

## **X-Ray Diffraction and Raman Spectroscopy for Evaluating the Carbonaceous Structures Features as a Function of Pyrolysis Temperature Production**

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**B**iochar (BC) is a carbonaceous product that comes from pyrolysis process of different biomasses, such as lignocellulosic feedstocks. Biomass incorporates atmospheric carbon during its life and, thanks to pyrolysis process, the lignocellulosic structure forms carbon phases in biochar's matrix, which could be resistant to degradation mechanisms and prevent carbon's return in atmosphere [1]. Biomass nature, pyrolysis temperature and speed heating rate affect the physical and chemical characteristics of BC produced. The aim of this work concerned the investigation of recalcitrant aspects of carbonaceous structures determined in biochar's matrix, which evolved as a function of pyrolysis temperature. BC samples were produced in laboratory starting from larch wood feedstock. Using X-Ray diffraction and Raman Spectroscopy, this study was focalized on the evolution of turbostratic carbonaceous structure, as a 'continuum' of both crystalline and amorphous phases in BC increasing pyrolysis process temperature [2]. Main XRD peaks of turbostratic phase were determined, and increasing process temperature lateral growth of aromatic sheets was found [3, 4]. Raman spectroscopy was applied for structural features of carbon molecules of carbonaceous phases, in order to discriminate the recalcitrant structures into biochar matrix. Aliphatic compounds and low- extended aromatic ring systems in BC could present a less recalcitrance properties during the time respect to the strong recalcitrance well known for graphitic compounds [5]. Thanks to the degradation against the time of less recalcitrant carbonaceous structures, potential interactions with the environment could happened, such as the adsorption processes of mineral elements and encapsulation of mineral crystalline phases, that could increase the stability of the carbonaceous residual fractions of biochar [5].

### **Biography**

Alessandro Montanaro currently works in a pharmaceutical company dealing the feasibility for new contract manufacturing projects, also dealing the new technology scouting. Previously he held the role of project manager and process technologist in the same company. He held a Master Degree in Chemical Engineer. He carried out two internship experiences during the University period. Alessandro accomplished his bachelor with a stage at Laue Langevin Institute (ILL, Grenoble, FR). He participated to the experiments at the European Synchrotron Radiation Facilities (ESRF, Grenoble, FR). The other stage, for completed his Master Degree, has been done at the National Research Council - Biometeorology Institute (CNR-IBIMET).