

Impact of controlled hydrophobicity of the organically modified silicates on the properties of biomedical thermoplastic polyurethane (TPU) nanocomposites

Abstract

The impact of nanofiller surface modifications and hydrophobicity on the morphology and mechanical properties of the biomedical TPU nanocomposites was studied. We show that incorporating nanofillers with higher hydrophobicity promotes better dispersion of nanofiller in TPU matrix due to greater interaction between the nanofiller and the hydrophobic PDMS soft segment in this ElastEon TPU system. The nanocomposite with the most hydrophobic surface modification demonstrates the best nanofiller dispersion and intercalation and hence resulted in an overall best mechanical and thermomechanical properties when incorporated in 2 wt%. These findings show that the polarity matching between the TPU and the nanofiller determines the nanofiller-TPU interactions and thus the mechanical properties of the produced nanocomposites.

Keywords — Nanocomposites, organically modified silicates, thermoplastic polyurethane