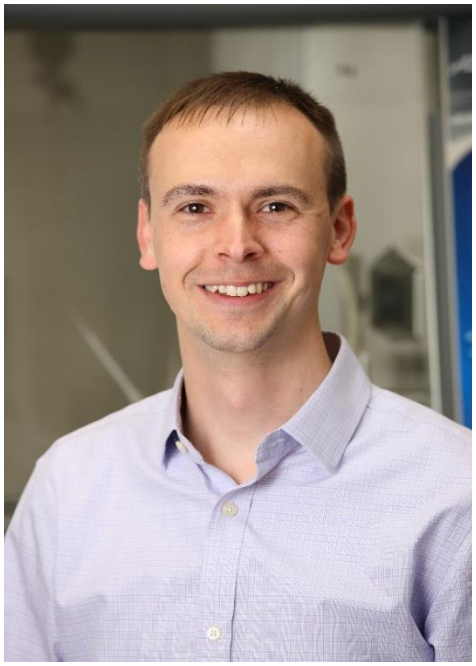
BIOMEDICAL ENGINEERING & MATERIAL SCIENCE ENGINEERING SEMINAR

University of Delaware



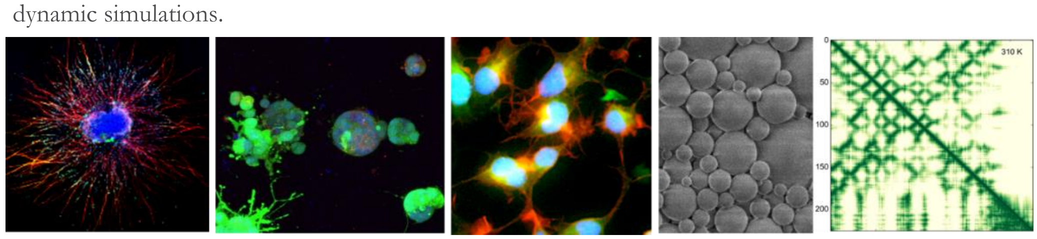
KYLE J LAMPE

Assistant Professor of Chemical Engineering

UNIVERSITY OF VIRGINIA

BIOMATERIAL DESIGN FOR 3D HYDROGEL MICROENVIRONMENTS AND NEURAL TISSUE ENGINEERING

Neural regeneration within the central nervous system (CNS) is a critical unmet challenge as brain and spinal cord disorders continue to be the leading cause of disability nationwide. Engineering microenvironments conducive to stem cell guidance and neural cell growth in vitro and therapeutic regeneration in vivo can be addressed with hydrogel materials that mimic native neural tissue. Designer multifunctional materials are well-suited as they support independent tuning of multiple biochemical and biophysical properties and allow three-dimensional (3D) encapsulation of neural cells to create a physiologically relevant engineered extracellular matrix. We use a variety of both synthetic and recombinant building blocks to create tunable 3D hydrogels. Our hydrogels are based on synthetic polymers like poly(ethylene glycol) and poly(lactic-co-glycolic acid), a recombinant elastin-like protein (ELP), and self-assembling peptides. By carefully tuning the degradation rate, antioxidant properties, integrin-binding ligand density, topography, and elastic modulus, we engineer cell instructive and cell-responsive elements to directly influence stem cell differentiation and self-renewal. Our current work applies these concepts to the myelin-producing oligodendrocytes of the CNS, and their precursors, in an effort to enhance their maturation and therapeutic utility. This talk will also highlight our work in designing new peptide and protein materials via all-atom molecular dynamic simulations.



BME/MSEG SEMINAR
11/07/2018

10:30 AM
322 ISE LAB

BIOGRAPHY

Kyle is an Assistant Professor in the Department of Chemical Engineering at the University of Virginia, with additional appointments in Biomedical Engineering and Neuroscience. He is a member of the steering committee for UVA's Center for Advanced Biomanufacturing (CAd Bio) and was recently named to ASEE's "20 under 40" list of faculty researchers and educators. In 2017 he was selected as one of the inaugural class of Translational Health Institute of Virginia (THRIV) scholars with a three-year mentored career development award. He was previously a NIH NRSA postdoctoral scholar at Stanford University with Prof. Sarah Heilshorn in the department of Materials Science and Engineering. Kyle completed his Ph.D. and B.S. in Chemical Engineering from the University of Colorado, Boulder and the Missouri University of Science and Technology (Rolla, MO), respectively. Having grown up in rural Iowa, he is a proud supporter of engineers from first generation and rural families. Kyle also takes great pleasure in mentoring undergraduate and graduate students in his lab, particularly female engineers which constitute over half his lab. The Lampe Group investigates biomaterials for tissue engineering, regenerative medicine, and drug delivery within the central nervous system.

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