Synthesis and Self-Assembly of Rod₂Coil Miktoarm Star Copolymers of Poly(3-dodecylthiophene) and Poly(methyl methacrylate) with high rod fractions

JICHEOL PARK, Pohang Univ of Sci & Tech, HONG CHUL MOON, University of Minnesota, CHUNG-ROYNG CHOI, JIN KON KIM, Pohang Univ of Sci & Tech — Poly(3-dodecylthiophene)-b-poly(methyl methacrylate) diblock copolymer (P3DDT-b-PMMA) can self-assembled into various microdomains such as spheres, cylinders, and lamellae depending on weight fraction of P3DDT. However, only fibril morphology was formed when weight fraction of P3DDT \( w_{P3DDT} \) was major \( (w_{P3DDT} \sim 0.76) \). Here, we introduce a new approach to obtain microdomain structures even at high \( w_{P3DDT} \) by using well-defined A₂B miktoarm star copolymer composed of P3DDT and PMMA \((P3DDT)_2PMMA\). We found via small angle X-ray scattering and transmission electron microscopy that \((P3DDT)_2PMMA\) showed PMMA cylinder packed hexagonally in the matrix of P3DDT and body-centered-cubic spheres of PMMA for \( w_{P3DDT} \) of 0.66 and 0.75, respectively. This because of much reduction of the rod-rod interaction in \((P3DDT)_2PMMA\) compared with P3DDT-b-PMMA diblock copolymers.

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