“Interfacing Cells and Materials for Advanced Delivery Systems”

Wednesday
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3:00 pm
Wu & Chen Auditorium
Levine Hall

Aaron C. Anselmo
Postdoctoral Associate
Massachusetts Institute of Technology

Abstract
The clinical translation of therapeutics, both synthetic and biological, is often limited by their poor biological performance. While synthetic delivery systems (e.g. nanoparticles) are well-suited for therapeutic loading and controlled release, they struggle to navigate through the circulatory system, target specific tissues, and breach biological barriers as effectively as natural cells. Therapies utilizing natural cells benefit from the ability of cells to perform complex biological functions, however, these therapies lack the controlled release advantages of synthetic systems. Through understanding cell-material interactions, I have developed approaches to interface cells and synthetic materials that take advantage of the respective strengths of both the cells and the materials. First, I will discuss a strategy known as "cellular hitchhiking", which involves the attachment of polymeric particles to the surface of circulatory cells so as to transfer innate circulatory (e.g. erythrocyte’s long circulation) and targeting abilities (e.g. leukocyte’s inflammation targeting) from cell to particle. The second part of my talk focuses on modifying therapeutic cells with synthetic polymers to improve the delivery of cell-therapeutics for enhanced host integration and function; specifically, improving the delivery of probiotics to the microbiome. The final part of my talk brings these two ideas together and leverages my fundamental findings of cell-material interactions to highlight the design, synthesis, and application of a synthetic cell, specifically a synthetic platelet capable of performing hemostasis.

Bio
Dr. Aaron C. Anselmo is a Postdoctoral Associate at the Massachusetts Institute of Technology. Working in the laboratory of Institute Professor Robert Langer, his research is focused on developing methods to improve the oral delivery of various therapeutics. He obtained his B.S. degree in Chemical Engineering from Rensselaer Polytechnic Institute, and a Ph.D. in Chemical Engineering from the University of California, Santa Barbara. At the University of California, Santa Barbara, Dr. Anselmo worked under the supervision of Professor Samir Mitragotri as an NSF GRFP Fellow and authored more than 25 peer-reviewed research publications in the field of drug delivery.