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Macromolecular Nanotechnology

# Influence of degree of intercalation on the crystal growth kinetics of poly[(butylene succinate)-co-adipate] nanocomposites

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## Source

European Polymer Journal > 2008 > 44 > 10 > 3133-3145

## Abstract

The influence of the degree of intercalation of polymer chains in the two dimensional silicate galleries on the crystallization behavior of poly[(butylene succinate)-co-adipate] (PBSA) is being reported on. The nanocomposites were prepared by melt-blending of PBSA and organically modified montmorillonite (OMMT) in a batch-mixer. Two different types of commercially available OMMTs, with different extents of miscibility of organic modifiers with PBSA, were used, leading to highly delaminated and stacked/intercalated nanocomposite structures as revealed by X-ray diffraction (XRD) patterns and transmission electron microscopy (TEM) observations. The non-isothermal crystallization behavior of PBSA and the nanocomposite samples were studied by differential scanning calorimetry (DSC). Crystal growth kinetics studies showed that when silicate layers are highly delaminated into the PBSA matrix, nucleation behaviors decreased significantly, relative to the stacked/intercalated silicate layers. These observations indicate that the overall crystal growth kinetics retard in delaminated nanocomposites, opposed to increasing in the case of stacked/intercalated nanocomposites. Polarized optical microscopy (POM) observations and light scattering studies indicate that PBSA spherulites are fairly large and more perfectly grown in the case of delaminated nanocomposites, relative to the pure PBSA matrix. The effect of high levels of dispersion of silicate layers in the PBSA matrix on cold crystallization behavior was also studied.

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## Identifiers

Journal ISSN : 0014-3057

DOI 10.1016/j.eurpolymj.2008.07.035

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## Keywords

Poly[(butylene succinate)-co-adipate] Nanocomposites Degree of intercalation Crystallization kinetics

**Additional information**

Publication languages: English

Data set: Elsevier


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**Publisher**

Elsevier Science

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**Fields of science**

*No field of science has been suggested yet.* 

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