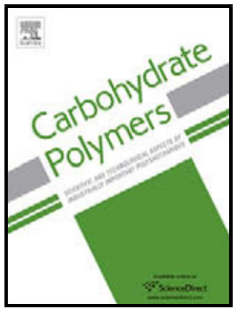

Title: Hydrazine Treatment Improves Conductivity of Bacterial Cellulose/Graphene Nanocomposites Obtained by a Novel Processing Method

Authors: Robert Ccorahua, Omar P. Troncoso, Sol Rodriguez, Daniel Lopez, Fernando G. Torres

PII: S0144-8617(17)30501-5
DOI: http://dx.doi.org/doi:10.1016/j.carbpol.2017.05.005
Reference: CARP 12291

To appear in:

Received date: 20-1-2017
Revised date: 6-4-2017
Accepted date: 1-5-2017

Please cite this article as: Ccorahua, Robert., Troncoso, Omar P., Rodriguez, Sol., Lopez, Daniel., & Torres, Fernando G., Hydrazine Treatment Improves Conductivity of Bacterial Cellulose/Graphene Nanocomposites Obtained by a Novel Processing Method.*Carbohydrate Polymers* http://dx.doi.org/10.1016/j.carbpol.2017.05.005

Hydrazine Treatment Improves Conductivity of Bacterial Cellulose/Graphene Nanocomposites Obtained by a Novel Processing Method

Robert Ccorahua[1], Omar P. Troncoso[1], Sol Rodriguez[1], Daniel Lopez[2], Fernando G. Torres[1,*]

[1] Department of Mechanical Engineering, Pontificia Universidad Catolica del Peru, Lima 32, Peru

[2] Institute of Polymer Science and Technology, Spanish Council for Scientific Research (CSIC), Madrid, Spain

*Corresponding author.

E-mail address: fgtorres@pucp.pe (Fernando G. Torres)

Highlights

- A novel processing technique was used to incorporate graphene oxide (GO) into BC.
- A simple hydrazine treatment was used to in-situ reduce GO of the BC-GO composites.
- This treatment causes a significant boost in the conductivity of BC-GO composites.

Abstract

A novel method to prepare BC nanocomposites reinforced with reduced graphene oxide (RGO) is reported. A simple hydrazine treatment is shown to in-situ reduce the graphene oxide (GO) incorporated to BC films while increasing their conductivity. Raman spectroscopy was used to confirm the presence of graphene and assess the effect of the hydrazine treatment on its structure. XRD tests revealed no changes on BC structure. We hypothesize that this treatment removes the hydroxyl and epoxy groups present on the reduced graphene and increases the content of nonoxygenated carbon. These changes account for the increase in conductivity of the BC-based films, which behaved as an insulating material before the hydrazine treatment and reach an average conductivity value of 12 S/m after such a treatment.

Keywords: Bacterial Cellulose; Reduced Graphene Oxide; Hydrazine; Electric Conductivity