

May 3rd (Tuesday)
11:30am – 1:00 pm
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Putting “Membranes” on Membrane-less Organelles

Abstract

Membrane-less organelles, also called biomolecular condensates, are assemblies of highly concentrated biomolecules that condense through liquid–liquid phase separation. These assemblies are important in many biological and pathological processes, and they also represent a new frontier for molecular and cellular bioengineering. One major question in the field is how amino acid sequence determines protein phase behavior and multiphasic assembly. A second outstanding question is how the size of biomolecular condensates is controlled. I will discuss recent progress that my lab and collaborators have made towards these questions. I will highlight how we generated amphiphilic proteins that localize to the surface of condensates. We observed diverse assemblies, including condensates enveloped by surfactant-like films, as well as complex multiphasic morphologies. In some configurations, these surfactant-like proteins influence condensate size. Our results suggest an important role of protein amphiphiles in establishing membrane-less organelle structure and function, and point towards design principles for bio-inspired protein materials.

About the Speaker

Dr. Benjamin Schuster is an assistant professor at Rutgers University in the Department of Chemical and Biochemical Engineering. His research group studies and engineers protein-based materials, with applications in biotechnology and in understanding human disease. His lab utilizes approaches from soft materials, synthetic biology, and biophysics. He started at Rutgers in January 2019 after completing his postdoctoral fellowship at the University of Pennsylvania in the lab of Daniel A. Hammer. Dr. Schuster received his Ph.D. at Johns Hopkins University and undergraduate degree at the University of Minnesota. Dr. Schuster is the recipient of a MIRA award from the National Institutes of Health.