

Rheological, mechanical and thermal properties of reprocessed and recycled polylactide nanocomposites

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In recent years there has been an increasing environmental consciousness in the development, sustainable usage and recycling of polymeric materials for different technological applications. The petroleum based polymers have been used for many years but despite of their good performance they present many drawbacks in respect of environmental impact. The average degradation time of a PET bag is in the range of hundreds of years creating a huge environmentally problem that remains unsolved. Biobased polymers have attracted the interest of researchers and are attractive to society due to their benefits in terms of sustainability and environmental impact. European society is ready for the replacement of conventional polymers for more sustainable ones. Among the different existing polymers Poly (lactic acid), PLA, which derives from natural renewable sources such as feedstock of corn, potatoes, fermented plant starch or sugar beet has been seriously considered as a replacement for polypropylene, polystyrene or polyethylene [1], although some of its properties such as its permeability, mechanical resistance and brittleness restrict its use in a wide-range of applications compared to the mentioned conventional polymers.

Our research group has demonstrated the enhancement of the PLA properties and processability by their reinforcement with natural nanofillers, obtaining superior materials that have been validated in active packaging applications [1]

In the present paper we have characterized the rheological, mechanical and thermal properties of both neat and nanoreinforced (with natural nanoclays) PLA after 20 reprocessing cycles and also with recycled materials used in packaging trays. The study has evaluated the effect that each reprocessing cycle has on the properties of the polymer demonstrating the reprocessability of these novel biobased materials.

References

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2. Victor Peinado, Lidia García, Ángel Fernández, Pere Castell “Novel lightweight foamed poly(lactic acid) reinforced with different loadings of functionalised Sepiolite” *Composites Science and Technology* 101 (2014) 17–23

