

Accepted Manuscript

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

Everton Luiz de Paula, Frédéric Roig, André Mas, Jean-Pierre Habas, Valdir Mano, Fabiano Vargas Pereira, Jean-Jacques Robin

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>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

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

Everton Luiz de Paula^a, Frédéric Roig^b, André Mas^{b,*}, Jean-Pierre Habas^b, Valdir Mano^c, Fabiano Vargas Pereira^a, Jean-Jacques Robin^b

^a Departamento de Química - Universidade Federal de Minas Gerais, Av. Antônio Carlos, 6627 – Pampulha, CEP 31270-901, Belo Horizonte - MG, Brazil

^b Institut Charles Gerhardt Montpellier UMR5253 CNRS-UM2-ENSCM-UM - Equipe Ingénierie et Architectures Macromoléculaires, Université Montpellier – cc1702, Place Eugène Bataillon, 34095 Montpellier Cedex 5, France

^c Departamento de Ciências Naturais - Universidade Federal de São João Del-Rei
Praça Dom Helvécio, 74 – Fábricas, CEP 36301-160, São João Del Rei - MG, Brazil

* Corresponding author.

E- mail address: andre.mas02@univ-montp2.fr (A. Mas).

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

Download English Version:

<https://daneshyari.com/en/article/5159700>

Download Persian Version:

<https://daneshyari.com/article/5159700>

[Daneshyari.com](https://daneshyari.com)