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Directed Assembly of Nanoparticle Arrays using Block Copolymer Templates HUIMAN KANG, Department of Chemical and Biological Engineering and Center for Nanotechnology, University of Wisconsin, Madison 53706, USA., ANDREW N. MANGHAM, Department of Chemistry, University of Wisconsin, Madison 53706, USA., MARK P. STOYKOVICH, Department of Chemical and Biological Engineering and Center for Nanotechnology, University of Wisconsin, Madison 53706, USA., ROBERT J. HAMERS, Department of Chemistry, University of Wisconsin, Madison 53706, USA., PAUL F. NEALEY, Department of Chemical and Biological Engineering and Center for Nanotechnology, University of Wisconsin, Madison 53706, USA. — CdSe nanoparticles, functionalized with tetradecyl phosphonic acid (TDPA), were synthesized so as to preferentially segregate into the polystyrene (PS) domains of polystyrene-*block*-poly(methyl methacrylate) (PS-*b*-PMMA). Nanocomposites, composed with ternary blends (PS-*b*-PMMA/PS/PMMA) and CdSe, could be directed to assemble into defect-free and registered periodic and non-regular structures on chemically patterned substrates. The location of nanoparticles in the PS differs depending on the blend composition and the commensurability between the chemical surface pattern and the bulk lamellar period of the composite and can be interpreted in terms of the interplay between the phase behavior of the composite systems and surface and interfacial interactions. CdSe nanoparticle arrays, replicating the block copolymer patterns, were obtained by removing the polymer using O₂ plasma.

Huiman Kang
Department of Chemical and Biological Engineering
and Center for Nanotechnology, University of Wisconsin
Madison 53706, USA.

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