

## Accepted Manuscript

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PII: S0960-8524(18)30808-3  
DOI: <https://doi.org/10.1016/j.biortech.2018.06.029>  
Reference: BITE 20046

To appear in: *Bioresource Technology*

Received Date: 3 May 2018  
Revised Date: 9 June 2018  
Accepted Date: 11 June 2018

Please cite this article as: Yang, F., Zhang, S., Sun, Y., Cheng, K., Li, J., Tsang, D.C.W., Fabrication and characterization of hydrophilic corn stalk biochar-supported nanoscale zero-valent iron composites for efficient metal removal, *Bioresource Technology* (2018), doi: <https://doi.org/10.1016/j.biortech.2018.06.029>

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**Fabrication and characterization of hydrophilic corn stalk biochar-supported nanoscale zero-valent iron composites for efficient metal removal**

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**Abstract**

Pyrolyzing low-cost agro-waste into biochar is a promising means for waste biomass utilization. This study engineers corn stalk-derived biochar with abundant hydrophilic functional groups as a support material for iron nanoparticles impregnation (nZVI-HCS). Surface chemistry and morphology of nZVI-HCS composites is characterized by SEM, TEM, TG, XRD, FTIR, XPS, and BET techniques, which helps to elucidate the mechanisms of Pb<sup>2+</sup>, Cu<sup>2+</sup> and Zn<sup>2+</sup> removal from single and mixed-metal solutions in batch experiments. Equilibrium adsorption capacities can reach 195.1, 161.9 and 109.7 mg·g<sup>-1</sup> for Pb<sup>2+</sup>, Cu<sup>2+</sup> and Zn<sup>2+</sup> at neutral medium after 6-h process, respectively. The engineered biochar with

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