Application of Mesoporous CoMn2O4 Hybridized with rGO as Electrode Material in Energy Storage Device

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Abstract:

Cobalt manganese spinel oxide (CoMn2O4) was hybridized with reduced graphene oxide (rGO) via a facile hydrothermal process and a highly porous three-dimensional (3D) structure was constructed. The phase structure, chemical bands, morphology and chemical state of the synthesized powders were investigated by X-ray diffraction (XRD), Raman spectroscopy, field emission secondary electron microscopy (FE-SEM) and X-ray photoelectron spectroscopy (XPS). CoMn2O4@rGO electrode delivered high specific capacitance of 1578 Cg 1at 1 Ag 1 in 1.0 M KOH electrolyte and an outstanding cycling stability with 94.2 % retention over 5000 cycles, suggesting the great potential application of this material in advanced energy storage device. The rGO makes great contributions to hybrid through supplying a conductive support for CoMn2O4, resulting in the prominent specific capacitances and outstanding cycle stability. Besides, the assembled CoMn2O4@rGO//AC asymmetric supercapacitor (ASC) displays the maximum energy density of 35.6 Whkg 1 at a power density of 8916.9 Wkg 1. Significantly, an ultralong cycling life of 98.2 % capacitance retention is achieved for the ASC device after 10,000 charge/discharge cycles at 1 Ag 1.