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Insight into the impacts of acid and base pre-treatment on activated carbon and biochar electrodes in flow-electrode capacitive deionization

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ABSTRACT

Biochar is an abundant, yet highly heterogenous, green alternative to the commercial activated carbons. As received, biochar possesses labile, soluble compounds that might obscure its utilisation in aqueous environments, for example, as porous electrodes for capacitive deionization. We investigated the effect of acid–base leaching on the physicochemical and electrochemical properties of straw biochar and commercial activated carbon. The findings suggested that the most commonly evaluated properties of the electrode materials (i.e., capacitance, resistance, functional groups, and porosity) do not unequivocally determine the electrode performance. The results point towards the importance of the more indefinite carbon properties, which differ between the pristine materials, arising from their inherent structural features, and could be related to their proton donating/accepting ability.

Keywords: Biochar; Activated carbon; Flow-electrode capacitive deionization; Acid/base pre-treatment; Flow carbon electrode

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