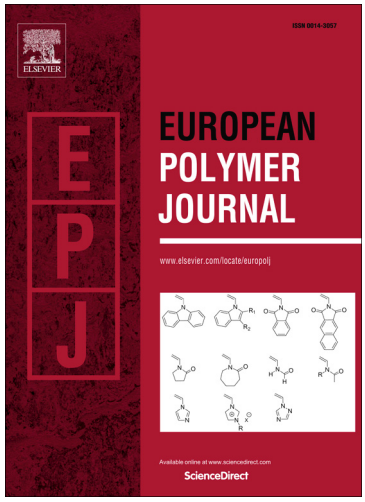

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PII: S0014-3057(16)30437-2
DOI: http://dx.doi.org/10.1016/j.eurpolymj.2016.09.019
Reference: EPJ 7490

To appear in: *European Polymer Journal*

Received Date: 17 May 2016
Revised Date: 30 August 2016
Accepted Date: 9 September 2016

Please cite this article as: Paula, E.L.d., Roig, F., Mas, A., Habas, J-P., Mano, V., Vargas Pereira, F., Robin, J-J., Effect of surface-grafted cellulose nanocrystals on the thermal and mechanical properties of PLLA based nanocomposites, *European Polymer Journal* (2016), doi: http://dx.doi.org/10.1016/j.eurpolymj.2016.09.019

Effect of surface-grafted cellulose nanocrystals on the thermal and mechanical properties of PLLA based nanocomposites.

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Abstract

The effects of polylactide-graft-cellulose nanocrystals on the thermal and mechanical properties of poly(L-lactide) matrices were investigated. Cellulose nanocrystals (CNCs) were grafted with polylactide chains *via* a solvent-free process by ring-opening polymerization of L-lactide using magnesium hydride as a catalyst. The efficiency of grafting was determined by infra-red, X-ray photoelectron spectroscopy and nuclear magnetic resonance analyses. X-ray diffraction analyses showed that the crystalline nature of the CNCs was preserved. Nanocomposites based on poly(L-lactide) matrix containing ungrafted nanocrystals (PLLA/CNCs) and grafted nanocrystals (PLLA/PLLA-*g*-CNCs) were investigated. DSC revealed that the grafted nanocrystals exhibited a strong influence on the crystallinity of the nanocomposites, inducing a significant enhancement of the mechanical properties of PLLA/PLLA-*g*-CNCs compared with PLLA/CNCs material. The role played by the