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Solution Characterization of pH-Sensitive Polypeptide Based Block Copolymer Assemblies KAY GEBHARDT, DANIEL SAVIN, University of Vermont, MANIKANDAN JAYARAMAN, JEAN FRECHET, Molecular Foundry, Lawrence Berkeley National Laboratories — A series of amphiphilic block copolymers consisting of poly(1,4-butadiene) and poly(lysine) (PB-b-PLys) were synthesized, and their solution properties were studied using dynamic light scattering and transmission electron microscopy. These materials were found to self-assemble in solution into spherical micelles and vesicles when the side chain amine groups on the lysine units are protected. Upon deprotection, the lysine units become responsive to solution acidity. At high pH, the poly(lysine) chain assumes either an α -helical or β -sheet conformation depending on temperature, while at physiological pH the side chains are protonated, resulting in an expanded coil configuration. These conformational changes result in a swelling of the micellar structure, the magnitude of which depends on the molecular weight and relative composition of the two blocks. For two molecular weights of PB ($DP_n = 25, 50$), a series of molecular weights for P(Lys) ($DP_n = 3, 6, 12, 25, 50$) were studied, and the assembly size and morphology were determined as a function of pH, ionic strength and temperature.

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