NORTHWESTERN UNIVERSITY'S DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING AND MATERIALS RESEARCH SCIENCE AND ENGINEERING CENTER PRESENT:

2022 MSE FUTURE LEADERS SEMINAR SERIES

Christina Tringides

PhD Candidate, Harvard University

Christina M. Tringides is a biophysics and medical engineering medical physics PhD candidate in Dr. Mooney's laboratory at the School of Engineering and Applied Sciences (SEAS), and Wyss Institute for Biologically Inspired Engineering, at Harvard. She earned her B.S. degrees in physics and in materials science and engineering from the Massachusetts Institute of Technology in 2015, and spent one year as a Fulbright Scholar at the Ecole Polytechnique Federale Lausanne before starting her PhD. Her research focuses on developing new materials and neurotechnologies to interface with the nervous system, from the cell to organ levels.

Designing Tissue-Inspired Multielectrode Surface Arrays

Living tissues are non-linearly elastic materials that exhibit viscoelasticity and plasticity. Man-made, implantable bioelectronic arrays mainly rely on rigid or elastic encapsulation materials and stiff films of ductile metals that can be manipulated with microscopic precision to offer reliable electrical properties. Here, we engineer a surface microelectrode array that replaces both the traditional encapsulation and conductive components with viscoelastic materials. Our entirely viscoelastic array overcomes previous limitations in matching the stiffness and relaxation behavior of soft biological tissues by using hydrogels as the outer layers. We introduce a novel hydrogel-based conductor made from an ionically conductive alginate matrix enhanced with carbon nanomaterials (e.g. graphene, carbon nanotubes). These high aspect ratio additives provide electrical percolation even at low loading fractions, and we fabricate ultra-soft viscoelastic conductive electrodes and electrical tracks that intimately conform to the convoluted surface of the heart or the brain cortex. Our combination of conducting and insulating viscoelastic materials, with top-down manufacturing, allows for the versatile fabrication of electrode arrays compatible with in vivo recording and stimulation.

Thursday, April 14 • 10 AM CDT • Zoom Link

Meeting ID: 958 6172 3631 • Password: mse_FLS

Questions? Contact Elena.Lindstrom@northwestern.edu

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