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Order enhancement in shear-aligned block copolymer thin films with solvent vapor annealing YE CHAN KIM, SO YOUN KIM, Ulsan Natl Inst of Sci Tech — Despite a great ability to create various nanoscale structures of block copolymers (BCPs) through microphase separation, defects formed during the ordering process often obstruct a successful lithographic application of BCPs. Reducing a defect density along with low line edge roughness is required for many device applications. Chemical guiding patterns has been considered; however, it is difficult to impart long range orders. Here, we introduce a defect melting showing that significant amount of defects of BCPs in thin film can be reduced with proper solvent annealing. Cylinder forming polystyrene-b-poly(2-vinylpyridine) is firstly shear-aligned and then exposed to the various solvents. Grazing incidence small-angle X-ray scattering (GISAXS) and SEM image analysis were used to conduct quantitative analysis of solvent vapor annealing for reducing defect density. GISAXS data clearly shows the appearance of high order peak and the peak sharpening with solvent vapor annealing, implying increased grain size. We also show that solvent selectivity for blocks is important for order enhancements.

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