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Mixed Solvent Strategy for the Dispersion of PCBM in Block Copolymer Thin Films¹ ABUL HUQ, MANISH KULKARNI, The University of Akron, KEVIN YAGER, Brookhaven National Laboratory, DETLEF-M. SMILGIES, Cornell High-Energy Synchrotron Source (CHESS), ALAMGIR KARIM, The University of Akron — In this work a model system of self assembling cylinder forming polystyrene-*b*-poly(ethylene oxide) (PS-*b*-PEO) block-copolymer (BCP) and photosensitive phenyl-C61-butyric acid methyl ester (PCBM) nanoparticles were utilized to study extent of nanoparticle dispersion into BCP thin films. We studied effects of different solvents and mixture of solvents for casting variable amount of PCBM loaded PS-*b*-PEO films on the final morphology of the films. Atomic force microscope (AFM) as well as transmission electron microscope (TEM) was employed to study the dispersion of PCBM into PS-*b*-PEO matrix. We were able to disperse more than fifty percent PCBM (wt./wt.) in the film, which is higher than the percolation threshold of nanoparticles, without forming PCBM clusters. Grazing incidence small angle scattering (GISAXS) results show that the mixed solvent strategy resulted in change of domain sizes of thin films due to change of effective interaction parameters. It was found by AFM scratch test that the film thickness is highly dependent on the casting solvent mixtures and nanoparticle concentration.

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