

Chemical Engineering Colloquium

March 26, 2025

Goddard Hall, Room 227

12:00 PM – 1:00 PM

Lipid Nanoparticles for Overcoming Biological Barriers to RNA Delivery

Michael Mitchell, Ph.D.

Associate Professor, Department of Bioengineering, University of Pennsylvania

Recent years have witnessed tremendous developments and breakthroughs in the field of RNA-based therapeutics and vaccines. The distinct mechanisms of exogenous RNAs and analogs, including messenger RNAs, small interfering RNAs, microRNAs, and antisense oligonucleotides, have brought them unprecedented potential to treat a variety of pathological conditions. However, the widespread application of RNA therapeutics and vaccines is hampered by their intrinsic features (e.g., instability, large size, and dense negative charge) and formidable host barriers. Development of safe and efficient vectors is key for successful delivery and translation of RNA therapeutics and vaccines. In this talk, I will discuss our efforts towards the development of new lipid nanoparticles (LNPs) that enable the delivery of RNA therapeutics and vaccines to target cells and tissues *in vivo*. Furthermore, I will describe new therapeutic strategies utilizing these LNPs for (i) mRNA delivery to solid tumors for cancer immunotherapy, and (ii) *in vivo* reprogramming of immune cells for *in situ* CAR T cell engineering.



WPI