Hybrid Nanostructures of MoS₂/Sisal Fiber Tubular Carbon as Anode Material for Lithium ion Batteries

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Environmentally friendly and low-cost MoS₂/sisal fiber tubular carbon (MoS₂/SFTC) nanohybrids have been prepared via a facile hydrothermal-anneal strategy, in which the tubular biomass carbon derived from natural sisal fibers as a conductive base. The as-prepared nanohybrids are characterized by Raman spectra, XRD, XPS, FESEM, TEM and EDS. It is shown that the sisal fiber tubular carbons with nanowrinkles and nanofolds were uniformly coated with vertical MoS₂ nanosheets on the surface. As an anode material for lithium ion batteries, the MoS₂/SFTC nanohybrids possess an excellent cycling performance, superior rate capability and high reversible capacity. A reversible specific capacity of 437.2 mA h g⁻¹ is maintained after 50 cycles at the current density of 50 mA g⁻¹. Even at a high current density of 2000 mA g⁻¹, the reversible specific capacity could be retained at 241.1 mA h g⁻¹. The superior electrochemical performance of the MoS₂/SFTC nanohybrids can be attributed to the synergistic effects of uniform vertical MoS₂ nanosheets and conductive SFTC nanostructures.

Keywords: Sisal fiber tubular carbon, Hydrothermal-anneal, MoS₂ nanosheets, Nanohybrids, Lithium ion batteries

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