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Disc Micelle Formation of Polystyrene-b-Polymethacrylate-b-Polyacrylic acid Triblock Copolymer ZHIBIN LI, Material Science and Engineering, University of Delaware, ZHIYUN CHEN, Department of Chemistry, Washington University in Saint Louis, KELLY HALES, HONGGANG CUI, Material Science and Engineering, University of Delaware, KAI QI, KAREN WOOLEY, Department of Chemistry, Washington University in Saint Louis, DARRIN POCHAN, Material Science and Engineering, University of Delaware — The self-assembled structures of polystyrene-b-polymethacrylate-b-polyacrylic acid amphiphilic triblock copolymers were studied in water/THF solvent mixtures with organic diamines as counterions. The system has been investigated by means of transmission electron microscopy (TEM), cryo-TEM, and small angle neutron scattering (SANS). Polymeric discs with diameters of approximately 100 nm are readily formed from this ionic triblock copolymer. By altering the water content of the solvent mixture, the hydrophobic polystyrene chain length, the chemical structure of the diamine counterions, and diamine counterion concentrations, one can predictively access disc or cylindrical micelle structure with the same triblock copolymer. Stacks of discs and the disc-to-rod transition (rods growing out from discs) were observed via direct electron microscopy imaging of these intermediate structures. Different pathways en route to the disc formation, the thermodynamic stability of the disk micelle morphology, and the kinetics of the disk-to-cylinder transition will be discussed.

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