

81f Artificial Protein Polymers for Development of Nanostructured Biomaterials

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Artificial biopolymers have shown promise as extracellular matrices and drug delivery vehicles. An important step in the continued development of these materials is learning to tune the molecular self-assembly properties of these biopolymers. One class of these materials consists of protein polymers with strictly alternating hydrophobic (H) and polar (P) amino acid residues, or "HP protein polymers." These HP proteins readily adopt beta-sheet conformations in solution, and HP proteins with complementarily charged polar side chains will self-assemble into beta-sheet fibrils and fibrous gels under appropriate solvent conditions.

We will describe the biological synthesis and subsequent characterization of various molecular weight poly(EAK)_n, a self-assembling HP protein polymer, with the amino acid repeat unit AEAEAKAKAEAEAKAK. We have produced this protein as a 9-mer, 24-mer, and a 63-mer. We will describe the characterization of these materials with emphasis on mechanical properties and microstructure of the resulting matrices.