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Self-Assembly of Magnetic Nanoparticles at the Surface and Within Block Copolymer Films CHEN XU, University of Pennsylvania, KOHJI OHNO, Kyoto University, RUSSELL COMPOSTO, University of Pennsylvania — We investigate the self-assembly of magnetic Fe_3O_4 nanoparticles in thin films of a symmetric block copolymer of poly(styrene-*b*-methyl methacrylate), PS-*b*-PMMA (75 kg/mol). The Fe_3O_4 nanoparticles (4nm) are grafted by poly(methyl methacrylate) (PMMA) (2.7 kg/mol) brushes to improve their compatibility. The weight percent of Fe_3O_4in PS-*b*-PMMA is 1, 4 and 10. The Fe_3O_4reside at the intermaterial dividing surface and also form small disk-like aggregates within the PMMA phase. The addition of Fe_3O_4 slows down the transition from perpendicular to parallel lamellae morphology at the surface and slowing down increases as weight percent Fe_3O_4increases. Using cross-sectional TEM, nanoparticles are found to be rejected from the parallel lamellae and gather preferentially within the perpendicular lamellae. These studies demonstrate that the Fe_3O_4 particles influence thin film morphology and visa versa. Because of widespread interest in nanodevices, this study shows that arrays of functional nanoparticles can be formed using block copolymer templates.

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