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Stability of Block Copolymers Thin Films During Direct Immersion Annealing[1] ALESSANDRO PEREGO, Brigham Young University, ALAMGIR KARIM, The University of Akron — Nano architectures in ordered block copolymers (BCP) thin films have inspired a variety of new applications. For example, the uniformly sized and shaped nano domains formed in the films have been used for nanolithography and high-density information storage media. Direct Immersion Annealing (DIA) is a novel and robust annealing technique, that has been shown to enhance the quality and rate of ordering in BCP thin films overcoming the major drawbacks of thermal annealing. As for now, DIA results have been reported for substrates with relatively high surface energy and there have been no studies performed concerning the effects of surface energy on the stability of BCP thin films during DIA. In this study we use a gradient surface energy substrate coat it with a thin film (100 nm) of PS-PMMA and anneal using DIA for varying amounts of time. This allowed us to investigate the role that surface energy plays in the stability of the film during the annealing process. Our results show that the stability of the film during DIA is highly dependent of the surface energy of the substrate. We were also able to determine a critical surface energy transition point which marks the separation from stable to unstable region and which can be correlated to the surface energy of the solvent mixture.

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Alessandro Perego
Brigham Young University

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