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## BIOCHAR AS A HIGH PERFORMANCE LOW COST FILLER FOR POLYMER COMPOSITES

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**P**olymer composite is a hot topic for a huge number of applications. From aerospace to everyday life, composites are becoming very popular. However, two issues have to be duly considered when a large-scale application is targeted, namely the economic and the environmental impact point of view. For the first, it will be critical to decrease the composite price while improving the properties (e.g. mechanical, electrical ones). For the second, to use of recycled or bio-derived materials is sought. In particular, in the field of polymer composites with carbon fillers, a recent trend is to use biochar in substitution to the other carbon fillers (e.g. carbon nanotubes, graphene). Biochar is a charcoal used normally as a soil amendment in agriculture. However, as it is stable and rich in carbon. Because of its high carbon content, it is a good candidate as a substitute for costlier and higher environment impact carbon forms. In this work, we will present recent achievements in the field of polymer composite based on biochar and will compare results obtained used biochar with those obtained with the other carbon fillers.

### Recent Publications

1. Khan, AAMER ABBAS; Savi, Patrizia; Quaranta, Simone; Rovere, Massimo; Giorcelli, Mauro; Tagliaferro, Alberto; Rosso, Carlo; Jia, Charles (2015) **Low-Cost Carbon Fillers to Improve Mechanical Properties and Conductivity of Epoxy Composites**. *Polymers* 9 (12): p. 642.
2. Daniele, Ziegler; Paola, Palermo; Mauro, Giorcelli; Alberto, Tagliaferro; Tulliani, Jean-Marc. (2017), **Biochars as Innovative Humidity Sensing Materials**. *Chemisensors* 5 (35): p. 1-16.
3. Colucci, G; Beltrame, C.; Giorcelli, M.; Veca, A.; Badini,

C. (2016), **A novel approach to obtain conductive tracks on PP/MWCNT nanocomposites by laser printing**. *RSC Advances* 6 (34): p. 28522-28531.

4. R.A. Khushnood; S. Ahmad; P. Savi; J.-M. Tulliani; M. Giorcelli; G.A. Ferro (2015). **Improvement in electromagnetic interference shielding effectiveness of cement composites using carbonaceous nano/micro inerts**. *Construction and building materials* 85: p. 208-216.
5. Giorcelli, Mauro; Savi, Patrizia; Yasir, M.; Miscuglio, Mario; HAJJ YAHYA, Muna; Tagliaferro, Alberto (2015) **Investigation of epoxy resin/multiwalled carbon nanotube nanocomposite behavior at low frequency**. *Journal of material reserarch* 30 (1): p. 101-107.
6. P. Savi; M. Miscuglio; M. Giorcelli; A. Tagliaferro (2014) **Analysis of microwave absorbing properties of epoxy MWCNT composites**. *Progress in electromagnetics research letters* 44: p. 63-69.

### Biography

Mauro Giorcelli is a Researcher in the Department of Applied Science and Technologies, Polytechnic University of Turin, Italy. He is a Carbon Material Specialist, particularly in composites materials. He is currently working in the field of low cost carbon materials, in particular carbon materials derived from biomass (Biochar). His research interest includes: carbon materials, composite, biomaterials. He has a widespread collaboration network in Europe and Canada for biochar applications. He has published over 50 articles in international journals and they have over 500 citations.

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