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Title	分子配向によるポリ乳酸の寸法変化を制御する新技術
Author(s)	VO DAI HOANG GIANG
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Description	Supervisor: 山口 政之, 先端科学技術研究科, 博士

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Abstract

Structural modification through crystallization improved the thermal and mechanical properties of semi-crystalline polymer. In actual processing, the applied flow-played a key role in the structural modification, which commonly promoted the crystallization, i.e., flow-induced crystallization. In this study, the post-process annealing was employed to improve the crystallization for a semi-crystalline polymer, e.g., poly(lactic acid) (PLA), having a low crystallization rate. Generally, the entropic elasticity is decreased by the orientation to the shear flow direction, leading to the increase entropic elasticity during post-process annealing. This phenomenon contributed to the orientation relaxation and isotropic crystallization, leading to shrinkage. This study provided a new phenomenon, that is, entropy reduction (orientation enhancement) during annealing. From this achievement, a fibrous nucleating agent was introduced to increase the orientation of PLA during annealing. As a result, the shrinkage was limited, compared to pure PLA sample. Moreover, a low-molecular-weight poly(vinyl alcohol) (PVA) was blended with PLA to fabricate an immiscible blend for injection-molding. During post-process annealing, the anomalous expansion to flow direction of the PLA/PVA injection-molded bar has been first investigated. The mechanism of an anomalous expansion was elucidated in the blend of PLA with a flexible poly(tetrafluoroethylene) (PTFE). This study opens the possibility to control the shrinkage of injection-molded products during annealing.

Keywords: Poly(lactic acid), Poly(vinyl alcohol), Poly(tetrafluoroethylene), Crystallization, Molecular orientation, Expansion, Shrinkage.