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**In-situ Grazing-incidence Small-angle X-ray Scattering Study of Diblock Copolymer Thin Films during Solvent Annealing** XIAODAN GU, University of Massachusetts Amherst, ILJA GUNKEL, ALEXENDER HEXEMER, Lawrence Berkeley National lab, THOMAS RUSSELL, University of Massachusetts Amherst, UNIVERSITY OF MASSACHUSETTS AMHERST COLLABORATION, LAWRENCE BERKELEY NATIONAL LAB COLLABORATION — Solvent annealing emerged as a convenient means to obtain ordered structures in block copolymer thin films. The mechanism, however, by which this ordering occurs is ill-understood. Here, we performed in-situ grazing incidence small-angle scattering (GISAXS) experiments on diblock copolymers thin films during annealing in organic solvent vapors to study the underlying mechanism that underpins the self-assembly process. We used two different cylinder forming block copolymers, poly(styrene-block-ethylene oxide) (PS-b-PEO) and poly(styrene-block-2-vinylpyridine) (PS-b-P2VP) that were spin-coated on silicon wafers and. The films were annealed in tetrahydrofuran (THF), which is slightly selective for the PS block. We performed in-situ scattering experiments at constant swelling of the films and also investigated the effect of deswelling at different rates of solvent removal. Our results show that the films undergo a disorder-to-order transition during swelling. Also we found that the lateral ordering of the microdomains after deswelling is highly sensitive to the rate of solvent removal.

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