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Magnetic Nanoparticles in Polymer Matrix

Nanostructured films composed of a polymer matrix and functional magnetic nanoparticles are promising materials due to their interesting physical properties in the areas of information storage and magnetic sensors. Hybrid films of the diblock copolymer polystyrene-block-poly (ethylene oxide) (PS-*b*-PEO) and surface-functionalized magnetic nanoparticles (Fe_3O_4 with hydrophobic coating) are prepared via spin coating. Both real-space and reciprocal-space techniques are employed to characterize the obtained hybrid films. The micro- and nanostructures of the magnetic films as a function of the nanoparticle concentration are probed using optical microscopy, scanning electron microscopy, atomic force microscopy, and grazing incidence small-angle X-ray scattering (GISAXS). The observed structures are explained in the framework of microphase separation and confinement. The electronic and magnetic structures of the hybrid films are studied through the technique of high energy resolution fluorescence detected (HERFD-XANES).

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