

Materials Chemistry Seminar

Friday, March 1, 2024
11:30 a.m. ~ BRWN 4102

"Exploring the Multifaceted Nature of Elastin-Like Polypeptides for Different Chemical/Biological Applications"



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Abstract:

Biopolymers have gained significant importance across various industrial applications in the last decade. Elastin-like Polypeptides (ELPs) represent a class of biopolymers frequently utilized in diverse applications due to their excellent biocompatibility, bio-tunability, temperature sensitivity and ease of purification. This study delves into different facets of ELPs to uncover their full potential in chemical and biological fields.

The highly hydrophobic nature of ELPs facilitates their extraction from bacterial pellets using organic solvents. An attempt was made to understand the mechanism underlying the organic solvent stabilization of ELP fusion proteins. A model system was created where ELPs were attached to an enzyme and thoroughly characterized to uncover the micellar behavior of ELPs in the organic phase. Furthermore, a novel imaging and therapeutic agent for bladder cancer was developed that had enhanced specificity and sensitivity. The polypeptide-based NIR (near-infrared) probe was designed to detect cells bearing epidermal growth factor receptors (EGFR) in urothelial carcinoma (UC) cases across canine and human samples. Subsequently, an elastin-like polypeptide (ELP) carrier system was formulated to deliver nucleic acid cargoes ranging in size from siRNA to plasmids. This agile ELP-based nanocarrier provides an alternative route for nucleic acid delivery, employing a bio-manufacturable, biodegradable, biocompatible, and highly tunable vehicle capable of targeting cells through engagement with overexpressed cell surface receptors.

Bio:

Saloni Darji is a fifth-year student conducting research in Prof. David H. Thompson's lab. Saloni is originally from Ahmedabad, India, and pursued her Bachelor's in Biochemistry from Gujarat University, followed by obtaining a Master's in Polymer Chemistry from Pittsburg State University, KS. Her research journey began at her master's program where she developed magnetic nanoparticles as therapeutics and nanosensors. In Prof. Thompson's lab, her focus has been on studying the properties of Elastin-like Polypeptides (ELPs) and utilizing ELPs for various biochemical applications. Besides research, Saloni enjoys painting, traveling to new cities, and spending time with her dog.