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**Facile preparation of hexagonal tin sulfide nanoplates anchored on graphene
nanosheets for highly efficient sodium storage**

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Abstract

Tin sulfide/graphene nanocomposite with hexagonal tin sulfide (SnS_2) nanoplates anchored on reduced graphene oxide (RGO) nanosheets was easily synthesized by one-step controllable hydrothermal growth followed by mild reduction. The SnS_2 hexagonal-plates distributed tightly and uniformly on the RGO support in a more favorable face-to-face (FTF) manner. The formation of SnS_2 nanoplates with hexagonal morphology may result from the accelerating growth of six energetically equivalent high-index (110) crystal planes and prohibiting growth of the (001) crystal plane on graphene. The FTF architecture is beneficial for the optimal electric contact efficiency of SnS_2 nanoplates with RGO matrix, thus leading to the greatly enhanced electrochemical performance of SnS_2/RGO composite than bare SnS_2 . The graphene-constructed two-dimensional integrated conductive networks minimize the transport paths of electrons and Na ions between electrode and electrolyte as well as accommodate the mechanical strain during long term cyclic. The SnS_2/RGO composite exhibits great application potential as an anode for sodium ion batteries

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