

Department of Chemical Engineering Seminar Series

Smart Alginate-Based Hydrogels: Bio-Inspired Materials for Regenerative Medicine



Rachael Oldinski

Assistant Professor, Engineering & Mathematical Science, and College of Medicine
University of Vermont

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Lecture: 4:00-5:00 p.m.

[Physics Astronomy Building \(PAA\)](#) A110

Reception at 3:30 p.m. PAA A110

Abstract

Prof. Rachael Oldinski is the founder and director of the Engineered Biomaterials Research Laboratory (EBRL) at the University of Vermont. One research objective of the EBRL includes the investigation of biological systems in vitro to quantify, predict, and model cell behavior in a controlled environment. The overall goal is to identify new mechanisms for drug development and delivery methods to control various cell responses in vivo, and to investigate signaling pathways in disease and cancer treatment. Specifically, we investigate the use of intracellular growth factor delivery as a mechanism to reprogram cells in vivo to treat diseases and cancers. Unlike extracellular growth factor delivery, which requires binding ligands on the cell surface to activate paracrine cell-signaling pathways, we utilize the stealth internalization of alginate-based nanospheres to activate intracrine signaling pathways. In addition, targeting ligands (i.e., antibodies) conjugated to the nanosphere surface significantly increase cell-specific internalization. Utilizing these mechanisms of delivery, adjuvant chemotherapeutic drug efficacy is also increased. To further investigate the cell response in 3D, multi-stimuli responsive hydrogels were developed to recapitulate the mechano-physical properties of the extracellular matrix. In this manner, high through-put studies may be developed to accelerate the advancement of regenerative medicine and cancer therapies.

Speaker Biography

As well as being the founder and director of EBRL, Prof. Oldinski is an Assistant Professor of Engineering and Mathematical Science, and Assistant Professor of the College of Medicine at the University of Vermont. She recently became an Honors College Representative of the College of Engineering and Sciences at the University of Vermont. She received her PhD and MS in Mechanical Engineering from Colorado State University in 2009 and 2007, and holds her BS in Biomedical Engineering from Michigan Technological University in 2004. Prof. Oldinski completed postdoctoral training in bioengineering at the University of Washington, where she successfully embarked on a research career that encompasses biomaterial science and biotechnology to treat inflammatory diseases such as osteoarthritis and periodontal disease. Her work includes polymer chemistry, tissue engineering scaffold fabrication, and applied biomechanics, and she focuses on developing novel polymer systems for timed release of vaccine/gene vectors.