

Exploring untapped effect of process conditions on biochar characteristics and applications

ABSTRACT

The aim of the current review is to examine the effect of process conditions on biochar characteristics and their impacts on a wide range of potential biochar applications for its commercialization. Biochar is a solid residue produced by thermochemical conversion from different biomass. In this study, a comprehensive discussion has been made on physiochemical characteristics of biochar such as carbon content, mineral content, volatile matter, surface area, pore structure, pore distribution, and electrical conductivity that are depend on several critical factors, including process temperature, heating rate, type of gasifier and biomass, and biomass composition. In addition, some other unique properties of biochar like high surface area and porous structure make it a promising cheap source for the production of carbon-based catalysts for energy recovery technologies like gasification, anaerobic digestion, and pyrolysis, adsorbents material in wastewater treatment, activated carbons, microbial fuel cells (MFC) electrodes, energy storage material, and the preparation of supercapacitors has been reviewed. Most importantly, the status of char technology for different application and the barriers, problems, and research gaps are also mentioned for future research and development for researchers, private and public investors.

Keyword: Biochar; Biochar applications; Biochar as catalyst; Energy recovery technology; Gasification