

Chemical-Physical investigation of biochar-matter: A material for nanotechnologies

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Biochar (BC) is a carbonaceous product obtained by pyrolysis, using lignocellulosic biomass. Feedstock and pyrolysis temperature affects the physical-chemical characteristics of the BC, and therefore its use and purpose. It is considered as an effective strategy for the climate change mitigation, caused by the fact that carbon is not easily returned to the atmosphere during BC lifetime [1, 2]. Due to the presence of several carbon molecules, arranged from the thermochemical process of pyrolysis, biochar is a heterogeneous compound. Previous studies revealed a wide presence of interesting carbon molecules; therefore, the biochar can be proposed as a useful material tank containing carbon structures used for different aims [3]. Our study was focused on physical and chemical characterization of carbonaceous structures of a kind of biochar as a function of pyrolysis temperature (300°C ÷650°C). By X- Ray Diffraction (XRD) spectra, two broad peaks (002) and (100) were found corresponding to the turbostratic carbon crystallites. In addition, Raman Spectroscopy spectra showed an overlap between two peaks, corresponding to G band associated with graphite, and D band, displaying the aromatic rings arranged on layers, similar to graphene sheets. To separate and exfoliate carbonaceous structures, BC samples were exposed to ultrasonic bath. Using Atomic Force Microscopy (AFM) the presence of about 1 nm topographic height islands on mica substrate was found, consistent with a typical height of Few Layer Graphene (FLG) reported in the literature [4]. Concerning these results, Biochar could be considered as a reservoir of materials for nanotechnology, such as graphene sheets [5].

Biography

Saturnino Fabio Santilli is currently a process engineer in a pharmaceutical company in L'Aquila dealing development and optimization of the production processes of oral solid forms. From the University of L'Aquila, he obtained master degree in chemical engineer. During his university studies, he supported an internship at the Laue Langevin Institute (ILL) in France, participating in several international experiments at this facility and at the European Synchrotron Radiation Facilities (ESRF, Grenoble, FR). During his master's studies, Saturnino participated in the research on "Biochar" at the National Research Council - Biometeorology Institute of Florence publishing scientific papers and posters.