

Abstract Submitted
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Origin of the Toughness and the Elastomeric Properties of Gels from Block Copolymers with Semicrystalline Syndiotactic Polypropylene Blocks FANNY DEPLACE, ZHIGANG WANG, GLENN H. FREDRICKSON, EDWARD J. KRAMER, MC-CAM and the Departments of Materials and Chemical Engineering, UC Santa Barbara, JEFFREY M. ROSE, GEOFFREY W. COATES, Department of Chemistry and Chemical Biology, Baker Laboratory, Cornell University, FUMIHIKO SHIMIZU, Mitsubishi Chemical Group, Science and Technology Research Center, Inc., Yokohama, LIXIA RONG, BENJAMIN S. HSIAO, SUNY Stony Brook, Department of Chemistry, Stony Brook — The exceptional toughness and elastomeric properties of gels from block copolymers with semicrystalline syndiotactic polypropylene blocks have been reported. From results obtained from small angle and wide angle X-ray scattering experiments simultaneously performed with step cycle tensile stretching, the toughness can be attributed to the formation, orientation and elongation of crystalline fibrils along the tensile direction. The evolution of the crystalline structure during deformation is confirmed by FTIR measurements and the crystalline morphology is characterized by polarized microscopy imaging. Both polypropylene crystals and the rubbery phase play a role in the elasticity of the gels. Due to the viscoelasticity of the rubbery phase, an increase in the elastic recovery is observed when the gels are allowed to relax at zero load before starting the next cycle.

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