

Effect of sonication time and heat treatment on the structural and physical properties of chitosan/graphene oxide nanocomposite films

ABSTRACT

This study determined the effect of ultrasonication time (30, 60, and 120 min) and heat treatment (30, 60, and 120 °C) on the structure and properties of the chitosan/ graphene oxide (CSGO) composite films. Graphene oxide (GO) nanosheets with thickness of ~1 nm was obtained after 120 min of sonication, as observed using atomic force microscopy (AFM). The incorporation of highly sonicated GO significantly ($p < 0.05$) improved both visible and ultraviolet (UV) light barrier properties of chitosan (CS) films. The heating temperature of 120 °C improved the hydrophobicity of the CSGO composite films, as demonstrated by contact angle analysis. Finally, all films were completely degradable within 28 days in a soil compost. The CSGO composites are potential green alternatives to petrochemical-based food packaging materials.

Keyword: Composite films; Graphene; Hydrophobic film; Ultrasonication; Biodegradable