Novel Rugby-Ball-like FeCoCuS2 Triple-Shelled Hollow Nanostructures with Enhanced Performance for Supercapattery

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The design of efficient electrode materials with hierarchical properties is of considerable importance to the further expansion of electrochemical energy storage devices. Herein, we develop an elaborate synthesis and design of novel hierarchical rugby-ball-like FeCoCuS2 triple-shelled hollow nanostructures (RB-FCC) by a metal–organic-framework-engaged strategy. Because of its hierarchical structure and compositional advantages, the as-fabricated RB-FCC electrode delivers remarkable electrochemical properties with a specific capacity of 1060 C g–1 at 2 A g–1 and a superior cycle stability of 96.5% with a retention over 7000 cycles in a three-electrode system. Considering the prominent results achieved, a hybrid supercapacitor was made with RB-FCC as cathode materials and AC (activated carbon) as anode electrodes in 3 M KOH. The as-prepared apparatus (RB-FCC (+)||AC(−) produced a desirable capacity of 133.5 F g–1 at 1 A g–1, an outstanding rate capability around 65.3% at 30 A g–1, a high specific energy of 48.2 W h kg–1, and a specific power of up to 25700.2 W kg–1 in an (RB-FCC) (+)||AC(−) device.

Keywords: Novel Rugby-Ball-like, FeCoCuS2, Nanostructures, Supercapattery