Annealing effects on the crystalline structures of syndiotactic polystyrene after the crystalline \( \beta \) to \( \alpha \) 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 \( \beta \) to \( \alpha \) were investigated. Our group has previously reported that \( \beta \) form crystals of sPS could transform into \( \alpha \) form crystals by mechanical strain at about 200°C. In this study, we investigated possible crystalline structural transitions of prestretched sPS by thermal treatments. More specifically, the samples containing \( \beta \) 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 \( \alpha \) form crystals, whereas the samples stretched at higher temperatures had more perfect \( \alpha \) form crystals. It was also found that the mesomorphic \( \alpha \) form crystals, produced by the mechanical strain at lower temperatures, could transform into perfect \( \alpha \) form crystals by annealing, and that the amount of \( \alpha \) form crystals slightly increased with the increase in the annealing temperature.

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