

# Characterisation and Thermal Properties of Titanium Dioxide Nanoparticles-Containing Biodegradable Polylactide Composites Synthesized by Sol–Gel Method

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## Abstract

This study reports the synthesis, characterisation and thermal properties of polylactide (PLA)/titanium dioxide nanoparticles (TiO<sub>2</sub> NPs) composites using the sol–gel method. The percentage weight of TiO<sub>2</sub> NP sol was varied from 3, 8, 11 and 14. The synthesised composites were characterised using scanning electron microscopy (SEM), Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction, energy dispersive X-ray spectroscopy (EDS), thermogravimetric analysis and dynamic mechanical analysis. Encapsulation of the TiO<sub>2</sub> into the PLA matrix was attainable based on the SEM images and the FTIR and EDS results. The thermal stability of the composites was shifted to lower temperatures due to photodegradation induced by the metal oxide on the PLA chain. Both PLA and TiO<sub>2</sub> NPs have potential in drug delivery because of their biocompatibility and biodegradability.