

Poly(lactic acid)/TiO₂ nanocomposites as alternative biocidal and antifungal materials

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© 2015 Elsevier B.V. Abstract Poly(lactic acid) (PLA) composites with titanium oxide

(TiO₂) ~ 10-nm nanoparticles were produced by the melting process and their main properties were evaluated. The nanoparticles are homogeneously dispersed in the matrix with a low degree of agglomeration, as seen by transmission electron microscopy (TEM). The crystallinity temperature increased ~ 12% when 5 wt.% of TiO₂ was added, showing that the nanoparticles acted as nucleating agents this trend was confirmed by optical images. The elastic modulus increased ~ 54% compared to neat PLA at 5 wt.% of nanoparticles. Despite these improvements, PLA/TiO₂ nanocomposites showed lower shear viscosity than neat PLA, possibly reflecting degradation of the polymer due to the particles. Regarding biocidal properties, after 2 h of contact the PLA/TiO₂ composites with 8 wt.% TiO₂ showed a reduction of Escherichia coli colonies of ~ 82% under no UVA irradiation co