


Article

Robust NiCo₂O₄/Superactivated Carbon Aqueous Supercapacitor with High Power Density and Stable Cyclability

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Abstract

Herein, we investigate the performance of an aqueous asymmetric supercapacitor (AAS) assembled by using novel nanostructured NiCo₂O₄ as the positive electrode and a polymer-derived superactivated carbon (SAC) as the negative electrode. The combination of both the nanostructured NiCo₂O₄ and the carbon with hierarchical porosity and ultrahigh specific surface area (above 3000 m² g⁻¹) led to excellent rate performances and long stability of the system. The optimization of the AAS device is further achieved through the variation of mass ratio between positive and negative electrodes. The optimized AAS full cell exhibits reversibility within the 0.0–1.5 V operative voltage region, delivering a specific cell capacity of 24.6 mAh g⁻¹ at a current density of 1 A g⁻¹. This results in a remarkable energy density of 13 Wh kg⁻¹ at a power density of 26.2 kW kg⁻¹ and an excellent cycling durability above 87 % of the initial capacity after 10,000 charge-discharge cycles.