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Evolution of directed and self-assembled structure in free standing and confined PS-b-PMMA thin films LINGSHU WAN, HYO SEON SUH, XUANXUAN CHEN, The University of Chicago, PAULINA DELGADILLO, The University of Chicago, IMEC, ZHANG JIANG, Advanced Photon Source, Argonne National Laboratory, PAUL NEALEY, The University of Chicago, IMEC COLLABORATION, ADVANCED PHOTON SOURCE, ARGONNE NATIONAL LABRATORY COLLABORATION — Directed self-assembly of block copolymer films is promising for sub-10-nm lithography. One strategy for obtaining perpendicularly oriented domains is to confine the film with a non-preferential wetting "top coat". Here we investigate the evolution of structure in films on non-preferential and chemically patterned substrates; use of PS-b-PMMA enables the direct comparison of free standing films and films that are confined with a "top coat". The films were characterized by grazing incidence small-angle X-ray scattering (GISAXS). For self-assembled films, the correlation length of the block copolymer structure was calculated using the Scherrer equation. Results indicate that the effects of the top coat on the self-assembling dynamics depend on the thickness of top coats, molecular weight of block copolymer, and annealing temperature. In the assembly on chemical patterns with density multiplication, the presence of the top coat resulted in more symmetric PS and PMMA domains, and comparable or possibly faster rates of assembly compared to free standing films.

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