Porous Carbon Derived from Nutshell as Electrode Materials for Supercapacitors

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The porous activated carbons derived from walnut epicarp is utilized as activated carbon electrodes for supercapacitors. The field emission scanning microscope and transmission electron microscopy tests demonstrate that the nutshell porous activated carbons (WEPACs) treated with ZnCl_2 can produce a large number of mesopores. As an electrode material for supercapacitor, the WEPACs possess high specific capacitance of $235 \text{ F}\cdot\text{g}^{-1}$ at a current density of $0.5 \text{ A}\cdot\text{g}^{-1}$ in three-electrode systems. As assembled WEPACs//WEPACs symmetric supercapacitor device exhibits specific energies of $17.1 \text{ Wh}\cdot\text{kg}^{-1}$ at a power density of $299 \text{ W}\cdot\text{kg}^{-1}$ and in the voltage range of 0–1.2 V. Moreover, it retained about 90.3% of the initial capacitance after 5000 charge–discharge cycles, indicating an excellent cyclic stability.

Keywords: Porous carbon, Supercapacitors, High energy density

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