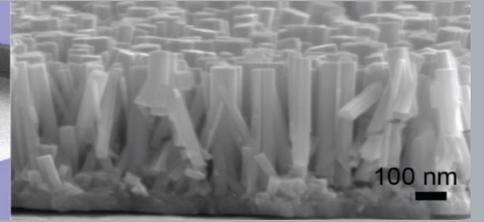
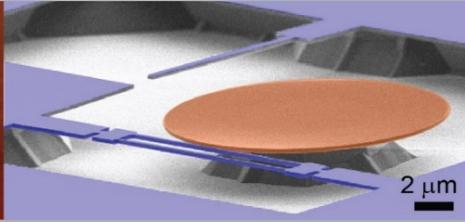
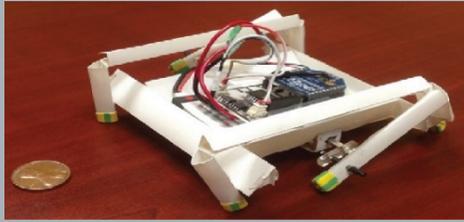




WPI

MECHANICAL ENGINEERING



ME Seminar

Interdisciplinary Interface Engineering

Tingyi “Leo” Liu, Ph.D.

Interdisciplinary Interface Engineering Laboratory
University of Massachusetts Amherst

Wednesday, October 2, 2019

10:00 – 10:50 a.m.

Higgins Labs 218

Abstract

“A picture is worth a thousand words. An interface is worth a thousand pictures.” Lotus leaves, wine tears, gecko feet are all heterogeneous interfaces that have been fascinating scientists and engineers in studying their fundamentals and mimicking them for various applications. Connecting two bulks, an interface is by nature interdisciplinary with characteristic length at micro-/nanoscales. In this talk, I will demonstrate how proper micro- and nano-engineering of the heterogeneous interfaces enables platform technologies with broad applications across different disciplines, as well as advancing the fundamental science.

First, I will present our recent efforts in developing soft implantable/wearable medical devices. By introducing our newly developed fabrication strategy for soft electronics and soft robotics, I will show how we could integrate high-performance semiconductor devices with hyperelastic polymers and liquid metals to realize flexible and stretchable systems. Using this platform technology, we have

developed a multifunctional neural probe with stiffness tunable over 5 orders of magnitude for deep-brain chemical sensing and drug delivery.

Second, I will present our work on wettability engineering. Focusing on the solid-liquid interface, I will show how we engineer this interface to create electrodedwetting – a seemingly anti-physics droplet-manipulation mechanism. In contrast to the well-known phenomenon of electrowetting, electrodedwetting beads droplets on a hydrophilic conductive surface by an electrical signal. Besides, I will show a digital microfluidic platform developed based on this new actuation mechanism that performs all the basic fluidic operations and shows strong resilience even to electrolysis.

About the Speaker



Prof. Tingyi “Leo” Liu received his B.E. in Electrical Engineering from Zhejiang University, Hangzhou China in 2009, M.S. and Ph.D. in Mechanical Engineering from the University of California, Los Angeles (UCLA) in 2011 and 2014, respectively. He joined the University of Massachusetts Amherst in

2018. He is now leading the Interdisciplinary Interface Engineering Laboratory (Inter²EngrLAB). His research focuses on utilizing micro- and nano-fabrication to study diverse interfacial phenomena and to engineer the heterogeneous interfaces for interdisciplinary applications.