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A TEM, SFM and GISAXS investigation of the ordering behavior of a cylinder forming block copolymer V. KHANNA, G.E. STEIN, A. HEXEMER, E.J. KRAMER, Materials Department, UCSB, X. LI, J. WANG, Argonne National Lab, S.H. HAHN, Dow Chemical — We present a transmission electron microscopy, scanning force microscopy, and grazing incidence small angle X-Ray scattering (GISAXS) investigation of the ordering of a cylinder forming pentablock copolymer, CECEC (C: poly(cyclohexylethylene), E:poly (ethylene), M_w = 60k g/mol $f_E = 0.25$). 600nm thick films of CECEC are spun cast and annealed in ultra high vacuum at 180 °C over several days. In the as-cast film the E cylinders are randomly oriented through the depth of the film. Microscopy images and GISAXS patterns of samples that were annealed for 1, 2 and 3 days show cylinders that are predominantly parallel to the plane of the film. After annealing for 7 days, we observe that a substantial fraction of cylinders align perpendicular to the film plane. TEM images suggest that the reorientation is observed to initiate from the air-film interface. This observation is corroborated by angle resolved GISAXS which suggests that the perpendicular orientation is more pronounced at the surface of the film than over the entire thickness.

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