

Ultrathin sandwich-like MoS₂@N-doped carbon nanosheets for the anode of lithium ion battery

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We report a simple and scalable process to synthesize the core-shell nanostructure of MoS₂@N-doped carbon nanosheets (MoS₂@C), in which polydopamine is coated on the MoS₂ surface and then carbonized. Transmission electron microscopy and Raman spectroscopy reveals that the as-synthesized MoS₂@C possesses a nanoscopic and ultrathin layer of MoS₂ sheets with a thin and conformal coating of carbon layers (~3 nm). The MoS₂@C demonstrates a superior electrochemical performances as an anode material for lithium ion batteries compared to exfoliated MoS₂ and bulk MoS₂ samples. This unique core-shell structure is capable of excellent delivery Li⁺ ion in charging-discharging process: a specific capacity as high as 1239 mA h g⁻¹, a high rate of charging-discharging capability even at a high current rate of 10 A g⁻¹ while retaining 597 mA h g⁻¹, and a good cycle stability over 200 cycles at a high current rate of 2 A g⁻¹.