

Effects of processing method and nanofiller size on mechanical properties of biomedical thermoplastic polyurethane (TPU) nanocomposites

Abstract

The effects of processing method and nanofiller size on mechanical performance of biomedical thermoplastic polyurethane (TPU)-organosilicate nanocomposites were examined. High energy milled organofluoromica nanofillers having reduced platelet aspect ratio and tactoid size were produced in order to obtain an overall better dispersion and more efficient TPU-organofluoromica nanocomposite reinforcement. Regardless the processing method, the lower aspect ratio milled nanofillers resulted in improved quality of dispersion and delamination when incorporated into the TPU and hence induced greater mechanical properties as compared to the non-milled nanofiller. However, the high temperature applied in melt compounding process might induce some degree of degradation of the dual surfactants employed, producing free amines and alkenes that can subsequently reduce the molecular weight of the TPU. Therefore, the expected larger increases in mechanical properties of melt blended TPU nanocomposites were not observed.

Keywords; Mechanical Property, Nanocomposite, Processing, Thermoplastic Polyurethane