

“Manipulation of the Cellular Microenvironment to Study Tissue Development and Disease”

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LECTURE: 9:00 AM - 10:00 AM

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Abstract: Multiple features of the cellular microenvironment can influence cell function, including soluble factors, mechanics, and the extracellular matrix (ECM). Understanding the roles of these stimuli in tissue development and disease can enable the construction of appropriate engineered environments for applications such as guiding stem cell fate for tissue regeneration or elucidating disease etiology to identify potential treatment targets. For example, our work in manipulating the cellular microenvironment in the context of calcific aortic valve disease has revealed information about the roles of extracellular matrix components, growth factors, peptide-receptor interactions, and intracellular signaling pathways in valve calcification, advancing us toward the creation of physiologically-relevant in vitro platforms for testing disease treatments. Using similar approaches, we also investigate how dermal wound healing is affected by the manner in which growth factors are presented, as well as the relationship between ECM remodeling and human embryonic stem differentiation. This presentation will concentrate on ways to tailor both 2-D and 3-D in vitro environments to regulate cell phenotype or fate and create defined systems that mimic elements of native pathologies.

Biography: Kristyn S. Masters is an Associate Professor in the Department of Biomedical Engineering and the Materials Science Program at the University of Wisconsin-Madison. Dr. Masters has a bachelor's degree in Chemical Engineering from the University of Michigan and a Ph.D. in Chemical Engineering from Rice University, and she performed her post-doctoral work in Chemical and Biological Engineering at the University of Colorado-Boulder. Her research program focuses upon applying tissue engineering techniques to elucidate disease etiologies and studying how microenvironmental cues regulate cell function, and her work is funded by the NSF, NIH, American Heart Association, and W.H. Coulter Foundation for Translational Research. Dr. Masters has also won numerous national, regional, and local teaching awards, and she co-directs a program that aims to advance effective educational and mentoring practices for both current and future faculty.

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