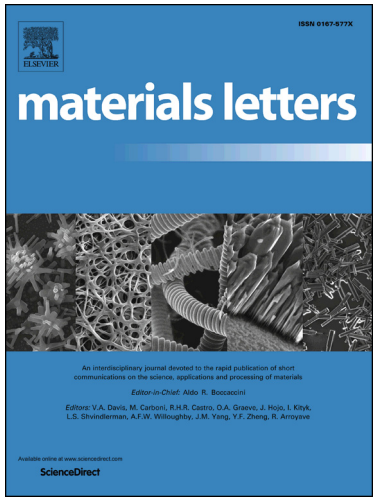

Deformation behavior of isotactic polypropylene with oriented α- and β-crystals

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Deformation behavior of isotactic polypropylene with oriented α- and β-crystals

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ABSTRACT: In this work, the oriented α- and β-crystals were simultaneously fabricated in the iPP parts with a β-nucleating agent by means of the oscillation shear injection molding (OSIM) technique. The β-nucleated iPP parts demonstrated an interesting deformation behavior, traced by *in situ* synchrotron X-ray diffraction equipped with a uniaxial tensile apparatus. In the small strain region (6.7 %) from the yield point to the strain hardening point, dramatic changes in terms of the crystal orientation and phase transition took place. In this region, the content and orientation degree of oriented α-crystals kept continuously increasing. On the contrary, the content of oriented β-crystals was successively decreasing until they almost disappeared, along with their fluctuant orientation. The formation of oriented α-crystals was initially at the sacrifice of oriented β-crystals, and subsequently the unoriented crystal and amorphous phase. Our work provides a theoretic foundation for the application of iPP parts with oriented α- and β-crystals under loading.

Keywords: Isotactic polypropylene; X-ray techniques; Crystal structure; α-crystal; β-crystal; Deformation behavior

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