Flower-like Structure of SnS with N-doped Carbon via Polymer Additive for Lithium-ion Battery

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In this work, flower-like SnS with N-doped carbon is synthesized by two steps, including hydrothermal method and sintering at moderate temperature in a protective atmosphere. In the hydrothermal method, the morphology can be controlled into flower-like particles after adding Polyvinylpyrrolidone to form a large surface area and to shorten the diffusion path of ions to transfer. In addition, Polyvinylpyrrolidone is also regarded as a carbon source owing to pyrolysis in high temperature and considered as a simple approach to obtain C-N structure devoted. In electrochemical performance, the flower-like SnS containing N-doped carbon displays a high capacity of ~1047mAh/g at 100mA/g after 30^{th} cycles in lithium-ion battery, and the retention as compared to cycle 1^{st} is about 78.3%. Moreover, the electrochemical impedance also decreases significantly. It is demonstrated that the Polyvinylpyrrolidone as a carbon source plays a vital role in controlling the structure of SnS into flower-like powder, producing a perfect net for diffusion path. It is anticipated that SnS is a potential material for tin-based anode due to the higher conductivity as compared to carbon and special 2-Dimensional structure. In addition, the SnS/N-doped carbon can enhance the performance with the approach of adding polymer during hydrothermal and sintering.