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Synthesis of Ordered Fe₂O₃ Nanoparticles within Norbornene Methanol/Norbornene Dicarboxylic Acid Diblock Copolymers PINAR AKCORA, Chemical Engineering, PETER KOFINAS, Chemical Engineering, ROBERT BRIBER, Materials Science and Engineering, University of Maryland — Norbornene methanol-deuterated norbornene dicarboxylic acid diblock copolymers were synthesized by ring-opening metathesis polymerization. Iron oxide nanoparticles were formed in the microdomains of the diblock through a solution doping mechanism. Polymer samples with and without iron oxide particles were solution cast under a solvent saturated atmosphere. The morphology of the diblock copolymer and the dispersion of iron oxide nanoparticles within the copolymer were examined with transmission electron microscopy and the two morphologies were compared. Spherical iron oxide particles of 3-5 nm in size showed ferrimagnetic behavior at 5 K with high magnetization values (40 emu/g polymer or 1300 emu/cm³) at 5 Tesla. It was shown that the magnetic properties and morphology of the iron oxide nanoparticles can be tailored by the in-situ synthesis within the domains of the copolymer. By controlling the size and dispersion of the Fe₂O₃ nanoparticles, the magnetization moments were found to be higher than that of magnetic particles in other polymer systems.

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