



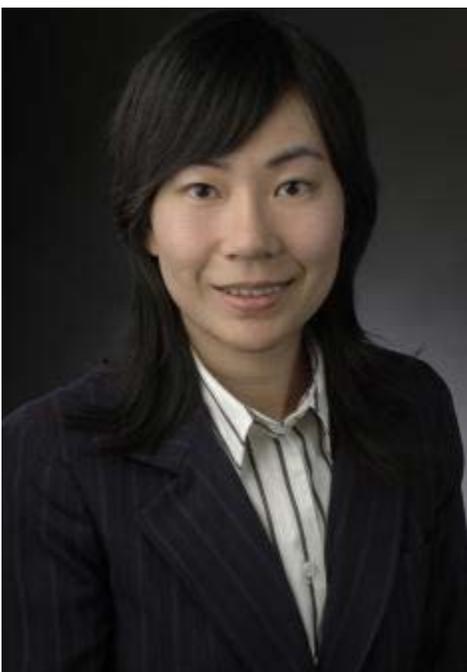
Department of Biomedical Engineering

Seminar Series

Flexible, Hybrid Opto-Electro-Chemo Implants for Neural Interfaces

Wen Li, Ph.D

Biomedical microelectromechanical systems (bioMEMS) enable translational engineering solutions for next-generation diagnosis and therapies to address vital unmet medical needs. In particular, the Microtechnology (μ Tech) Laboratory at Michigan State University is interested in the integration of multiple modalities (e.g. electrical, optical, and chemical) in miniaturized devices for applications in fundamental neuroscience research, biomedical diagnostics, and therapy. This talk will describe our recent efforts towards developing hybrid opto-electro-chemo neural implants at the microscale combining novel inorganic materials with polymeric materials. I will first highlight the development of a wireless opto- μ ECoG array consists of epidural LEDs and transparent microelectrodes for stimulating and recording neural activity from superficial layers of the cortex. In the second example, an ultra-flexible, highly conductive and transparent microscale electrocorticogram (μ ECoG) electrode arrays made of PEDOT:PSS-ITO-Ag-ITO assembly are developed for neural recordings in conjunction with optogenetics neuromodulation and imaging. The last example is boron-doped polycrystalline diamond microelectrodes for neurotransmitter sensing. The efficacy of the above devices has been demonstrated in-vitro or in-vivo in rat models.



Wen Li received the B.S. degree in Material Science and Engineering from Tsinghua University, Beijing, and the M.S. and Ph.D. degrees both in Electrical Engineering from California Institute of Technology, Pasadena, in 2004 and 2009, respectively. Currently she is an associate professor in the Departments of Electrical and Computer Engineering and Biomedical Engineering at Michigan State University, East Lansing. Her research interests include bioMEMS, neuroprosthetic devices, micro/nanosensors, nanoelectronics, polymer microfabrication process development, and microsystem integration and packaging technologies. Li is the recipient of the NSF CAREER Award (2011), the Best Application Paper Award at 3M-NANO (2011), and the Best Paper Award at International Neurotechnology Consortium (2013). She is a senior member of the IEEE, and a member of the American Chemical Society (ACS), IEEE Engineering in Medicine and Biology Society (IEEE-BMES), Biomedical Engineering Society, and IEEE Eta Kappa Nu Honor Society (IEEE-HKN).