

Substrate-free FeS<sub>2</sub> fiber-based electrode for high-performance flexible sodium ion battery

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A substrate-free flexible carbon-coated FeS<sub>2</sub> fibers-based cathodes for rechargeable sodium ion batteries (NIBs) is reported for the first time. A facile electrospinning technique followed by carbonization was employed for the synthesis of a novel cathode for a NIB. A discharge capacity of about 808.26 mAh/g was obtained in the first charge-discharge cycle, which is greater than that of any previously reported Na/FeS<sub>2</sub>-based battery. The carbon coating on the FeS<sub>2</sub> fiber allows the battery to have an enhanced discharge capacity of 633.43 mAh/g, even after undergoing five charge-discharge cycles at a 0.1C rate. At a 2C rate, a lofty specific capacity of 393.53 mAh/g is maintained, and the value increases on the return from 2C to 0.1C until it reaches a value similar to the initial 0.1C rate. A superior rate capability with enhanced electrochemical stability of the NIB is also demonstrated due to the substrate-free flexible carbon-coated FeS<sub>2</sub> fibers-based cathode. The unique structure of the carbon coated fibrous FeS<sub>2</sub> electrode not only prevents dissolution of the polysulfide, but also improves the electrochemical reaction by increasing the migration rate of electrons and ions.