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SnS₂ nanosheets arrays sandwiched by N-doped carbon and TiO₂ for high-performance Na-ion storage

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Abstract

In this paper, SnS₂ nanosheets arrays sandwiched by porous N-doped carbon and TiO₂ (TiO₂@SnS₂@N-C) on flexible carbon cloth are prepared and tested as a free-standing anode for high-performance sodium ion batteries. The as-obtained TiO₂@SnS₂@N-C composite delivers a remarkable capacity performance (840 mA h g⁻¹ at a current density of 200 mA g⁻¹), excellent rate capability and long-cycling life stability (293 mA h g⁻¹ at 1 A g⁻¹ after 600 cycles). The excellent electrochemical performance can be attributed to the synergistic effect of each component of the unique hybrid structure, in which the SnS₂ nanosheets with open frameworks offer high capacity, while the porous N-doped carbon nanoplates arrays on flexible carbon cloth are able to improve the conductivity and the TiO₂ passivation layer can keep the structure integrity of SnS₂ nanosheets.

Keywords: Sandwich structure; SnS₂ nanosheets; N-doped carbon; TiO₂; sodium-ion battery

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