

Accepted Manuscript

A renewable and compostable polymer for reducing consumption of non-degradable plastics

Bahareh Bahramian, Ali Fathi, Fariba Dehghani



PII: S0141-3910(16)30252-X

DOI: [10.1016/j.polymdegradstab.2016.08.014](https://doi.org/10.1016/j.polymdegradstab.2016.08.014)

Reference: PDST 8040

To appear in: *Polymer Degradation and Stability*

Received Date: 22 July 2016

Revised Date: 23 August 2016

Accepted Date: 27 August 2016

Please cite this article as: Bahramian B, Fathi A, Dehghani F, A renewable and compostable polymer for reducing consumption of non-degradable plastics, *Polymer Degradation and Stability* (2016), doi: 10.1016/j.polymdegradstab.2016.08.014.

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.

A Renewable and Compostable Polymer for Reducing Consumption of Non-Degradable Plastics

Bahareh Bahramian, Ali Fathi, Fariba Dehghani*

The University of Sydney, School of Chemical & Biomolecular Engineering, Sydney, NSW
2006, Australia

E-mail: fariba.dehghani@sydney.edu.au, Tel: +61 2 93514794, Fax: +61 2 93512854

Abstract

Poly(propylene carbonate) (PPC) is a biodegradable and partially renewable polymer that is synthesized from CO₂. PPC is a suitable alternative to non-degradable polymers and a possible option for effectively recycling CO₂. In this study, the properties of PPC are compared with other commercial polymers. It is demonstrated that while the mechanical properties of PPC are comparable to non-degradable polyethylene, its permeability to oxygen and water vapor are remarkably lower. PPC degradation in compost soil is nearly 9% within six months that is comparable with biodegradable polymers such as Eco-Flex. Meanwhile, PPC is chemically stable when exposed to a broad range of simulated media such as low or high pH as negligible mass loss and molecular weight deductions are detected after six months exposure to these media. Therefore, PPC is deemed to be an ideal polymer for food packaging and many other applications such as biomedical devices. The application of PPC can significantly reduce the disposal of non-degradable polymers in landfills and minimize the reliance on fossil fuel based polymers.

Keywords: poly(propylene carbonate); biodegradable polymer; compostable; packaging.

1 Introduction

The broad use and application of non-degradable plastics in recent decades has led to major environmental issues, such as the lowering capacity of landfills, and the exposure of the ecosystem to hazardous pollutants [1, 2]. As a result of this impact many countries have banned the use of non-degradable polymers for food packaging. Introducing biodegradable plastics, like Poly

Download English Version:

<https://daneshyari.com/en/article/5200960>

Download Persian Version:

<https://daneshyari.com/article/5200960>

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