



ANALYSIS ON THE STRUCTURAL VARIATION DURING THE STRETCHING AND RECOVERY OF ELASTOMERIC FIBERS PREPARED FROM POLYPROPYLENES OF LOW STEREO-REGULARITY

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Polypropylenes (PP) with controlled low stereo-regularity (LMPP) have been attracting considerable attention as a new type of thermoplastic elastomer. In this study, three types of PPs, i.e. low stereo-regularity PP (LMPP), LMPP blended with 15 wt% of high stereo-regularity/low molecular weight PP (LMPP-LMC) and LMPP blended with 15 wt% of high stereo-regularity/high molecular weight PP (LMPP-HMC) were prepared. High-speed melt spinning of these polymers were conducted at various take-up velocities to obtain fibers with wide variety of elastomeric properties. There was a considerable improvement of processability by the blending of high stereo-regularity PP. Tensile test during stretching and recovery revealed that elastic recovery decreases steeply with the increase of take-up velocity, whereas the blending of high stereo-regularity PP leads to the increase of tensile modulus and slight reduction of elastic recovery. In-situ WAXD and SAXS measurements were also carried during the tensile testing. Good recoverability of higher-order structure after the stretching and recovery, which can be characterized by the reduction of a*-axis oriented crystals and increase of the c-axis oriented crystals during stretching, was found to be the characteristics of fibers with good elastic recovery.