

# Biochar as effective tool for conductive polymers composites production

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Innovative carbonaceous materials such as carbon nanotubes or graphene represent cutting edge frontiers of materials science. Despite their astonishing properties, their use as filler for composites production is limited because of high cost and poor dispersibility in polymeric matrix. Use of carbonaceous material produced from pyrolysis of wasted biomasses could represent an affordable alternative. These materials are generally termed as biochar and show very interesting properties such as a high dispersibility in organic matrix (up to 20 wt.%[1]) and high electrical conductivity. The conductivity of biochar is strongly related to the highest temperature reached during the pyrolytic process and to the type of inorganic additives used, if any.

In this work, we report on the use of biochar derived from wasted biomasses by pyrolysis at different temperatures as a filler for the production of conductive composites. The polymeric matrix tested were epoxy resin filler percentages ranging from 5 wt.% to 30 wt.%. The electrical conductivity of biochar powders and of composites was evaluated using the system described in ref.[2] and sketched in Figure 1. A comprehensive study based on morphological and spectroscopically analysis was carried out and the main biochar characteristics were related to the different conductivity values and mechanical properties observed.

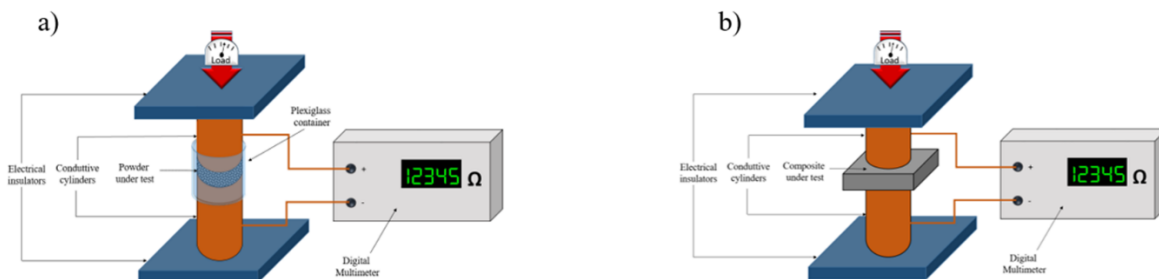


Figure 1: Sketch of Measurement set-up for conductivity study of a) carbon fillers and b) composite

<sup>1</sup> Giorcelli, M., Khan, A., Pugno, N. M., Rosso, C., Tagliaferro, A. Biomass and Bioenergy, (2019) 120, 219-223.

<sup>2</sup> Giorcelli, M., Savi, P., Khan, A., & Tagliaferro, A. Biomass and Bioenergy, (2019) 122, 466-472.