Preparation of Ginger Straw based Porous Carbon using One-step Pyrolysis Process as Electrode Material for Supercapacitor

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Conventional preparation for porous carbon is expensive, complex, leading to a low yield. In this study, a one-step pyrolysis synthesis method without any chemical additive is designed based on the natural tubular structures and components (rich in potassium) of the ginger straw. The physicochemical and electrochemical performance of the product are studied, and the synthesis mechanism is discussed. Based on the excellent hierarchical porous structure, the specific capacitance can reach 274 F g^{-1} ($38.1 \text{ } \mu\text{F cm}^{-1}$) @ 0.1 A g^{-1} , and the specific capacitance can retain 88% after 6000 cycles at the current density of 5 A g^{-1} . The maximum energy density and power density can be $34.06 \text{ W h kg}^{-1}$ and 4.35 kW kg^{-1} . This study provides a new perspective for designing preparation method based on the component and structure characteristics of the raw material, and provide a new perspective on the treatment of ginger straw waste.

Keywords: synthesis method; porous carbon; supercapacitor; electrochemical performance; biomass

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