

CHEMICAL & BIOMEDICAL ENGINEERING GRAD STUDENT SEMINAR

Engineering the Interstitial Matrix to Dissect and Disrupt Fibrosis

Friday, October 30
11:00 AM
COE B221

Brendon Baker, Ph.D.

ASSOCIATE PROFESSOR
Biomedical Engineering, University of Michigan

ABSTRACT: Fibrosis is a pathological process that can affect virtually every organ and, once established, often progresses to organ failure. This process is driven by the persistent activation of myofibroblasts that deposit, crosslink, and contract the extracellular matrix. The resulting changes to tissue architecture and mechanics further reinforce myofibroblast activation, creating a self-sustaining cycle that current therapies can slow but fail to halt or reverse. Breaking this cycle requires in vitro models that capture the fibrous architecture, mechanics, and remodeling dynamics of the native interstitium, yet conventional 2D culture and reconstituted natural hydrogels offer limited control over these features. To address this gap, we developed fibrous hydrogel composites that integrate synthetic ECM-mimetic fibers with cell-degradable hydrogels, enabling independent control over fiber density, matrix mechanics, and degradability. Using these interstitial matrix mimetics, we show that myofibroblast differentiation in response to fibrotic stimuli depends critically on matrix metalloproteinase-mediated degradation, underscoring the importance of matrix remodeling in models used to study and target fibrosis. Building on this platform, we examine how endothelial cells respond to the fibrotic microenvironment and implicate dysregulated angiogenesis as a potential driver of disease progression.



This event is sponsored by FAMU-FSU College of Engineering and
Department of Chemical & Biomedical Engineering

