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**Reduced domain size and interfacial width in nanofilled block copolymer films by direct immersion annealing** ALAMGIR KARIM, MELANIE LONGANECKER, ANDREY DOBRYNIN, Univ of Akron, SUSHIL SATIJA, National Institute of Standards and Technology, JOONA BANG, Korea University — Most functional applications of nanofilled block copolymers (BCP) generally require a high loading of nanoparticles, which is difficult to achieve due to particle aggregation, slow kinetics of ordering, and disruption of block copolymer order. We demonstrate direct immersion annealing (DIA) as a promising directed self-assembly (DSA) method to overcome these problems. DIA is shown to fully order highly filled (Au-PSrPMMA nanoparticles) lamellar poly(styrene-b-methyl methacrylate) (PS-PMMA) BCP films, whose lamellar ordering is practically unimpeded by filler loading. Neutron reflection (NR) further confirms that DIA sharpens the interfacial width between PS-PMMA domains. In situ NR studies further reveal that DIA predominantly induced film ordering in a 5 mass percent anisotropic organoclay (C93A) filled PS-PMMA film in less than 30 s. In contrast, identical C93A nanofilled PS-PMMA films that were thermally annealed (19h at 160C) only exhibit partial ordering near the free surface. DIA films also exhibit notably reduced domain soacing, resulting in 2 times the number of BCP domains.

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