Electrical & Computer ENGINEERING

Carnegie Mellon University

Seminar

Hydrogel-based Electronics: Ultracompliant electrodes for neural interfaces and beyond

Christopher J. Bettinger, PhD

April 11, 2018 | 12:00 - 1:30pm | Scott Hall 6142

The DSN-I Seminar Series is hosted by the Device Science and Nanofabrication Initiative. DSN-I Seminars target researchers in micro and nanofabrication technologies or devices, with the goal of strengthening the user community of the new Scott Hall nanofabrication facility and other shared infrastructure.

Seminar abstract

Implantable neural interfaces underpin many technologies that rely on recording and stimulating neuronal activity from organs in the central and peripheral nervous systems. Reliable and stable chronic recording from excitable tissues using implantable multielectrode arrays has been elusive to date due, in part, to host tissue interactions that contribute to device failure. Local tissue damage and device failure is worsened by the mechanical mismatch between materials used to fabricated rigid silicon-based microfabricated multielectrode arrays (EMEA ~ 100 GPa) and tissues in the nervous system (EPNS ~ 10 kPa). Hydrogel-based electronics could reduce the mechanical mismatch across the tissue-device interface and enhance performance. Here we present materials and companion fabrication strategies to create ultracompliant electronic devices for use in peripheral nerve interfaces. Integrated strategies for polymer synthesis, processing, and microfabrication are described. Details regarding the in vitro and in vivo performance of these devices will also be presented.

Speaker bio

Christopher Bettinger is an Associate Professor at Carnegie Mellon University in the Departments of Materials Science and Engineering and Biomedical Engineering. He directs the laboratory for Biomaterials-based Microsystems and Electronics at CMU, which designs materials and interfaces to integrate medical devices with the human body. Chris has published over 70 articles. Chris has received honors including the National Academy of Sciences Award for Initiatives in Research, the MIT Tech Review TR35 Top Young Innovator under 35, and the DARPA Young Investigator Award. Prof. Bettinger is also a co-inventor on several patents and Co-Founder and CTO of Ancure, an early stage medical device company. Prof. Bettinger received an S.B. in Chemical Engineering, an M.Eng. in Biomedical Engineering, and a Ph.D. in Materials Science and Engineering as a Charles Stark Draper Fellow, all from the Massachusetts Institute of Technology. He completed his post-doctoral fellowship at Stanford University in the Department of Chemical Engineering as an NIH Ruth Kirschstein Fellow.

Seminar notes: Lunch will be served.