PRODUCTION, CHARACTERIZATION AND USES OF N-DOPED AND METAL-N-DOPED BIO-CHARS

Manuel Garcia-Perez, Department of Biological Systems Engineering, Washington State University, USA
mgarcia-perez@wsu.edu

Key Words: N-doped chars, Metal-N doped chars, applications, phosphate removal, catalytic properties

N-doped and metal-N-doped carbons are receiving increasing attention for environmental and electronic applications. Modifications of carbons such as biomass-derived char by N-doping allow for modulating carbons' acid-base character, adsorption, catalytic performance, and electrochemical properties (e.g., electrical conductivity and capacitance). N-doped carbons are obtained from the thermal co-processing of C-rich and N-rich sources (e.g., lignocellulosic biomass, proteins, ammonia). Although the literature is abundant in papers on producing heteroatom-doped carbon nanotubes, carbon fibers, and other high-value carbonaceous products from non-renewable sources, there is limited information on the production of N-doped bio-chars from bio-resources. Our presentation aims to review synthesis processes and activation strategies to produce N-doped carbons from biomass resources and the uses of the resulting materials. Pyrolysis and hydrothermal carbonization offer opportunities to obtain relatively cheap, environmentally friendly N-doped carbonaceous materials with tailored properties for environmental and electronic applications. The role of the Maillard reactions in integrating N into carbonaceous products' structure is also discussed. The desired char properties and the relationship between chemical composition and application performance of these materials will be discussed. Our presentation will focus on the production and propertied of Mg-N-doped chars for phosphate removal and on catalytic properties of these materials for oxidation reactions.