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BIONANOCOMPOSITES PREPARED BY A SOL-GEL PROCESS IN THE MELT

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The waste composed by packaging residues, made usually of non-biodegradable polymers, is a major environmental concern. One of the solutions to reduce this kind of waste is the use of biodegradable polymers in packaging applications. Biodegradable polymers are design to degrade upon disposal by the action of living organisms and are a major advantage to packaging applications like in foodstuff or any other short term packaging material. Unfortunately, the use of biodegradable materials has been strongly limited because of its poor properties, like barrier and mechanical properties. Therefore, the aim of this work is to set the best conditions to prepare a bionanocomposite in the melt using the sol-gel process. The materials used were a poly(ϵ -caprolactone) (PCL) with a high molecular weight and titanium(IV) butoxide as a precursor. The nanocomposites were prepared with different precursors amount and different conditions. The obtained materials were characterized by Fourier Transformed Infra Red Spectroscopy (FT-IR), rheological measurements and electron microscopy. The best conditions to obtain nanocomposites without polymer degradation were 90°C, 100 rpm and 8 minutes. The materials prepared under these conditions showed a rheological behavior very similar to the PCL matrix, showing that no degradation occurred.

Acknowledgement: The authors would like to thank Portuguese Foundation of Science and Technology (FCT) for financial support (PTDC/AMB/73854/2006).

Keywords: nanocomposites; poly(ϵ -caprolactone); sol-gel process