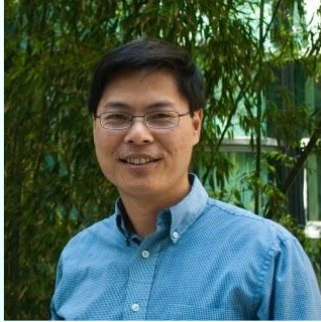




Reading and writing to the brain with light: From voltage imaging to photoswitchable genome engineering



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Time : 10:30 am

Venue : Room G02, Lo Kwee-Seong Integrated Biomedical Sciences Building, CUHK

Abstract

"Unraveling the enormous complexity of the brain requires investigation across temporal and spatial scales, from understanding how millisecond electrical signaling underlies neural computation to determining how specific genes govern the development and function of defined cell types and circuits. I will discuss efforts in my lab to address this challenge by developing new ways of reading and writing to the brain with light.

To monitor the electrical signals that encode and transmit information in the brain, we developed the ASAP family of genetically encoded fluorescent voltage indicators, which combine large responses, fast kinetics, and compatibility with both one- and two-photon imaging. Our latest ASAP5 and ASAP6 indicators enable single-millivolt and single-millisecond optical recordings from individual neurons and neural circuits. At the other end of the spatiotemporal spectrum, to control gene activity with high spatial precision, we developed photoswitchable RNA-guided CRISPR nucleases. By combining these systems with a new approach for ultrasound-mediated light generation, we demonstrate localized gene editing in specific regions of the brain. Together, these technologies highlight the potential of genetically encoded optical sensors and actuators to understand brain function across time and length scales."

Biography

Michael Z. Lin is Professor of Neurobiology and Bioengineering at Stanford University. He received an A.B. summa cum laude in Biochemistry (Harvard). After PhD training in biochemistry and neurobiology with Michael Greenberg at Harvard Medical School, Dr. Lin received his MD from UCLA, then performed postdoctoral research in protein engineering with Chemistry Nobel Laureate Roger Y. Tsien at UCSD. Dr. Lin is a recipient of a Burroughs Wellcome Career Award for Medical Scientists, a Rita Allen Scholar Award, a Damon Runyon-Rachleff Innovation Award, and a NIH Pioneer Award.

*** ALL ARE WELCOME ***

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