Laterally Confined Block Copolymer Cylinder Monolayers: Smectic, Nematic, and Isotropic Ordering\(^1\) M.R. HAMMOND, E.J. KRAMER, UCSB — We investigate the temperature dependence of nanodomain ordering in laterally confined, monolayer films of a cylinder-forming block copolymer. The lateral confinement (in channels up to 3 \(\mu\)m wide) aligns the cylinders, providing long range orientational order of the nanodomains over the entire channel width at annealing temperatures \(T\) well below the bulk ODT. As \(T\) is progressively increased, an increasing density of dislocations and disclinations is observed and the orientation correlation function \(g_2(r)\) decreases with \(r\), eventually exponentially above a \(T_c < \text{ODT}\). We compare these results to theory\(^1\), which predicts that a 2-D smectic film at 0 K is, as \(T\) increases, transformed to a “nematic” phase, in which the local cylinder normal acts as the nematic director, by phonons and thermally generated dislocations. As the system is heated through \(T_c\), we examine whether it is indeed the unbinding of disclinations that produces the observed isotropic (yet still microphase-separated) phase, as suggested by theory. \(^1\) J. Toner and D. R. Nelson, Phys. Rev. B, 23, 316, (1981)

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