

## **The role of biochar for sorption behavior of sulfonamides in soil and removal of Cr(VI) in water**

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Biochar derived from agricultural residue has been widely applied in soil amendment and water remediation. Herein on the one hand, we focused on sulfonamides, a kind of ionized antibiotics, adsorption and leaching behavior in soils in the presence of biochar. We found that the biochar amended soil had a strong adsorption potential and retention ability (12-20% increase) for sulfonamides than untreated soil, which effectively prevents the sulfonamides transporting in the soils and infiltrating into groundwater. The results also showed the effects of soil type, pH value, humic acid and heavy metals such as  $\text{Cu}^{2+}$  on the sorption/desorption behavior of sulfonamides.

On the other hand, we investigated on the heavy metal such as Cr(VI) removal by magnetic biochar in aqueous solution. In contrast to pristine peak shell biochar, magnetic biochar with  $\gamma\text{-Fe}_2\text{O}_3$  significantly enhanced the adsorption capacity (77.54 mg/g) of Cr(VI) and it was also easily recycled by magnets. Besides, we discussed influencing factors including pyrolysis peak temperature, particle size, the surface area, and magnetic properties of biochar. It showed that high temperature, small size and low pH increased the capacity to adsorb Cr(VI). The results of our present study confirm that biochar effectively mitigate sulfonamides and Cr(VI) in soil and water, which could provide an important basis and guidance in details for development of farmland soils and water treatment.

The study was supported by National Natural Science Foundation of China (41472232, 41272061), Fundamental Research Funds for the Central Universities and Open Program of State Key Laboratory of Biogeology and Environmental Geology (GBL21404).