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Annealing effects on the crystalline structures of syndiotactic polystyrene after the crystalline β to α form structural transition induced by mechanical strain. FUYUAKI ENDO, ATSUSHI HOTTA, Department of Mechanical Engineering, Keio University — The thermal effects on the polymorphic behavior of syndiotactic polystyrene (sPS) after the crystalline structural transition from β to α were investigated. Our group has previously reported that β form crystals of sPS could transform into α form crystals by mechanical strain at about 200C. In this study, we investigated possible crystalline structural transitions of pre-stretched sPS by thermal treatments. More specifically, the samples containing β form crystals were stretched at temperatures above the glass transition temperature (T_g) before annealing. The crystalline structures in the sPS samples were characterized by Fourier-transform infrared spectroscopy and X-ray diffraction analyses. Before the annealing treatment, the samples stretched at near T_g possessed mesomorphic α form crystals, whereas the samples stretched at higher temperatures had more perfect α form crystals. It was also found that the mesomorphic α form crystals, produced by the mechanical strain at lower temperatures, could transform into perfect α form crystals by annealing, and that the amount of α form crystals slightly increased with the increase in the annealing temperature.

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