

Accepted Manuscript

Reactive Extrusion: A Useful Process to Manufacture Structurally Modified PLA/o-MMT Composites

J. Cailloux, R.N. Hakim, O.O. Santana, J. Bou, T. Abt, M. Sánchez-Soto, F. Carrasco, M.Ll. Maspoch

PII: S1359-835X(16)30157-9
DOI: <http://dx.doi.org/10.1016/j.compositesa.2016.05.024>
Reference: JCOMA 4314

To appear in: *Composites: Part A*

Received Date: 14 January 2016
Revised Date: 15 May 2016
Accepted Date: 21 May 2016

Please cite this article as: Cailloux, J., Hakim, R.N., Santana, O.O., Bou, J., Abt, T., Sánchez-Soto, M., Carrasco, F., Maspoch, M.Ll., Reactive Extrusion: A Useful Process to Manufacture Structurally Modified PLA/o-MMT Composites, *Composites: Part A* (2016), doi: <http://dx.doi.org/10.1016/j.compositesa.2016.05.024>

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.



Reactive Extrusion: A Useful Process to Manufacture Structurally Modified PLA/o-MMT**Composites**

J. Cailloux^{a,1,*}, R. N. Hakim^{a,1}, O. O. Santana^a, J. Bou^b, T. Abt^a, M. Sánchez-Soto^a, F. Carrasco^c, M. Ll. Maspoch^a

^a *Centre Català del Plàstic (CCP)– Universitat Politècnica de Catalunya Barcelona Tech (ETSEIB-UPC), C/Colom, 114, Terrassa 08222, Spain*

^b *Department of Chemical Engineering, Universitat Politècnica de Catalunya Barcelona Tech (ETSEIB-UPC), Pavelló G, planta 1, Avenida Diagonal, 647, Barcelona 08028 Spain*

^c *Department of Chemical Engineering, Agriculture and Food Technology – Universitat de Girona (UdG), Campus Montilivi s/n, Girona 17071, Spain*

Abstract

In the present work, Poly(lactic acid) (PLA) sheets reinforced with organically modified montmorillonite (o-MMT) were manufactured through reactive extrusion-calendering using a masterbatch approach in a pilot plant. Reaction monitoring analysis suggests the occurrence of premature reactions between o-MMT and the reactive agent; lowering further structural changes in the polymeric matrix. While calendered sheets exhibited a homogenous and preferential distribution of clay particles in MD, the coexistence of mixed structures, involving tactoids of various sizes as well as intercalated clay layers was observed. However, a higher and finer dispersion of o-MMT particles was achieved through clay-polymer tethering via chain extender molecules. Under tensile loading, the aforementioned clay dispersion enhanced multiple cavitation processes, notably improving PLA shear flow.

¹ These authors contributed equally to this work.

* Corresponding author.

E-mail address: jonathan.cailloux@upc.edu (J. Cailloux).

Tel.: +34 93 783 70 22 Fax: +34 93 784 18 27

Keywords:

A. Biocomposite, B. Mechanical properties, D. Process monitoring, E. Extrusion

Download English Version:

<https://daneshyari.com/en/article/7890516>

Download Persian Version:

<https://daneshyari.com/article/7890516>

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