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Increase in the Domain Spacing from ARB-Type Triblock Copolymer SANGHOON WOO, HYUNJUNG JUNG, JUNE HUH, Department of Chemical and Biological Eng., Korea University, DU YEOL RYU, Department of Chemical and Biological Eng., Yonsei University, SOO-HYUNG CHOI, Department of Chemical Eng., Hongik University, JOONA BANG, Department of Chemical and Biological Eng., Korea University — It has been reported that the self-assembly of block copolymers (BCP) with very high molecular weight (MW) can achieve the length scale above 100 nm, which can be utilized as photonic band-gap materials or photonic crystals. However, due to slow chain dynamics, it is hard to fabricate well-controlled nano-patterns from high MW BCPs via thermal annealing process. In this work, we designed a new type of BCP, namely ARB-type BCP, where the R represents the short middle block composed of A and B random copolymer. It was expected that the R block provide the effect of increased polydispersity via compositional distribution, leading to an increased domain size compared to the AB diBCP with same MW and polydispersity. We prepared various ARB-type BCPs and AB diBCPs having the similar polydispersity via living-radical polymerization, and their morphologies were characterized by TEM, SAXS, and GISAXS. Consequently, it was shown that the ARB-type triBCP exhibited ∼30% increase in the domain spacing compared to the AB diBCPs with same MW and polydispersity. These results were also compared with theoretical viewpoint.

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