



DEPARTMENT OF BIOMEDICAL ENGINEERING

# FALL SEMINAR SERIES

# 2020

## TAKASHI DY KOZAI PH.D.

Assistant Professor  
Biomedical Engineering

University of Pittsburgh

**12-04-20**  
10:30<sup>AM</sup>

### ABSTRACT:

### ***BLENDING SCIENCE AND ENGINEERING AT THE BRAIN-COMPUTER INTERFACE***

Science and engineering go hand-in-hand in Neural Engineering. For example, implantable neural microelectrode arrays are important recording and stimulation tools for neuroscience research and have promising clinical applications. However, the intricacies of the biological response after implantation, and their ultimate influences on recording performance and failure, remain challenging to elucidate. We employ in vivo multiphoton imaging and electrophysiology to ask scientific questions on how implantable device design and intervention strategies impact 'reading from' and 'writing to' the brain, and the system-of-systems interdependence between different cell types in brain injuries and diseases. From an engineering perspective we demonstrate that this research needs to be carried out in parallel with careful evaluation and minimization of sources of errors such as quiescent neurons, electrophysiological artifacts, tissue distortions related to post-mortem processing, and material failure. Together, this talk will discuss utilizing engineering to conduct research at the unexplored frontiers of human knowledge, and in turn, motivate scientifically informed novel engineering.

### BIOGRAPHY:

Takashi Kozai is an Assistant Professor of Bioengineering at the University of Pittsburgh. He received the B.A. (magna cum laude) degree with distinction in Molecular, Cellular, and Developmental Biology, and another B.A. degree with distinction in Biochemistry from the University of Colorado, Boulder, CO, USA, both in 2005, and M.S. and Ph.D. degrees in Biomedical Engineering from the University of Michigan, Ann Arbor, MI, USA, in 2007 and 2011, respectively. From 2011 to 2013, he was a Postdoc with the Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA, USA, where he was appointed as a Research Assistant Professor from 2013-2015 before starting his own lab. His research interests include: (1) Manipulation of neuronal and non-neuronal cells to influence the function of neuronal networks, (2) Understanding the role of neuroimmune cells in neuronal damage and regeneration, and (3) Improving long-term performance of implanted electrodes and integrating man-made (engineered) technology with the human brain for the purpose of studying normal and injured/diseased nervous systems in vivo at the cellular level, as well as restoring function to patients.

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