

Abstract Submitted
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Mesoscopic Iron-Oxide Nanorod Polymer Nanocomposite Films

ROBERT FERRIER, University of Pennsylvania, KOHJI OHNO, University of Kyoto, RUSSELL COMPOSTO, University of Pennsylvania — Dispersion of nanostructures in polymer matrices is required in order to take advantage of the unique properties of the nano-sized filler. This work investigates the dispersion of mesoscopic (200 nm long) iron-oxide rods (FeNRs) grafted with poly(methyl methacrylate) (PMMA) brushes having molecular weights (MWs) of 3.7K, 32K and 160K. These rods were then dispersed in either a poly(methyl methacrylate) or poly(oxyethylene) (PEO) matrix film so that the matrix/brush interaction is either entropic (PMMA matrix) or enthalpic and entropic (PEO matrix). Transmission electron microscopy (TEM) was used to determine the dispersion of the FeNRs in the polymer matrix. The results show that the FeNRs with the largest brush were always dispersed in the matrix, whereas the rods with the shorter brushes always aggregated in the matrix. This suggests that the brush MW is a critical parameter to achieve dispersion of these mesoscopic materials. This work can be extended to understand the dispersion of other types of mesoscopic particles

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