

# Surface functionalization of graphene oxide with octadecylamine for improved thermal and mechanical properties in polybutylene succinate nanocomposite

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**Abstract** Modification of graphene oxide (GO) with long-chain aliphatic amine offers a substantial improvement in high-performance polymer as nanofiller in the composite. In this work, graphene oxide was functionalized with octadecylamine via sonochemical exfoliation method producing mono- to few-layer graphene oxide/octadecylamine (GOODA) nanofiller. Biodegradable polybutylene succinate (PBS) was incorporated with GOODA via solution intercalation method. GOODA does not profoundly affect the crystallinity of PBS/GOODA nanocomposite, but interestingly improves the mechanical and thermal properties. The addition of only 0.1 wt% GOODA nanofiller loading exhibited a sharp increase in tensile strength and Young's modulus of up to 50 and 58.9%, respectively. The improvement in strength and thermal behavior could be attributed to the successful interfacial interaction between amine group in GOODA and carboxylic group in PBS chain tail via nucleophilic substitution reaction. This improved interphase structure enhanced the dispersion and exfoliation of GOODA in PBS matrix.

## Introduction

Polybutylene succinate is a potential biodegradable polyester polymer due to its ability to be processed using conventional polyolefin processing machines for various types of applications such as injected, extruded, and blown films [1].

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