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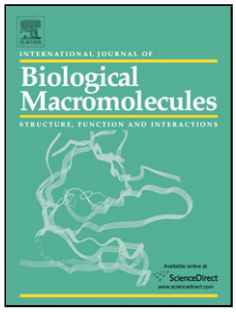

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Impact of Ionic Liquid Type on the Structure, Morphology and Properties of Silk-Cellulose Biocomposite Materials

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Abstract

Microcrystalline cellulose and Bombyx mori silk blended biocomposite films were regenerated using various imidazolium-based ionic liquids. The films were characterized to understand the effect of the inter- and intra-molecular interactions upon the morphology and thermal properties. Various techniques were implemented to investigate structural, morphological and thermal properties of the biocomposite films, including Fourier transform infrared spectroscopy (FTIR), scanning electron microscope (SEM), thermal gravimetric analysis (TGA), differential scanning calorimetry (DSC) and X-ray scattering. Results show that the type of ionic liquid has strong influence on the structure of silk-cellulose composites that can form either amorphous or semicrystalline structures. While the thermal properties are independent of the type of cation in ionic liquids, the levels of β-sheet configuration are dependent on the type of anion, which further causes changes on the biocomposite thermal properties. The topological image provided information to support morphological effects on the varying ionic liquids and X-ray scattering allowed for insight on the role of ionic liquids on the crystallinity and the spacing differences in

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