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Characterization of Biodegradable Polycaprolactone Containing Titanium Dioxide Micro and Nanoparticles

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Abstract : Composites based on a biodegradable polycaprolactone (PCL) containing 0.5, 1.0 and 2.0 wt % of titanium dioxide (TiO2) micro and nanoparticles were prepared by melt mixing and the effect of filler type and contents on the thermal properties, dynamic-mechanical behaviour and morphology were investigated. Measurements of storage modulus and loss modulus by dynamic mechanical analysis (DMA) showed better results for microfilled PCL/TiO2 composites than nanofilled composites, with the same filler content. DSC analysis showed that the Tg and Tc of micro and nanocomposites were slightly lower than those of neat PCL. The crystallinity of the PCL increased with the addition of TiO2 micro and nanoparticles; however, the □c for the PCL was unchanged with micro TiO2 content. The thermal stability of PCL/TiO2 composites were characterized using thermogravimetric analysis (TGA). The initial weight loss (5 wt %) occurs at slightly higher temperature with micro and nano TiO2 addition and with increasing TiO2 content.

Keywords : polycaprolactone, titanium dioxide, thermal properties, morphology
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