Fine-Tuning the Morphology of Self-Assembled Peptide-Polymer Amphiphiles: Biomimetic Materials

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Peptide polymer amphiphiles (PPAs) are highly tunable hybrid materials that achieve complex, protein-like assembly landscapes by combining sequence-dependent properties of peptides with structural diversity of polymers. Despite their promise as functional biomimetic materials, determining how polymer and peptide properties simultaneously affect PPA self-assembly remains challenging. We have previously found that decreasing peptide hydrophilicity and increasing the polymer's degree of polymerization increases the number of self-assembled vesicles in comparison to micelles and other morphologies. To probe the role of peptide secondary structure on the resulting morphology of PPAs, we synthesized five peptides composed of an alpha helical peptide sequence with and without a hydrophilic spacer. Glycine5 (G5) and polyethylene glycol DP 8 (PEG8) spacers were used to vary composition and were placed at either the N- or C-terminus to vary their location. This peptide block was conjugated to an oligo(ethyl acrylate) polymer tail with an average degree of polymerization of five. Future work in this developing platform of biomimetic materials will focus on retaining functionality of biologically relevant alpha helical peptides in assembled PPA particles.