CoMoO₄ Supported by N-doped Carbon Derived from ZIF-67 as a Novel Electrode Material for High Performance Supercapacitors

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ZIF-67 derivatives show promising applications in energy storage owing to their high surface area and excellent electrochemical performance. In this work, an N-doped carbon-coated CoMoO₄ nanoparticle (CMO@NC) polyhedron was prepared by hydrothermal treatment and calcination. The structural and morphological properties of the obtained samples were measured by X-ray diffraction (XRD), scanning electron microscopy (SEM) and N₂ adsorption/desorption isotherms. In terms of electrochemical performance, CMO@NC exhibits a remarkable specific capacitance of 267.3 F g⁻¹ at 0.5 A g⁻¹. Moreover, a hybrid supercapacitor device with CMO@NC as the positive electrode material and active carbon (AC) as the negative electrode material was observed to achieve a specific capacitance of 114 F g⁻¹ at 0.5 A g⁻¹, with a stable operational voltage of 1.5 V and a maximum energy density of 35.4 Wh kg⁻¹ at a power density of 1041 W kg⁻¹. The specific capacitance retention can reach up to 82.4 % after 5000 cycles, as determined by GCD measurements, indicating outstanding cycling stability and potential application prospects in supercapacitors.

Keywords: Asymmetric supercapacitor; CoMoO₄@NC; Composite; High-performance

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