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Self-Assembly and Responsiveness of Polypeptide-Based Star and Triblock Copolymers[1]

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This study involves the bottom-up design and tunability of responsive, peptide-based block polymers. The self-assembly of amphiphilic block polymers is dictated primarily by the balance between the hydrophobic core volume and the hydrophilic corona. In these studies, amphiphilic triblock and star copolymers containing poly(lysine) (PK), poly(leucine) (PL) and poly(glutamic acid) (PE) were synthesized and their solution properties studied using dynamic light scattering, circular dichroism spectroscopy and transmission electron microscopy. The peptide block in these structures can serve to introduce pH responsiveness (in the case of PK and PE), or can facilitate the formation of elongated or kinetically-trapped structures (in the case of PL.) This talk will present some recent studies in solution morphology transitions that occur in these materials under varying solution conditions. As the topological complexity of the polymers increases from diblock to linear triblock or star polymers, the solution morphology and response becomes much more complex. We present a systematic series of structures, with increasing complexity, that have applications as passive and active delivery vehicles, hydrogels, and responsive viscosity modifiers.

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