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## Production of carbon-based materials from graphite eletrodes (waste) for polymeric reinforcement

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**B**ased on a circular economy concept, this study aims to develop a feasible, reliable and secure method that can be carried out on an industrial scale, by transforming graphite electrodes (waste from EDM processes) into new carbon-based materials-graphite functionalized or not with oxygen, reduced or even graphene-in order to reuse them in another form in final products. Previous work presented various exfoliation techniques: Friction, ball milling, cryogenic milling and detonation. The materials were characterized using Raman spectroscopy, Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM). This work shows that the raw materials obtained by the friction technique can be used as reinforcement additives/ reinforcements of polymeric materials, improving their physical and mechanical properties. Polypropylene (PP) and multilayer graphene from the graphite eletrodes were used to create a Polymer Matrix Composites (PMC), by injection molding. The final PMC were tested for their stress-strain behavior, bending resistance and hardness.

## **Biography**

Cristiano Azevedo has completed his Master's degree in Mechanical Engineering at University of Coimbra. He is currently working as a Research Engineer at the Centre for Mechanical Engineering, Materials and Processes at University of Coimbra. His research interests include industrial waste valorization, additive manufacturing, sputtering and copper and graphene applications.

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