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Effect of Nanoparticle Size on Nanoparticle Spatial Distribution in a Diblock Copolymer Supramolecular Thin Film PETER BAI, JOSEPH KAO, MATTHEW LUCAS, PAUL ALIVISATOS, TING XU, University of California, Berkeley — The self-assembly of nanoparticles (NPs) opens many pathways towards generation of functional nanostructured materials with desirable optical, mechanical and electrical properties. A great challenge in this field is the effective control of NP spatial distribution within the block copolymer matrix, which is crucial in tailoring the macroscopic properties of the polymer/nanoparticle composites. We systematically investigated the effect of NP size on the spatial distribution of nanoparticles upon blending with a diblock copolymer based supramolecule in thin film. The spatial distribution of NPs in thin film was observed to be strongly dependent on NP size. These observations can be explained by the increase in entropic penalty of incorporating larger NPs associated with the deformation of the BCP block to accommodate the NPs. This effect is observed for NPs with different chemistries and could serve as a promising route to creating multifunctional thin film nanocomposites.

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