Influence of TiO₂ and SiO₂ as Additives to Improve Electrochemical Properties of MoS₂ as Anode Material for Lithium Ion Batteries

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The paper attempts to dope the system containing MoS₂ in order to check the reversibility of the cell's operation. To this end, commercial TiO₂ and SiO₂ were used from emulsion systems. The electrochemical properties of the MoS₂/TiO₂ and MoS₂/SiO₂ composites were evaluated by cycling voltammetry (CV), charge-discharge cycles and impedance spectroscopy. The MoS₂/oxide composites exhibited high capacity and excellent cyclic stability used as anode materials for Li-ion batteries. The composite exhibited the highest reversible capacity (320 mAh g⁻¹) and excellent cyclic stability. After 80 cycles, it still retained 300 mAh g⁻¹. The significant improvements in the electrochemical properties of the MoS₂/TiO₂ and MoS₂/SiO₂ composites could be attributed to the graphene-like structure of the MoS₂ nanosheets and the synergistic effects of oxide-like MoS₂. The very good electrochemical performances of MoS₂/TiO₂ electrode originate from the purposely designed unique structures, in which the MoS₂ provide more lithium storage sites and the shorter Li-ion diffusion length, and the stability of capacity.

Keywords: MoS₂, TiO₂, SiO₂, galvanostatic charge–discharge, reversibility

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