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Hydrothermal Synthesis and Electrochemical Properties of MoS_2/C Nanocomposite

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A molybdenum disulfide/carbon (MoS_2/C) nanocomposite was synthesized by a simple hydrothermal method using glucose as a carbon source followed by carbonization. The sample was systematically investigated by using X-ray diffraction (XRD), field-emission scanning electron microscopy (FESEM) and high-resolution transmission electron microscopy (HRTEM). Electrochemical performances were evaluated in two-electrode cells versus metallic sodium. The synthesized MoS_2/C composite exhibits an initial capacity of 475.1 mAh g^{-1} at a current density of 100 mA g^{-1}, and a capacity retention of 71% is obtained after 100 cycles at a current density of 250 mA g^{-1}. The material shows enhanced electrochemical performances compared with pristine MoS_2 due to incorporation of the conductive carbon, which suppressed significant volumetric change in MoS_2 during the charge/discharge process and increased the electrical conductivity of MoS_2.

Keywords: MoS_2/C composite; hydrothermal synthesis; anode material; sodium-ion battery

FULL TEXT