

Investigating the Crystal Growth Behavior of Biodegradable Polymer Blend Thin Films Using In Situ Atomic Force Microscopy

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Abstract

This article reports the crystal growth behavior of biodegradable polylactide (PLA)/poly[(butylene succinate)-co-adipate] (PBSA) blend thin films using atomic force microscopy (AFM). Currently, polymer thin films have received increased research attention due to their important role in a variety of technological applications, and crystallization plays a pivotal role in controlling the properties of thin films. Thin films of biodegradable PLA/PBSA blends were prepared on a silicon wafer substrate with a spin coater. The morphology and crystal growth behaviors of films, which were crystallized at different temperatures, were visualized with AFM. The results indicated that the size and distribution of the dispersed phase were directly related to the blend composition. The crystal growth behaviors indicated the presence of both homogeneous and heterogeneous nucleation, and the nature of nucleation was directly related to the blend ratio and the temperature at which crystallization occurred. Therefore, this study will facilitate the understanding of crystal growth behavior in a confined environment and will allow us to modulate the blend properties.