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Investigation of the Phase Behavior of Amphiphilic Triblock Copolymers (PAA-*b*-PMA-*b*-PS in Mixed Solvents KELLY HALES, HONGGANG CUI, ZHIBIN LI, DARRIN POCHAN, Dept. of Materials Science and Eng, Univ. of Delaware, ZHIYUN CHEN, QAI KI, KAREN WOOLEY, Dept. of Chemistry, Washington Univ. at St. Louis — Unique morphologies have been prepared from amphiphilic triblock copolymers of poly(acrylic acid)-b-poly(methyl acrylate)-b-polystyrene in water/tetrahydrofuran (THF) solvent mixtures. The length of the acrylic acid block and the methyl acrylate block were held constant for each copolymer while the polystyrene block length was varied. For self- assembly, the block copolymers were dissolved in THF in the presence of a divalent, organic counterion and water was added slowly. This resulted in a variety of unique structures including polymer nanoparticles with internal block phase separation, bulk phase separation, spherical micelles, cylindrical micelles, disks, as well as toroidal (ring-like) assemblies. The specific structure formed was dependent on the architecture of the triblock copolymer, the amount of counterion present, and the water to THF volume ratio. The focus of this work is the basic understanding and characterization of the phase separated structures present in low water content solutions. The understanding of this bulk phase behavior and its effects on the assemblies formed at higher water contents will be presented. Transmission electron microscopy (TEM), cryo-TEM and neutron scattering were used to examine the copolymer solutions.

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