UNIVERSITY OF DELAWARE

CHEMICAL & BIOMOLECULAR ENGINEERING

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ENGINEERING GLOBULAR PROTEIN VESICLES FOR PROTEIN-POWERED SYNTHETIC MINIMAL CELLS

Our research group aims to create innovative bioinspired materials with a particular focus on protein-powered synthetic cells. We utilize a systematic engineering approach to construct synthetic minimal cells using self-assembling recombinant fusion proteins. These protein building blocks, composed of globular proteins, leucine zippers, and elastin-like polypeptdies (ELPs), self-organize into coacervates or vesicles depending on environmental conditions, mimicking cellular compartmentalization. In this seminar, I will discuss the control and characterization of these protein-assembled vesicles, with an emphasis on their stability under external stimuli, permeability, and membrane orientation. Understanding these properties is crucial for engineering the biological functionalities of protein vesicles. Additionally, I will present our latest advancements in creating giant protein vesicles capable of de novo protein synthesis via in vitro transcription and translation, as well as their potential for sensing biological molecules. This work represents a significant step forward in our efforts to synthesize autonomous artificial cells.