High Surface Area Activated Carbon From Rice Husk As A High Performance Supercapacitor Electrode

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ABSTRACT

In this study, we report on the application of high surface area activated carbon (AC) derived from rice husks as a supercapacitor electrode. The prepared AC was free from Brønsted or Lewis acid sites, thus making the electrical double layer capacitance as the main charge storage mechanism. Three samples of AC with different surface areas were prepared at different activation temperatures and studied electrochemically using cyclic voltammetry, galvanostatic charge-discharge and electrochemical impedance spectroscopy. All AC samples exhibited good electrochemical performance as supercapacitor electrode. The maximum specific capacitance (147 F g^{-1}) was obtained by the AC sample (surface area of 2696 m^2 g^{-1}) which was prepared at an activation temperature of 850 °C. Detailed impedance studies revealed the low resistivity (0.23 Ω) of AC sample and the fast frequency response (0.11 s) of the supercapacitor electrode.

KEYWORDS: Biowaste; energy storage; supercapacitors; electrochemistry; activated carbon

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