SPIE. PHOTONICS WEST BIOS

The Moscone Center
San Francisco, California, United States
2 - 7 February 2019

Optogenetics and Optical Manipulation 2019

This conference has an open **call for papers:**

SUBMIT AN ABSTRACT
(SIGN IN REQUIRED)

Submission guidelines for Authors and Presenters

Important Dates

SHOW | HIDE

Abstract Due:
25 July 2018

Author Notification:
1 October 2018

Manuscript Due Date:
11 January 2019

Conference Committee

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Conference Chairs

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Call for Papers

By combining genetic and optical methods, "optogenetics" has allowed control (stimulation or silencing) of electrically-activatable, genetically-targeted cells with high temporal precision. This has heavily impacted neuroscience research by allowing dissection of functioning of neuronal circuitry. Since its first in-vivo demonstration, optogenetics technology has been applied to freely moving mammals and could eventually form the basis of treatments of neurological disorders such as for vision restoration, psychiatric treatment and pain-control. Optogenetic technology is also impacting other biomedical research areas such as for control of cardiac function, stem cell differentiation and reprogramming of metabolic activities in mammalian cells. In all of these settings, optics is playing a crucial role in both delivering light for cellular control, and in some cases for imaging the consequences of this control. The introduction of non-linear optics has further allowed very precise and in-depth spatial control of optogenetic stimulation. Though fiber optic and waveguide technology is enabling delivery of light to targeted tissue regions, other photonic imaging technologies have the potential to significantly contribute to imaging read-outs of neural/cellular activities during optogenetic stimulation (e.g. intravital microscopy, diffuse-reflectance, fluorescence, and SHG etc.). While a detailed understanding of tissue optics is essential for delivery of stimulation light, use of crystallography and spectroscopic methods will enhance the understanding of the interaction processes between light and optogenetic molecules.

Innovative schemes for delivery and control of light irradiation, including miniaturized light source, fiber optics, waveguides and special beams can potentially improve optogenetic therapy. Optical microscopy, spectroscopy, and imaging techniques hold significant promise for characterizing optogenetic probes and submissions in these areas are especially welcome. New therapeutic applications, including control of central and peripheral nervous system, cardiac system, stem cells as well as control of metabolic activities will also be topics of interest for this conference. Contributions from all biomedical specialties and basic sciences are encouraged. Technical and scientific papers related to advancement in development of optogenetics probes, their characterization, and applications, as well as other emerging hybrid optical technologies, coupled with new imaging and detection modalities are solicited. These include:

Applications of optogenetic modulation

- neural modulation for medical applications
- controlling stem cell activity and their differentiation
- manipulation of cardiac and other excitatory cellular systems
- reprogramming of metabolic activities
- dissection of neural circuitry: functional connectomics
- modulation of other cellular functions.

Biophysics and spectroscopic characterization of opsins

- characterization of opsins by FTIR, Raman and other optical spectroscopic methods
- elucidation of the molecular structure of opsins by crystallography
- novel electrophysiological evaluation methods
- modeling of opsin-photocycle.

Novel sources for optogenetic stimulation

- two-photon optogenetics
- spatially and temporally modulated beams
- waveguides and light delivery methods for in-vivo applications
- µLED array based devices for prosthetic applications
- modeling propagation of stimulating light in tissue.

New opsins and delivery methods for optogenetics

- functionally-improved opsins with enhanced spectral and electrical properties
- viral vectors and new expression strategies
- optically-controlled delivery and gene expression
- advanced combinatorial optogenetic probes.

Other emerging hybrid optical technologies

- photochemical stimulation
- optoelectric activation
- optofluidic manipulation
- photothermal stimulation.

Biophysical mechanisms of infrared stimulation and inhibition

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