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**Analysis of block-copolymer thin film ordering through a moving thermal zone** KEVIN YAGER, NATHANIEL FREDIN, RONALD JONES, Polymers Division, National Institute of Standards and Technology — Block-copolymer thin films self-assemble into well-defined structures at the nanometer lengthscale. It has been shown that the morphology, orientation, and degree of order resulting from assembly is sensitive to a variety of preparation parameters, including annealing time and temperature, solvent exposure, substrate surface energy, application of electric fields, etc. A moving thermal zone can also strongly affect the ordering. We have shown that relatively "cold" zone annealing (CZA) conditions (above the glass-transition but well below the disordering temperature) can induce a preferential orientation of the microdomains in thin films. We further analyze this effect by measuring the ordering through the thermal front, using atomic force microscopy and scattering techniques (reflectivity and GI-SAXS), which are combined to quantify the order and 3D orientational distribution. Zone annealing leads to increased grain sizes and substantially faster coarsening kinetics, as compared to oven annealing. Moreover, the evolution of order through the thermal front constrains models which aim to explain the CZA's ability to induce orientational bias.

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