

Engineering the Shape of Monodisperse Block Copolymer Particles by Solvent Annealing

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Non-spherical particles of block copolymers (BCP) are important class of materials. Here, we introduce a re-shaping strategy using solvent vapor annealing (SVA) to transform size controlled, monodisperse BCP spheres into shape-anisotropic particles. Monodisperse BCP spheres with controlled size were produced using Shirasu Porous Glass (SPG) membrane emulsification. Then, successful transformation to non-spherical shapes was conducted using SVA while maintaining the monodispersity. This approach was applicable to various BCPs including polystyrene-block-poly(1,4-butadiene) (PS-b-PB), polystyrene-block-polydimethylsiloxane (PS-b-PDMS), polystyrene-block-poly(4-vinylpyridine) (PS-b-P4VP) which allowed good control over the aspect ratio (AR) of non-spherical BCP particles. Furthermore, versatility on particle shape was demonstrated by transforming BCP spheres into prolate and oblate shapes. Furthermore, transformation kinetic and the effect of molecular weight were investigated.