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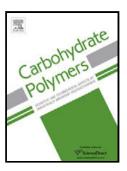
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### ACCEPTED MANUSCRIPT

# Preparation and characterization of poly(ethylene terephthalate) films coated by chitosan and vermiculite nanoclay

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#### **Highlights**

- Poly(ethylene terephthalate) (PET) 130 µm thick films have been successfully coated with 1 to 3 µm thick of homogeneous layers of chitosan or vermiculite/chitosan nanocomposite (with 0 to 50 wt% of vermiculite)
- Improvement of the Barrier improvement factor (Bif) of a PET film of 100 in helium with a 2.40 µm thick chitosan/vermiculite (50 wt%) layer
- Decrease in the oxygen transmission rate from 0.36 to 0.016 cm<sup>3</sup>/m<sup>2</sup>.day with addition of 40 wt% of vermiculite to chitosan layers
- Permeability of nanocomposite layers are two decades lower than poly(vinylidene chloride) (PVDC) in dry condition

#### Abstract

Chitosan (CS) layers are coated on a poly(ethylene terephthalate) (PET) film in order to decrease the oxygen permeability through the polymeric films for food packaging applications. Oxygen transmission rate (OTR) of the 130  $\mu$ m PET films can be decreased from 11 to only 0.31 cm³/m².day with a coated layer of 2  $\mu$ m of CS. Additional decrease is obtained with the addition of vermiculite (VMT) to CS matrix in high proportion (40 to 50 w/w%). The OTR of the coated PET films decreased to very low values, below the detection limit of commercial instrumentation ( $\leq 0.008$  cm³/m².day). This high-barrier behavior is believed to be due to the brick wall nanostructure, which produces an extremely tortuous path for oxygen molecules.

**Keywords:** Chitosan, Vermiculite, Poly(ethylene terephthalate), Barrier properties, Food packaging, Coating.

#### 1. Introduction

Plastics have been widely adopted in food packaging because of their advantages over other materials. These advantages are reflected in the physical, mechanical

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