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A Study on the Crystallization Kinetics of PLLA in the Presence of Graphene Oxide and PEG-grafted-Graphene Oxide: Effects on the Nucleation and Chain Mobility

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Abstract

The crystallization behavior of Poly(L-lactic acid) (PLLA) was studied in the presence of different nanoparticles. Two types of nanoparticles including Graphene oxide (GO) and Poly(ethylene glycol) (PEG)-grafted Graphene oxide (GO-g-PEG) were examined at various concentrations. SEM images revealed an improvement in the dispersion of nanoparticles after grafting PEG chains on the GO surface. Kinetic analysis and morphological observations indicated that GO-g-PEG has enhancing effects on the crystallization rate and nucleation ability of PLLA. This was attributed to the improved dispersion of GO-g-PEG in the PLLA matrix. The contribution of nucleation and growth steps was examined using generalized Lauritzen-Hoffman model.

Keywords: PLLA, Isothermal Crystallization, Nucleation, Graphene Oxide