“Advanced Fabrication of Biomechanics for Improved Health Care”

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2:45 – 3:45 PM
Brauer Hall, Room 12

Abstract
Tissue architectures regulate tissue health and disease through controlling the biochemical and biomechanical microenvironment of the cells. Recent advances in engineering of 3D culture models allow more accurate representation of the cellular microenvironment than 2D cultures; however, the existing paradigm suffers from limited capacity toward generating complex topographical, biomechanical and biomolecular cues. This lecture will describe our recent development of advanced biofabrication technologies that allow the creation of mechanically-active 3D tissue models for disease modeling, drug discovery and damaged tissue repair. Our research focuses on three main areas: 1) Organ-on-chip systems with tissue morphogenesis and force sensing capabilities. Using microfabricated arrays of flexible micropillars, we generated lung alveolar-like, contractile microtissues for the screening of anti-fibrosis drugs and force sensor-coupled collagen microtissues for the modeling of normal and abnormal blood clotting under shear flow. 2) Rapid stereolithography bioprinting of large-size, vascularized tissue models that are potentially suitable for repairing volumetric muscle loss. 3) Origami-inspired fabrication of 3D tissues with shape morphing capability. These advanced biofabrication technologies allow unprecedented control of the spatial distribution of the materials, cells and mechanobiological and biochemical signals across multiple length scales, and thus they hold great promise for improving the physiological relevancy and clinical utility of engineered 3D tissues.

Biography
Dr. Ruogang Zhao is an Assistant Professor in the Department of Biomedical Engineering at the State University of New York at Buffalo. He received both of his B.Eng. and M.A.Sc. in engineering mechanics and his PhD in biomaterials and biomedical engineering from the University of Toronto. He was a postdoctoral fellow in biological physics at the Johns Hopkins University before moving to Buffalo. Through combining advanced biofabrication technologies and biomechanics, he has developed a unique research program to address the unmet need to model the physiology and pathology of mechanosensitive tissues. During his Ph.D. training, he received the prestigious Heart and Stroke Foundation of Canada Doctoral Research Award. He has been recently nominated to receive the 2019 Young Innovators Award of Cellular and Molecular Bioengineering.

Faculty, students, and the general public are invited. A light reception will follow the seminar outside of Brauer 12.