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**Nanocomposites based on nanostructured PI-*b*-PMMA copolymer and selectively placed PMMA-modified magnetic nanoparticles:
Morphological and magnetic characterization**

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ABSTRACT

Hybrid organic/inorganic nanocomposites with magnetic properties have been prepared, based on nanostructured PI-*b*-PMMA block copolymer and selectively placed magnetic Fe₂O₃ nanoparticles. Magnetic nanoparticles have been functionalized with PMMA brushes by atom transfer radical polymerization in order to increase the compatibility with the PMMA block of the copolymer. The success of nanoparticle modification has been probed by infrared spectroscopy and thermogravimetric analysis. Morphological characterization of the neat block copolymer and the nanocomposites has been studied by small-angle X-ray scattering and atomic force microscopy measurements. For as cast films of nanocomposites, the surface perpendicular lamellar nanostructure was altered with the nanoparticle addition, and a morphology consisting on a mixture of surface parallel and perpendicular lamellae was formed for low nanoparticle amount, while for higher nanoparticle content some cylindrical domains were observed. For films annealed by solvent vapors, the cylindrical morphology of the neat copolymer thin film was maintained for low nanoparticle content, while the ordered morphology was disrupted for the highest nanofiller content. Magnetic characterization by vibrating sample magnetometer and superconducting quantum interference device has demonstrated that magnetic properties of nanoparticles have been transferred to the nanocomposites, exhibiting superparamagnetic behavior similar to that of the maghemite nanoparticles at room temperature.

1. INTRODUCTION

Hybrid nanocomposites based on block copolymer matrices with embedded inorganic nanoparticles have attracted great attention due to their potential in tailoring their properties for numerous applications [1, 2]. The ability of block copolymers to self-

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