Perpendicular Orientation Control of Small Feature Size Fluorine-Containing Block Copolymers

조성준, 전승배, 전태석, 류두열†
연세대학교
(dyryu@yonsei.ac.kr†)

Block copolymers (BCPs) have drawn attention for its distinct property as a "bottom-up" approach, which they spontaneously form nanoscale structures in large area. The limits of sub-10 nm feature size has pushed the high-χ (Flory-Huggins interaction parameter) BCP field to the next level. In this study, we report a newly designed fluorine-containing BCPs (polystyrene-*b*-poly(2,2,2-trifluoroethyl acrylate)) via sequential anionic polymerization followed by transesterification. Small-angle X-ray scattering (SAXS) was used to evaluate the χ value which was higher than 0.2 over the entire temperature range with the linear-type χ of $30.86/T + 0.160$, where T is absolute temperature. For the practical application, film experiments were demonstrated to form a sub-10 nm perpendicular lamellar morphology. Additional thin layers were supported to control the preferential properties at the substrate and air surface. Thin films were characterized by AFM, SEM and confirmed by GISAXS experiments.