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Direct nanoparticle assembly in block copolymer based supramolecules containing liquid crystal MYUNG IM KIM, University of California, Berkeley, CLAYTON E. MAULDIN, JEAN M.J. FRECHET, TING XU, University of California, Berkeley — Block copolymer (BCP)-based supramolecules which combine the nanoscopic assembly of BCPs and molecular ordering can generate hierarchical structure with built-in functionality. Here, we investigated the phase behavior of BCP-based supramolecules containing cholesteric liquid crystal (LC) moieties and achieved directed assembly of nanoparticles. In bulk, we found that BCP-based supramolecules formed a cylinder-in-lamellar structure after solution casting. Upon heating, the order-order transition from cylinder-in-lamella to lamella-in-cylinder was observed. In thin films, supramolecules forming a parallel cylinder-in-lamella structure on silicon substrates were induced by solvent-annealing in chloroform vapor. In addition, we could achieve directed nanoparticle assembly in BCP-based LC supramolecules in bulk and in thin films with control of nanoparticle spatial distribution.

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