Abstract

The micellar structures of a liquid crystal ABA-type triblock copolymer in a B-selective solvent were examined using small angle X-ray scattering (SAXS) and small angle neutron scattering (SANS) at various block copolymer concentrations and different solution temperatures. Furthermore, their structures were analyzed with a generalized inverse Fourier transform method. An ABA-type triblock copolymer, LCP(7K)-dPS(19.7K)-LCP(7K), consisting of liquid crystalline polymer (LCP, poly(4-cyanobiphenyl-4- oxyundecylacrylate)) 'A' endblock and a deuterated polystyrene (dPS) 'B' midblock (where the numbers in parentheses represent the number-averaged molecular weights 1000 g/mole measured by gel permeation chromatography) was successfully synthesized by atom transfer radical polymerization. In a dPS-selective solvent (CCl4), LCP-dPS-LCP self-assembled into spherical micelles with a LCP core and a dPS corona, in which dPS was looped to produce a flower-shaped structure. The SAXS and SANS analysis revealed the hollow sphere structure of the dPS corona from SANS with an electron density profile attenuated from the center of the LCP core from SAXS. Combined SANS and SAXS analyses indicated that the micelle had a core radius of 18 nm and an overall radius of 36 nm, which were consistent with the transmission electron microscopy data.