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A novel modification of lignin on corncob-based biochar to enhance removal of cadmium from water

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ABSTRACT

In order to improve the adsorption capacities of corncob-based biochars for heavy metal, the different pyrolysis temperature (350°C, 450°C and 550°C) of corncob-based biochars were modified with the acrylonitrile, and adsorption capacities of Cadmium from solution by biochars were studied. The results showed that only at 350°C the biochar can be successfully modified. The Cd adsorption capacity (85.65 mg/g) by the biosorbent was higher than other methods of modifying biochars previously reported. SEM-EDS and FTIR confirmed that the C≡N group was grafted on the biochar at low pyrolysis temperature. Batch adsorption experiment including pH-dependence, adsorption kinetics, and isotherms and XPS results showed that the removal mechanism of Cd(II) by the modified biochar was ion exchange and adsorption-complexation. This research not only obtained a novel method to modify biochar but also furthered research into the lignin of biochar composition, and provided an efficient sorbent for heavy metal.

Keywords: Biochar; agricultural waste; grafting modification; heavy metal; lignin

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