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Architectural Effects in Thin Films of Poly(styrene-*b*-methyl methacrylate) Copolymers¹ NIKHILA MAHADEVAPURAM, THAI VU, GILA STEIN, Univ. of Houston — Block copolymer self-assembly offers a simple route to generate nanostructures over large areas. Control over domain orientation is critical for nanopatterning; typically, the lower-surface energy constituent will segregate at the air interface and drive a parallel orientation of cylindrical or lamellar domains. Recent works by Khanna et al.² and Matsen³ suggest that molecular architecture can affect surface energetics and domain orientations. We compared the thin film ordering of lamellar poly(styrene-*b*-methyl methacrylate) (PS-PMMA) diblock copolymers with PMMA-PS-PMMA triblock copolymers. Films that ranged in thickness from $t = L_0 - 5L_0$ were cast on neutral substrates, annealed under vacuum at 220°C for 2 days, and then measured with grazing-incidence small-angle X-ray scattering. The triblock copolymers adopt a perpendicular domain orientation near the film surface for all thicknesses considered, while the perpendicular domain orientation was only stable for diblock copolymers when $t \leq L_0$. However, triblock thin films contain defects in the film interior that limit their utility.

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²Khanna et al., *Macromolecules*, 39, 9346-9356, 2006

³Matsen, *Macromolecules*, 43, 1671-1674, 2010

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