

Thickness Dependent Phase Transition Behavior of Block Copolymer in Film Geometry

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We investigated the phase transition behavior in cylinder- and lamella-forming polystyrene-*b*-poly(2-vinylpyridine) (PS-*b*-P2VP) films and its thickness dependence. Cylindrical and lamellar microdomains oriented parallel to the substrate are generated by a preferential wetting condition. We present the thickness dependent phase transition behavior using *ex-situ* grazing incidence small-angle x-ray scattering (GISAXS). The order to disorder transition temperature (T_{ODT}) remarkably increases as the film thickness decreases less than a critical thickness above which the T_{ODT} of the films are independent film thickness. Our numerical calculation utilizing integral version of self-consistent field theory (SCFT) is qualitatively consistent with the experimental results displaying an increase in T_{ODT} of the BCP films.