Tunable Fabrication of Hollow Nano Sword-Like CuCo2O4Derived from Bimetal-Organic Frameworks as Binder-Free Electrodes

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Abstract

This study successfully synthesized highly porous hollow nano sword-like CuCo2O4 with a large specific surface area (80.2 m2 g–1) on a nickel foam substrate through a simple solution-based method followed by a calcination process. Benefiting from their geometrical merits, including excellent structural robustness, large electroactive surface areas, and 3D open structures, the hollow nano sword arrays of CuCo2O4 deliver remarkable electrochemical performances for SCs. Using this binder-free strategy, the synthesized copper cobalt oxide electrode delivers a great specific capacity of 717 C g–1 at 1 A g–1 with an excellent rate capability and cycling stability in a three-electrode cell configuration. Consequently, the fabricated CCO-HS//AC device exhibits the highest specific energy of 54 Wh kg–1 at a specific power of 3137 W kg–1 with a remarkable cycle stability of 91.1% capacity retention after 8000 cycles, indicating its potential as a novel electrode for energy storage systems.

Keywords: Copper Cobalt Oxide, Supercapacitor, Hollow Structure, Nanoporous, Transition Metal Oxide, Cuco2o4