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The Origin of Memory Effect in Stereocomplex Poly (lactic acid) Crystallization from Melt State

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ABSTRACT

Three arm poly(propylene oxide) block poly(D-lactide) block poly(L-lactide) (PPO-PDLA-PLLA) stereoblock copolymers melted at various melting temperature and recrystallized. The role of crystallization memory effect of stereocomplex structures was demonstrated utilizing *in situ* FTIR and WAXD. There is a critical temperature (T_{cr}) for detachment of stereocomplex structures of melt samples. When the melting temperature (T_{melt}) is lower than T_{cr} , crystallization temperature (T_c) of samples decreases with T_{melt} increasing. If the T_{melt} is higher than T_{cr} , the samples' T_c is as a constant temperature. We attribute the decrease in T_c to crystallization memory effect and correlate it with the detachment of stereocomplex structures in melt. When $T_m < T_{melt} < T_{cr}$, the stereocomplex crystallites melt, but stereocomplex segments could survive. The remaining stereocomplex segments play as the self-seeds and reduce the crystallization barrier energy. The recrystallization is the same process as a general self-seeds crystallization. Influence of melt time and molecular weight on the stereocomplex behavior in melt were also investigated.

KEYWORDS: Memory effect; Stereocomplex; Poly (lactic acid); Crystallization; Self-seeds

1.INTRODUCTION

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