CHEMICAL ENGINEERING

SEMINAR SERIES

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University of Delaware

Designing responsive biomaterials for controlling the cell environment

ABSTRACT: The nano- to macro-scale physical and chemical properties of the environment that surrounds a cell are known to play an important role in cell function and fate. Yet, less is known about how combinations of and changes in these properties influence biological functions. For example, driven by transient bidirectional crosstalk between cells and the extracellular matrix (ECM), cell activation and tissue remodeling are complex processes that often involve the presentation of multiple cues that are tightly regulated over multiple time and size scales. Studying such dynamic processes in vitro can be challenging. Biomaterials, particularly hydrogels, are useful tools for probing how microenvironment cues regulate cell behavior toward directing cellular functions in the treatment of disease and regeneration of tissue. Further, these materials can be utilized to deliver therapeutics, from proteins to cells, to regulate these processes in vivo. Engineering hydrogel-based materials from the bottom up enables controlled presentation of selected cues at the appropriate time and place within the cellular niche. This talk will focus on simple strategies to impart highly-regulated property control by synthesizing monomers capable of forming hydrogels in the presence of cells and subsequently allowing triggered modification (e.g., light, enzymes, or reducing conditions) to tune the physical or chemical properties of the network. In particular, we will highlight recent results toward understanding the critical cues that regulate the activation of breast cancer cells in metastatic disease and new approaches for the construction of soft, well-defined synthetic extracellular matrices with controlled nanostructure.

RECEPTION 3:30 • LECTURE 4:00 – 5:00
PHYSICS ASTRONOMY BLDG. (PAA) A110

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BIOGRAPHY: April M. Kloxin, Ph.D., is an Assistant Professor in Chemical & Biomolecular Engineering, Materials Science & Engineering, and Biomedical Engineering (affiliate) at the University of Delaware (UD) and a member of the Breast Cancer Research Program at the Helen F. Graham Cancer Center and Research Institute in the Christiana Care Health System. She obtained her B.S. (Summa Cum Laude) and M.S. in Chemical Engineering from North Carolina State University and Ph.D. in Chemical Engineering from the University of Colorado, Boulder, as a NASA Graduate Student Research Program Fellow. She trained as a Howard Hughes Medical Institute postdoctoral research associate at the University of Colorado before joining the faculty at UD in 2011. Her research group focuses on the design of responsive biomaterials and development of controlled, dynamic models of disease and regeneration. Her honors include a Komen Foundation Career Catalyst Research award, NSF CAREER award, a Pew Scholars in Biomedical Sciences award, the Western Association of Graduate Schools Innovation in Technology Award, the Max S. Peters Outstanding Graduate Research Award, and the_ACS Polymer Chemistry Division Excellence in Graduate Polymer Research Award.