

Biochar-Based Nanocomposites: A Sustainable Solution for Water and Wastewater Treatment

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Abstract

Biochar, a carbonaceous solid is derived from the waste biomass. Recently, biochar has shown a promising role in water and wastewater treatment due to its unique physicochemical properties, low cost, and wide availability of feedstocks. It is mainly used as an adsorbent owing to its highly porous structure, which imparts high surface area and presence of functional groups on its surface. However, unmodified biochar often falls short in meeting the expectations of water processing due to limited adsorption capacity in case of a high concentration of pollutants and difficulty in the recovery of pulverous biochar. In order to mitigate these issues, biochar-based nanocomposites which enhance the adsorption capabilities for contaminants like organic contaminants, heavy metals, pharmaceuticals, and so on. The development of biochar nanocomposites not only improves the adsorption capacity, stability, and biocompatibility but also provides the advantage of magnetic separation improving the overall water treatment process. Additionally, the use of biochar nanocomposite can also work as catalytic support offering adsorption and simultaneous degradation of the contaminant. Thus, biochar-based nanocomposites provide a sustainable solution for integrating water and wastewater treatment with carbon capture and waste disposal.