

The Lateral Ordering of Hydrophilic Block Copolymer Thin Film

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Recently, it was reported that block copolymer films of poly(styrene-*b*-ethylene oxide) (PS-PEO) and poly(styrene-*b*-methyl methacrylate-*b*-ethylene oxide) (PS-PMMA-PEO), exhibiting cylindrical microdomains, demonstrate a high degree of long-range lateral order by solvent casting followed by solvent annealing. In this case, it was shown that relative humidity plays an important role in long-range as well as lateral ordering of the block copolymer thin films. However, the origin of the humidity effect on the lateral ordering of these hydrophilic block copolymers is not yet fully understood. To investigate the effect of humidity further, we prepared other hydrophilic block copolymers, poly(N,N-dimethyl acrylamide-*b*-styrene) (PDMA-PS), where PDMA is a cylindrical microdomain. As with PEO-containing block copolymers, it was shown that PDMA-PS block copolymers also exhibit the long-ranged lateral ordering after solvent annealing with a controlled humidity. This result suggests that the long-range lateral ordering is induced by the effect of humidity, and the incorporation of the hydrophilic component is a controlling key in this case.