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Phase Transitions in Triblock Copolymer Thin Films A. HEXEMER, G.E. STEIN, V. KHANNA, E.J. KRAMER, UCSB, X. LI, J. WANG, ANL-APS — Using scanning force microscopy, X-ray reflectivity and grazing incidence small angle X-ray scattering we investigate a phase transition in a thin film poly(styrene-*b*-ethylene-*r*-butylene-*b*-styrene) SEBS triblock copolymer ($M_w = 54\text{kg/mol}$; $f_{PS} = 0.24$). It has been shown for similar systems that the morphology of thin triblock copolymers is dependent on film thickness.¹ A 37nm thick SEBS film on SiO_2 annealed at 180°C shows a perforated lamella (PL) structure of PS embedded in an EB matrix with no islands. We investigate the phase transition of the PL into a cylindrical structure by further annealing the film at a higher temperature of 210°C . In contrast to the flat PL film, the cylindrical phase shows islands of cylinders surrounded by a cylindrical monolayer. After a third annealing step at 180°C , the islands return the PL morphology while the surrounding monolayer remains in the cylindrical morphology.

¹A. Knoll et al. Phys. Rev. Lett. 89, 035501 (2002)

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