Extended Abstract
Volume 4:4, 2021

Journal of Pollution

Open Access

Characterization of biodegradable poly (propylene carbonate) for food packaging application

Fariba Dehghani and Bahareh Bahramian

University of Sydney, Australia, *E-mail: fariba.dehghani@sydney.edu.au*

Abstract

The development of new generation of renewable materials, in particular, thermoplastic and biodegradable polymers are desirable for packaging and many other applications to tackle the major issues of disposing non-degradable polymers in landfills. Aliphatic biodegradable polymers such as poly (propylene carbonate) (PPC) can be considered as an alternative to non-degradable polymers. PPC is a partially renewable polymer from feedstock such as CO2 and propylene oxide (PO). In this study, we assess the potential of PPC for food packaging application. To this context, we compared the physicochemical properties of PPC with commercial polymers such as low density polyethylene (LDPE) and poly (butyrate abdicate terephthalate) (Eco-Flex) that are currently used for food packaging. Our results demonstrated that tensile modulus of PPC was three-fold more than biodegradable Eco flex and comparable with non-degradable LDPE. Furthermore, tear resistance of PPC was fivefold higher than LDPE. More importantly, permeability of PPC to oxygen and water vapour was lower than these polymers. This property is pivotal for food packaging as it prolongs the food shelf life by reducing the spoilage rate. Finally, we confirmed that PPC is chemically resistance to a diverse range of food products such as juices, oils and alcoholic beverages due to the fact that its weight loss was negligible after six months in the food simulated media. Our results also showed that the degradation rate of PPC in landfill condition is comparable to biodegradable Eco-Flex. The cereal grain's total composition (excluding the pericarp) is used to obtain the films. The plasticizing effects of two packaging and many other applications to tackle the major issues of disposing non-degradable polymers in landfills. Aliphatic biodegradable polymers such as poly (propylene carbonate) (PPC)

Can be considered as alternative ton on-degradable polymers. PPC is a partially renewable polymer from feedstock such as CO2and propylene oxide (PO). In this study, we assess the potential of PPC for food packaging application. To this context, we compared the physicochemical properties of PPC with commercial polymers such as low density polyethylene (LDPE) and poly (butyrate abdicate terephthalate)(Eco-Flex) that are currently used for food packaging. Our results demonstrated that tensile modulus of PPC was three-fold more than biodegradable Eco flex and comparable with non-degradable LDPE. Furthermore, tear resistance of PPC was five-fold higher than LDPE. More importantly, permeability of PPC to oxygen and water vapour was lower than these polymers. This property is pivotal for food packaging as it prolongs the food shelf life by reducing the spoilage rate. Finally, we confirmed that PPC is chemically resistance to a diverse range of food products such as juices, oils and alcoholic beverages due to the fact that its weight loss was negligible after six months in the food simulated media. Our results also showed that the degradation rate of PPC in landfill condition is comparable to biodegradable Eco-Flex. In summary, we demonstrated that PPC has superior properties to be contemplated as an alternative to polyethylene and other polymers for food packaging to reduce the environmental foot-print of non-degradable polymers.

This work is partly presented at 6th International Conference on Food & Beverage Packaging
June 13-14, 2020 Rome, Italy