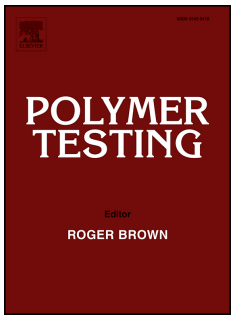
Accepted Manuscript



Morphology and properties of biodegradable poly (lactic acid)/poly (butylene adipate-co-terephthalate) blends with different viscosity ratio

Xiang Lu, Jianqing Zhao, Xiaoyun Yang, Peng Xiao

PII: S0142-9418(17)30129-0

DOI: 10.1016/j.polymertesting.2017.03.008

Reference: POTE 4955

To appear in: *Polymer Testing*

Received Date: 4 February 2017

Accepted Date: 8 March 2017

Please cite this article as: X. Lu, J. Zhao, X. Yang, P. Xiao, Morphology and properties of biodegradable poly (lactic acid)/poly (butylene adipate-co-terephthalate) blends with different viscosity ratio, *Polymer Testing* (2017), doi: 10.1016/j.polymertesting.2017.03.008.

Material Properties

Morphology and Properties of Biodegradable Poly (lactic acid)/Poly (butylene adipate-co-terephthalate) Blends with Different Viscosity Ratio

Xiang Lu[1,2,3], Jianqing Zhao[1,2]*, Xiaoyun Yang[3], Peng Xiao[3]*

[1] College of Materials Science and Engineering, South China University of Technology, Guangzhou, 510640, China

[2] Key Laboratory of Polymer Processing Engineering of the Ministry of Education, South China University of Technology, Guangzhou, 510640, China

[3] National-certified Enterprise Technology Center, Kingfa Scientific and Technological Co. Ltd., Guangzhou, 510663, China

Abstract: Phase morphology exerts a tremendous influence on the properties of polymer blends. The development of the blend morphology depends not only on the intrinsic structure of the component polymers but also on extrinsic factors such as viscosity ratio, shearing force and temperature in the melt processing. In this study, various poly (butylene adipate-co-terephthalate) (PBAT) materials with different melt viscosity were prepared, and then poly (lactic acid) (PLA)/PBAT blends with different viscosity ratio were prepared in a counter-rotating twin-screw extruder under constant processing conditions. The influence of viscosity ratio on the morphology, mechanical, thermal and rheological properties of PLA/PBAT (70/30 w/w) blends was investigated. The experimental results showed that the morphology and properties of PLA/PBAT blends strongly depended on the viscosity ratio. Finer size PBAT phase were observed for viscosity ratio less than 1 ($\lambda<1$) compared to samples with $\lambda>1$. It was found that the interfacial tensions of PLA and PBAT were significantly different when the viscosity ratio was changed, the lowest interfacial tensions (0.12 mN/m) was obtained when the viscosity was 0.77. Additionally, the maximal tensile strength in PLA/PBAT blends were obtained when the viscosity ratio was 0.44, while the maximal impact properties were obtained when the viscosity ratio was 1.95.

Keywords: Viscosity ratio, Morphology, Properties, PLA/PBAT blends

Introduction

The blending of immiscible or miscible polymers has become an increasingly important technique for developing commercial polymer materials, which may combine the properties of several single polymers [1, 2]. It is much more cost-effective to blend two or more polymers with known properties than to synthesize new polymers with unknown properties [3]. However, since most blended polymers are immiscible, polymer blends tend to separate into two or more distinct phases [4, 5]. The final properties of such immiscible blends are strongly affected by