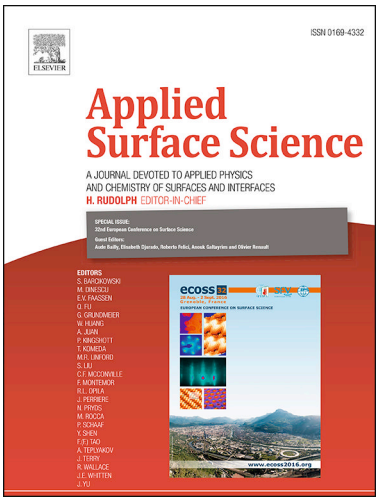

Full Length Article

Hierarchical Co_3O_4/PANI hollow nanocages: Synthesis and application for electrode materials of supercapacitors

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Hierarchical Co_3O_4/PANI hollow nanocages: Synthesis and application for electrode materials of supercapacitors

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Abstract

Hierarchically hollow Co_3O_4/polyaniline nanocages (Co_3O_4/PANI NCs) with enhanced specific capacitance and cycle performance for electrode material of supercapacitors are fabricated by combining self-sacrificing template and in situ polymerization route. Benefiting from the good conductivity of PANI improving an electron transport rate as well as high specific surface area from such a hollow structure, the electrode made of Co_3O_4/PANI NCs exhibits a large specific capacitance of 1301 F/g at the current density of 1 A/g, a much enhancement is obtained as compared with the pristine Co_3O_4 NCs electrode. The contact resistance (R_e), charge-transfer (R_{ct}) and Warburg resistance of Co_3O_4/PANI NCs electrode is significantly lower than that of the pristine Co_3O_4 NCs electrode, indicating the enhanced electrical conductivity. In addition, the Co_3O_4/PANI NCs electrode also displays superior cycling stability with 90 % capacitance retention after 2000 cycles. Moreover, an aqueous asymmetric supercapacitor was successfully assembled using Co_3O_4/PANI NCs as the positive electrode and activated carbon (AC) as the negative electrode, the assembled device exhibits a superior energy density of 41.5 Wh/kg at 0.8 kW/kg, outstanding power density of 15.9 kW/kg at 18.4 Wh/kg, which significantly transcending those of most