Tissue Inspired Hydrogels to Understand Breast Cancer Metastasis and Drug Resistance

**Abstract:** Improved *in vitro* models are needed to better understand cancer progression and bridge the gap between *in vitro* proof-of-concept studies, *in vivo* validation, and clinical application. Many methods exist to create biomaterial platforms, including hydrogels, which we use to study cells in contexts more akin to what they experience *in vivo*. Our lab has multiple approaches to create such biomaterials, based on combinations of poly(ethylene glycol) (PEG) with peptides and zwitterions. In this presentation, I will discuss our findings in using these cell culture environments to understand the role of the extracellular matrix (ECM): ligand density, stiffness, geometry, etc., in controlling cancer cell innate drug response via adaptive signaling.

**Biography:** Shelly Peyton is the Barry and Afsaneh Siadat Assistant Professor of Chemical Engineering at the University of Massachusetts, Amherst. She received her B.S. in Chemical Engineering from Northwestern University in 2002 and went on to obtain her MS and PhD in Chemical Engineering from the University of California, Irvine. She was then an NIH Kirschstein post-doctoral fellow in the Biological Engineering department at MIT before starting her academic appointment at UMass in 2011. Shelly Peyton leads an interdisciplinary group seeking to create and apply novel biomaterials platforms toward new solutions to grand challenges in human health. Our unique approach is using our engineering expertise to build simplified models of human tissue with synthetic biomaterials. These *tissue mimics* are engineered to capture a subset of the mechanical and chemical features of human tissue, and are cheap and reproducible. With these, we study how cell-material interactions in tissues affect drug response toward better patient outcomes. We use these systems to understand 1) the physical relationship between metastatic breast cancer cells and tissues to which they spread, 2) how tissue-specific stem cells remodel tissues to facilitate metastasis, and 3) the role of matrix remodeling in drug resistance. Shelly is a Pew Biomedical Scholar, received a New Innovator Award from the NIH, and she was awarded a CAREER grant from the NSF.