Hierarchical Self-Supported TiO₂/NC-MoS₂ Composite as a Stable Anode for Enhanced Lithium-Ion Batteries

Peng Sun¹, Haigang Liu¹, Xiankun Ma¹, Jiahua Zhao¹, Junlin Qiu¹, Yongfei Wang^{1,2,*}, Zhiqiang Zhang^{1,*}

¹ School of Chemical Engineering, University of Science and Technology Liaoning, 185#, Qianshan Zhong Road, Anshan 114044, PR China

² School of Materials and Metallurgy, University of Science and Technology Liaoning, 185#, Qianshan Zhong Road, Anshan 114044, PR China

*E-mail: wyf8307@ustl.edu.cn, zzq@ustl.edu.cn

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Ultrafine MoS₂ nanosheets are embedded with nitrogen-doped carbon-coated TiO₂ nanofibers (TiO₂/NC-MoS₂) via a facile hydrothermal reaction and annealing treatment. Applied in the anode of a lithium-ion battery, the as-prepared TiO₂/NC-MoS₂ hybrid delivers a good cycling performance of 629.9 mA h g⁻¹ at 0.1 A g⁻¹ after 200 cycles and a rate capability of 471.2 mA h g⁻¹ at 1 A g⁻¹ over 1000 cycles. The superior electrochemical performance results from both the unique hierarchical morphology and the synergic effects among various interfaces and components. Nitrogen doping in carbon materials can facilitate the transfer of Li ions and TiO₂ nanofibers to prevent the aggregation of MoS₂ nanosheets. The MoS₂ nanosheets provide more active sites for electrochemical reactions. This work demonstrates that the obtained composite holds great potential for high-performance energy storage applications.

Keywords: MoS₂, hydrothermal, electrochemical, anode

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