

# European Chemistry Congress

June 16-18, 2016 Rome, Italy

## Perpendicularly-oriented microdomain ordering of lamella-forming PS-*b*-PMMA thin film observed by tuning film thickness

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Perpendicular orientation of block copolymer (BCP) thin film has advantage of achieving uniformly well-defined nanopattern. In this study, polystyrene-*b*-poly(methyl methacrylates) (PS-*b*-PMMA) with various molecular weights were utilized to investigate the effect of film thickness on the in-plane ordering, which was assessed via defect distance ( $D$ ) and orientational correlational length ( $\xi$ ) analysis to derive the power law relationships versus film thickness. The perpendicular orientation of BCP thin film was facilitated by the surface energy neutralization by hydroxyl-terminated random copolymer, PS-*r*-PMMA. Thin film morphology was verified by AFM (Atomic Force Microscope), SEM (Scanning Electron Microscope) and GISAXS (Grazing Incidence Small Angle X-ray Scattering). As a result, the PS-*b*-PMMA with molecular weight higher than 74 kg/mol exhibited the behavior that the lateral ordering was enhanced ( $D$  and  $\xi$  increased) as the film thickness increases. Whereas in the case of 50 kg/mol BCP film exhibited the tendency that the lateral ordering was enhanced as the film thickness decreases. This research provides an comprehensive guide to understand the thickness-dependent long-range ordering enhancement in BCP thin films.

### Biography

Wooseop Lee has achieved Bachelor's degree of Chemical Engineering in year 2015 from Yonsei University, Korea. He is now studying in graduate school of Yonsei University, the chemical and biomolecular engineering department. His research is closely related to examining the fundamental properties of polymer brush and BCPs, and its application for the advanced materials.

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