Department of Biomedical Engineering

Graduate Seminar

February 7th (Monday)
4:00-5:00 pm
WebEx (Click here)

Dr. Joel Finbloom, PhD.
Health Innovation Via Engineering Postdoctoral Fellow.
Department of Bioengineering and Therapeutic Sciences,
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Harnessing Self-Assembly Across Length Scales to Advance Biomedical Applications

Abstract

Self-assembly is found throughout natural and bioinspired systems, where building blocks ranging in size from angstroms to microns come together through noncovalent forces to create materials with new and dynamic properties. Throughout my career, I have developed strategies to harness self-assembly across length scales for applications in disease diagnostics, antimicrobial drug delivery, and regenerative engineering. During my graduate work at UC Berkeley, I utilized supramolecular chemistry to create new bioconjugation reactions as well as a new class of xenon NMR/MRI turn-on probe that activates in response to disease microenvironments and biomarkers. As a postdoc at UCSF, I used electrostatic self-assembly to develop a new class of polymeric drug carrier to treat bacterial biofilm infections. By engineering the physicochemical properties of these nanoparticles, I regulated the microbe-material biointerface to overcome biological barriers and treat cystic fibrosis lung infections. I further utilized biointerface engineering to design networks of high aspect-ratio particles that direct colloidal assembly dynamics for applications in growth factor delivery and regenerative medicine. Throughout this work, self-assembly strategies and biointerface engineering were leveraged to address critical biomedical challenges. This bioinspired approach to biointerface design will be a centerpiece of my future independent research program, as my lab will develop dynamic nanomaterials that interface with microbial communities such as bacterial biofilms and the microbiome to advance applications in regenerative medicine and tissue engineering.

About the Speaker

Joel Finbloom started his scientific career at the National Institutes of Health in 2008, where he worked for four summers in the Cytokine Biology Section of the National Institute of Allergy and Infectious Diseases under the mentorship of Dr. Kathryn Zoon. He then received his BA in chemistry in 2013 from Northwestern University, while conducting research in the laboratory of Professor Samuel Stupp. There, Joel developed stimuli-responsive peptide nanomaterials for cancer drug delivery. He went on to earn his PhD in chemistry in 2018 from the University of California Berkeley, where he was a National Defense Science and Engineering Graduate Fellow in the lab of Professor Matthew Francis, working to combine the fields of biomaterials and chemical biology for applications in protein modification and nanomedicine. Joel is currently a Health Innovation Via Engineering (HIVE) postdoctoral fellow in the laboratory of Professor Tejal Desai at the University of California San Francisco, where he develops nanomaterials-based strategies for antimicrobial drug delivery and regenerative medicine. A central theme throughout Joel's interdisciplinary research has been the physicochemical design of nanomaterials to influence their biointerfaces and interactions with dynamic biological systems.