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Self-Assembly of Giant Molecular Shape Amphiphiles based on Polystyrene Tethered Hydrophilic POSS/C_{60} Nanoparticles XINFEI YU, I-FAN HSIEH, KAN YUE, WEN-BIN ZHANG, STEPHEN CHENG, The University of Akron — Giant molecular shape amphiphiles (GMSAs) are molecules with two blocks which have different chemical properties and shapes. These molecules are precisely synthesized by controlled/living polymerization and "click" chemistry. Self-assembly behaviors of GMSAs are explored in solution, bulk, and thin film states. Micelles (spheres, cylinders, and vesicles) are obtained in the solutions, which are controlled by molecular topology, polymer length, and solvent properties. Nanophase separated structures at 10 nm scale are obtained in the bulk state, which are dependent on volume fractions of each block as well as molecular topology. The nanophase separated structures of GMSAs in the bulk state imply their potential applications in thin-film nano-patterning. Compared with traditional block copolymers, the shape-persistent feature of the molecular nanoparticles might help to reduce the line-edge roughness. Shape and interactions are conclude as two important factors to determine the self-assembly of these molecules.

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