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Kristi S. Anseth

Tisone Distinguished Professor of Chemical & Biological Engineering, Department of Chemical & Biological Engineering, University of Colorado at Boulder

ENGINEERING BIOMATERIALS FOR 4D BIOLOGY

Sponsored by: Davidson School of Chemical Engineering

SEMINAR //

THURS, JAN. 17

3:00-4:00 p.m.

FRNY G-140

Watch online: kaltura.com/tiny/660x8

Soft Materials for Studying Hard Biological Problems //

Our group focuses on the development of biomaterial matrices that can serve as advanced culture systems or in vivo delivery systems for primary cells. We exploit material chemistry as a tool to decipher how cells process signals from the extracellular matrix (ECM), and then use this information to design improved biomaterials that promote tissue regeneration. Specifically, we design synthetic ECM analogs that capture key features of the unique chemistry and physical properties of a cell's niche—an environment that is not only tissue specific, but can be strikingly heterogeneous and dynamic. Unique to our approach is the ability to create cell-laden matrices in three-dimensional space in which the matrix properties can be changed on demand—so-called 4D biology. Here, our group has focused on the development of photochemical reactions to create tunable cell-laden matrices, for example, the thiol-ene photo-click reaction and complementary photo-clip reactions to introduce and remove biological signals from a complex milieu. These photochemical reactions not only proceed rapidly and with high specificity, but are bio-orthogonal, spatiotemporally controlled, and cytocompatible. This talk will illustrate how we leverage these and other reversible chemistries to create biologically responsive hydrogel matrices, and employ them to study the effects of matricellular signaling on diverse cellular functions and processes. For example, we exploit peptide-crosslinked PEG hydrogels to encapsulate stem cells and study how matrix density, degradability, elasticity, and adhesivity influence migration, proliferation, and differentiation. More recently, we have integrated photodegradable linkers into hydrogels and used these spatiotemporal controlled reactions to direct the growth and differentiation of stem cells into intestinal organoids.

PANEL //

THURS, JAN. 17

4:15-5:15 p.m.

FRNY Atrium

Watch online: kaltura.com/tiny/45y5j

Biomaterial and Medical Device Development in the Age of Precision Medicine //

While precision medicine has been applied primarily in pharmaceutical-based approaches to different disorders, it also is increasingly relevant to biomaterial and medical device development. The panel will discuss ways in which precision medicine principles are guiding research and some of the challenges in translating fundamental innovations from "bench to bedside". Viewpoints from both academic research and industry will be provided, along with a bioethical perspective.

Moderator:

William Clark, Visiting Professor, Davidson School of Chemical Engineering, Purdue University

Panelists:

- Kristi Anseth, Tisone Distinguished Professor of Chemical and Biological Engineering, Department of Chemical and Biological Engineering, University of Colorado at Boulder
- Julie Liu, Associate Professor, Davidson School of Chemical Engineering, Purdue University
- Luis Solorio, Assistant Professor, Weldon School of Biomedical Engineering, Purdue University
- Andrew Brightman, Assistant Head and Associate Professor of Engineering Practice, Weldon School of Biomedical Engineering
- Michael Hiles, Senior Vice President and Chief Scientific Officer, Cook Biotech, Inc.

Biography //

Kristi S. Anseth is the Tisone Distinguished Professor of Chemical and Biological Engineering and Associate Faculty Director of the BioFrontiers Institute at the University of Colorado at Boulder. Her research interests lie at the interface between biology and engineering where she designs new biomaterials for applications in drug delivery and regenerative medicine. Dr. Anseth is an elected member of the National Academy of Engineering (2009), the National Academy of Medicine (2009), the National Academy of Sciences (2013), and the National Academy of Inventors (2016). She is also a Fellow of the American Association for the Advancement of Science, the American Institute for Medical and Biological Engineering, American Institute of Chemical Engineers, and the Materials Research Society. Dr. Anseth currently serves on the Board of Directors of the American Institute of Chemical Engineers, Board of Trustees for the Gordon Research Conferences, and is an editor for Biomacromolecules and Progress in Materials Science. She is a proud alumna of Purdue, receiving her BS in 1992 from the School of Chemical Engineering and an honorary doctorate in 2016.