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Confinement and Ordering of Au Nanorods in Polymer Films
MICHAEL J. A. HORE, ERIC MILLS, YU LIU, RUSSELL J. COMPOSTO, Department of Materials Science and Engineering, University of Pennsylvania — Ordered arrays of gold nanorods (Au NRs) possess interesting optical properties that might be utilized in future devices. Au NRs functionalized with a poly(ethylene glycol)-thiol brush are incorporated into homopolymer or block copolymer (BCP) films. NR distribution and orientational correlations are studied as a function of nanorod concentration and spacial confinement via Rutherford backscattering spectrometry (RBS) and transmission electron microscopy, respectively. In particular, differences in the degree of nanorod ordering are presented for PMMA homopolymer films ($d \sim 45$ nm) versus PS-*b*-PMMA BCP films (L/2 $\sim$ 40 nm), where higher ordering is seen in the case of BCP films. At moderate volume fractions of NRs, ϕ = 1% to 10%, the degree of ordering is moderate, and increases with increasing ϕ . However, coexistence between regions of higher ordering and isotropic orientations is observed. In addition to the planar confinement considered above, orientation of Au NRs confined to cylindrical P2VP domains is studied in PS-*b*-P2VP BCP films.

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