition in a human or non-human animal.	Board of Trustees of Stanford University (Palo Alto, CA, USA), Humboldt University of Berlin (Berlin)	Deisseroth KA, Ferenczi EA, Hegemann P	3/5/2019
US 10,188,871	A flat optogenetic cuff interface (FOCI) configured for functional optical stimulation of axons in a single fascicle of a peripheral nerve bundle in which the axons have been genetically modified to express light-sensitive proteins for excitation or inhibition of the nerves. The FOCI may be used as an interface for prosthetic devices to restore lost sensory or motor function, to augment human sensor or motor performance or to modulate autonomic functions.	Teledyne Scientific & Imaging (Thousand Oaks, CA, USA)	Simons S, Zhou J, Peot MA, Grill W, Turner D	1/29/2019
US 10,052,383	Compositions, devices, systems and methods for optogenetic modulation of action potentials in target cells, including light-generating devices, control devices, and delivery devices for delivering light-responsive polypeptides, or nucleic acids encoding same, to target cells; subject compositions and systems for light-activated polypeptides, nucleic acids comprising nucleotide sequences encoding these polypeptides, and expression systems that facilitate expression of these polypeptides in target cells; and methods of using the subject devices and systems to optogenetically manipulate action potentials in target cells, e.g., to treat a neurological or psychiatric condition in a human or animal.	Board of Trustees of Stanford University (Palo Alto, CA, USA)	Deisseroth KA, Lee SY, Ramakrishnan C, Berndt A	8/21/2018
US 10,048,275	Screening compounds by exposing a plurality of cardiomyocytes to a compound, wherein the cardiomyocytes express an optogenetic reporter of membrane potential and an optogenetic reporter of calcium level; receiving light from the optogenetic reporter of membrane potential; creating an action potential waveform using the received light; and analyzing the action potential waveform to determine the presence or absence of a risk for arrhythmia associated with the compound.	Q-State Biosciences (Cambridge, MA, USA)	Kralj J, Dempsey G, Werley C, Cohen A	8/14/2018

Source: United States Patent and Trademark Office (<http://www.uspto.gov>).

Published online: 3 December 2019
<https://doi.org/10.1038/s41587-019-0343-4>