

Investigation of PLLA-blockcopolymers

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Poly(lactide) (PLA) is a biobased and biodegradable polymer with a high brittleness. The goal is to modify the mechanical properties to increase the application of this material. In this work we present the synthesis of blockcopolymers (BCP) based on poly-L-lactide (PLLA) and amorphous polystyrene as well as the investigation of crystallinity and rheological behaviour. Both blocks tend to a hard phase separation¹ and with FT-rheology a strong decrease of the third higher harmonic in the nonlinear regime is observed (see Figure 1 left). This behavior is still observed for other kinds of BCP like polystyrene-b-polybutadiene². Because of the strong segregation of PS and PLLA the order-disorder transition temperature T_{ODT} is higher than the crystallization temperature T_c of PLLA and the glass transition temperature T_g of PS³. So the BCP crystallizes under confinement. The crystallinity is measured with DSC and WAXD (see Figure 1 right).

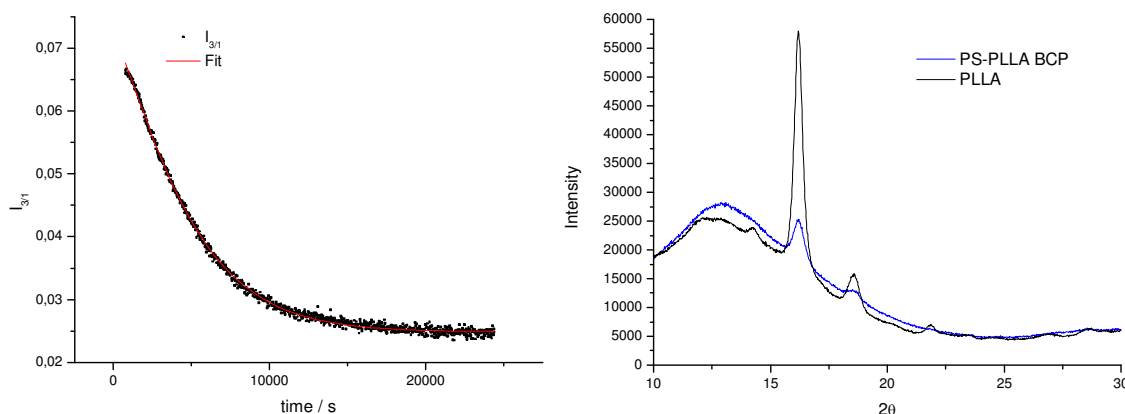


Figure 1 left: Decrease of nonlinearity measured with FT-rheology of PS-PLLA BCP; right: WAXD-spectra of PLLA and PS-PLLA BCP

Literature:

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