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Direct Immersion Solvent Annealing of Nano-filled Block Copolymer Films MELANIE LONGANECKER, ARVIND MODI, Univ of Akron, GUANGCUI YUAN, SUSHIL SATIJA, National Institute of Standards and Technology, JOONA BANG, Korea University, ALAMGIR KARIM, Univ of Akron, UNIVERSITY OF AKRON TEAM, NATIONAL INSTITUTE OF TECHNOLOGY COLLABORATION, KOREA UNIVERSITY COLLABORATION — The addition of nanoparticles to polymer films is a strategic approach to enhance film properties such as optical, thermal, hardness, conductivity, permeability etc. with inorganic components while maintaining an easily processable polymer matrix. To this end, the "annealing" of block copolymers while immersed directly in a chamber of solvent is examined to determine its efficacy in ordering nano-filled block copolymer films. Previously we have shown that it is possible to order neat block copolymer films in a mixture of solvents, and this research follows up that work. Specifically, we observe and utilize the effects of direct immersion solvent annealing (DIA) on lamellar poly(styrene-b-methyl methacrylate) thin films with loadings of gold nanoparticles as high as 25 percent by mass. Neutron reflection confirms that DIA is a viable technique applicable to ordering these highly loaded, nano-filled block copolymer systems. Some notable differences exist with respect to results on conservation of domain spacing that may be beneficial to film barrier properties, accomplished with minimal disruption of order and fast kinetics that is compatible with roll-to-roll techniques.

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