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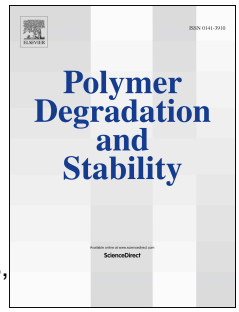

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PII: S0141-3910(18)30048-X

DOI: 10.1016/j.polymdegradstab.2018.02.005

Reference: PDST 8459

To appear in: *Polymer Degradation and Stability*

Received Date: 11 December 2017

Revised Date: 22 January 2018

Accepted Date: 7 February 2018

Please cite this article as: Rapp Gé, Samuel Cé, Odent Jéé, Raquez J-M, Dubois P, Bussière P-O, Gardette J-L, Therias S, Peculiar effect of stereocomplexes on the photochemical ageing of PLA/PMMA blends, *Polymer Degradation and Stability* (2018), doi: 10.1016/j.polymdegradstab.2018.02.005.

Peculiar effect of stereocomplexes on the photochemical ageing of PLA/PMMA blends

Géraldine Rapp[1], Cédric Samuel[2], Jérémy Odent[3], Jean-Marie Raquez[3], Philippe Dubois[3], Pierre-Olivier Bussière[1], Jean-Luc Gardette[1], Sandrine Therias[1]*

[1]Université Clermont Auvergne, CNRS, SIGMA Clermont, ICCF, F-63000 Clermont-Ferrand, France

[2]Department of Polymers and Composites Technology and Mechanical Engineering (TPCIM), Mines Douai, Rue Charles Bourseul 941, CS 10838, 59508 Douai, France

[3]Laboratory of Polymeric and Composite Materials (LPCM), Center of Innovation and Research in Materials and Polymers (CIRMAP), University of Mons Research Institute for Materials Science and Engineering & Materia Nova Research Center (UMONS – MATERIANOVA), Place du Parc 23, B-7000 Mons, Belgium

KEYWORDS : Polylactide/poly(methyl methacrylate) blends, stereocomplex, morphology, photodegradation

ABSTRACT: The effect of UV light on polylactide/poly(methyl methacrylate) (PLA/PMMA) blends produced by melt-extrusion with a special emphasis on the peculiar influence of PLA stereocomplexes on the photochemical behavior of the blends is the focus of this paper. Stereocomplexable PLA have been prepared by melt-blending of high-molecular-weight poly(L-lactide) (PLLA), poly(D-lactide) (PDLA) and PMMA. The photochemical behavior of resulting PLA/PMMA blends was studied by irradiation under photooxidative conditions (λ > 300 nm, temperature of 70°C and in the presence of oxygen). The chemical modifications induced by UV light irradiation were analyzed using infrared spectroscopy (IR) and size exclusion chromatography (SEC). Morphological changes were studied by differential scanning calorimetry (DSC) and atomic force microscopy (AFM). It was shown that PDLA and PMMA don't affect the rate of photooxidation of PLLA. However, PLA stereocomplexes have a strong impact on the morphology of the blends during photochemical ageing.

1. Introduction

Driven by environmental awareness and fossil resources rarefaction, serious attention from industries has been paid to polylactide (PLA) as a biosourced alternative to conventional petroleum-based polymers in different types of applications such as packaging, automotive and electronics [1-2]. The reason for its development relies mainly on a number of interesting properties, including its excellent mechanical properties, positive life cycle assessment and relatively low-cost. Despite these advantages, some efforts on improving its thermal stability, impact strength,