Title	Self-assembly of a liquid crystal ABA triblock copolymer in a nematic liquid crystal solvent
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Abstract

An ABA type triblock copolymer, consisting of liquid crystalline polymer (LCP, poly(4-cyanobiphenyl-4-oxyundecylacrylate)) 'A' end blocks and a deuterated polystyrene (dPS) 'B' mid block (LCP–dPS–LCP) was successfully synthesized by atom transfer radical polymerization (ATRP). The number average molecular weight (M_n) of LCP–dPS–LCP was LCP (7.1 K)–dPS (19.4 K)–LCP (7.1 K) with a polydispersity index (PDI) of 1.41. LCP–dPS–LCP was self-assembled in a nematic liquid crystal solvent of 4-pentyl-4′-cyanobiphenyl (5CB) into spherical micelles with a LCP corona and a dPS core, in which dPS was folded to produce a V-shape structure. Micellar structures of LCP–dPS–LCP in 5CB were examined by small angle neutron scattering at various block copolymer concentrations and temperatures using a curve fitting method. The critical micelle concentration was 0.25 wt% and the self-assembled micelles dissociated into unimers at 33 °C, which is lower than the nematic to isotropic transition temperature (T_{ni}) of 5CB (36 °C). The entropic penalty imposed on dPS by the ordered nematic state of the 5CB solvent caused phase separation of the flexible dPS block to form micelles, which vanished above the T_{ni} of the 5CB solvent. Magnetic field-induced global orientation of 5CB revealed the structure of the dPS core of the micelle to be prolate (an elongated sphere) oriented with its long axis along the direction of the applied magnetic field.