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Zone Annealed Thin Block Copolymer Films on Chemical Micropatterns SANGCHEOL KIM, BRIAN C. BERRY, RONALD L. JONES, ALAMGIR KARIM, Polymers Division, NIST, ROBERT M. BRIBER, Dept. of Materials Science and Engineering, University of Maryland, HO-CHEOL KIM, Alamaden Research Center, IBM — While zone refining techniques have long been utilized to produce very pure metals and semiconductors, a similar technique known as directional solidification has been used for organic materials such as organic alloys and liquid crystals. We extend the technique to thermally processed thin block copolymer films to understand the role of substrate defects on block copolymer ordering. To produce defects on the substrate, chemical patterns were created using a self-assembled monolayer of adsorbed octyldimethylchlorosilane with exposure to ultraviolet light. Zone annealing was performed on thin block copolymer films cast on hydrophilic/hydrophobic chemical patterns and the development of hole or island structures was observed. The variation of surface topology across the chemical pattern was investigated by optical microscope and scanning force microscope. When thin films were pulled at a constant speed across the boundary of the chemical patterns, the surface topology governed by chemical block wetting and the inversion transition depended not only on the preferential block affinity to the substrate, but was also the affected by the motion stage (defines thermal processing profile) speed.

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