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Crystalline Structure, Morphology and Gas Transport in Semicrystalline Syndiotactic Polystyrene

BRIAN OLSON, JUSTIN BRANDT, SERGEI NAZARENKO, School of Polymers and High Performance Materials, University of Southern Mississippi — Crystalline syndiotactic polystyrene (s-PS) continues to amuse the researchers by showing very unusual properties. This work mainly explored the remarkable free volume properties of the crystalline structure of this polymer, and also very unusual gas transport behavior. It was possible by varying the temperature of the melt and crystallization conditions to prepare a series of semicrystalline samples with different crystallinities (0-50%) containing either pure α -form, pure β -form and pure γ -form. Solid-state structure and the morphology of all prepared systems were examined by an assortment of techniques: DSC, density, WAXS, SAXS, and AFM. The structure was also probed by passing through small gas molecules, and by means of positron lifetime spectroscopy (PALS).

Brian Olson

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