Supporting Information

Ultralarge Single Crystal SnS Rectangular Nanosheets

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Experimental Section

Chemical: Tin (II) chloride ($SnCl_2 \cdot 2H_2O$; 98%, AR)(Shanghai Experiment Reagent Co., Ltd.), Sodium diethyldithiocarbamate trihydrate ($Na(Ddtc) \cdot 3H_2O$; 99%) (Sinopharm Chemical Reagent Co., Ltd.), Oleylamine (OM; 80-90%, Aladdin), Oleic acid (OA; 90%, Aldrich), 1-Octadecen (ODE; 90%, Aldrich), absolute ethanol and cyclohexane were of analytical grade and used as received without further purification.

Synthesis of $Sn(Ddtc)_2(Phen)$: Typically, 10 mmol of $(Phen) \cdot 3H_2O$ were dissolved in 80 mL of boiling water. Then, it was introduced into 40 mL of $SnCl_2 \cdot 2H_2O$ (10 mmol) aqueous solution with vigorous stirring. The color of the mixture solution was turned to yellow because of the reaction between Phen and tin ions. After 10 min, 40 mL of $Na(Ddtc) \cdot 3H_2O$ (20 mmol) aqueous solution was added dropwisely into above yellow solution, and the color of the aqueous mixture changed to yellowish. After 3 h, the resulting yellowish precipitate was filtered, washed with distilled water, and dried in air at 70 °C.

Synthesis of orthorhombic SnS nanosheets: The synthesis was carried out using the oxygen-free procedure. A typical procedure is described as follows: 0.046 g of $Sn(Ddtc)_2(Phen)$ was added into OM/ODE(OM:ODE=20 mmol : 20 mmol) mixture solvents in a three-necked flask (100 mL) at room temperature. Then, the slurry was heated to 120 ºC to remove water and oxygen with vigorous magnetic stirring under vacuum for 20 min in a temperature-controlled electro mantle. The solution was then heated to 300 ºC and was kept for 1 h under N_2 atmosphere. Then it was allowed to cool down to room temperature naturally. And 40 mL of ethanol was poured into the solution, the resultant mixture was centrifugally

separated and the products were collected.

Synthesis of hexagonal SnS_2 nanoplates: The synthetic procedure was the same as that for SnS nanosheets synthesis, except that the solvent used here is a mixture of OA/OM /ODE (10 mmol : 10 mmol : 20 mmol), the amount of precursor is 0.3 g and the temperature is 280 ºC.

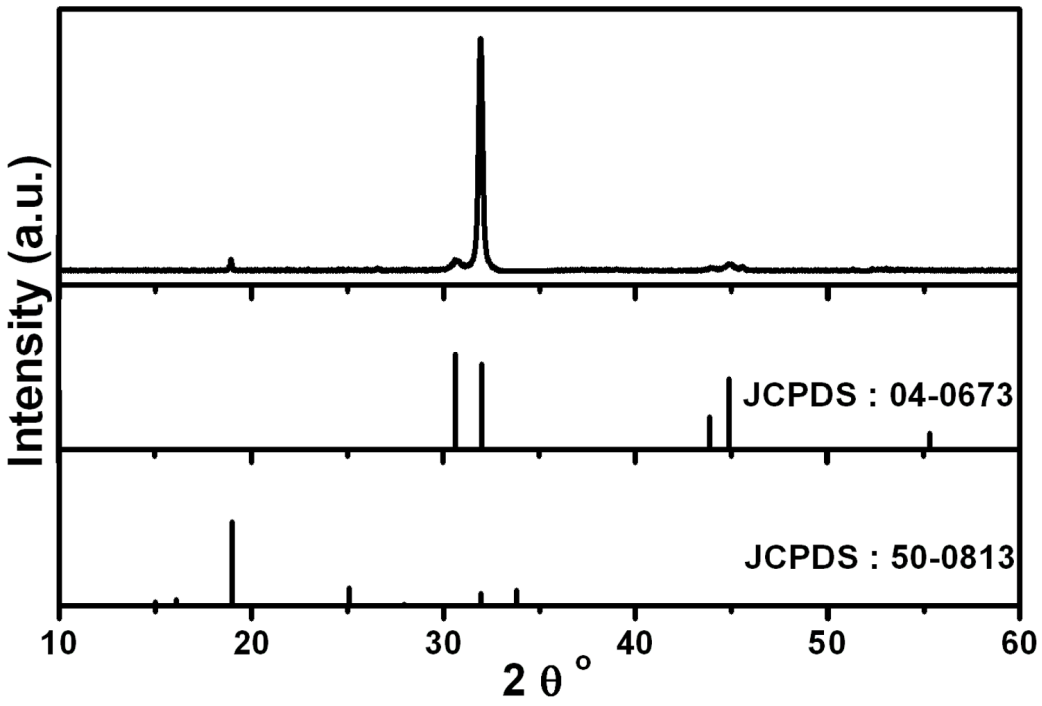

Figure S1. XRD pattern of the nanosheet electrodes after the 5th electrochemical discharge reaction. JCPDS: 04-0673 and JCPDS: 50-0813 were recorded for Sn and P_2S_5, respectively.

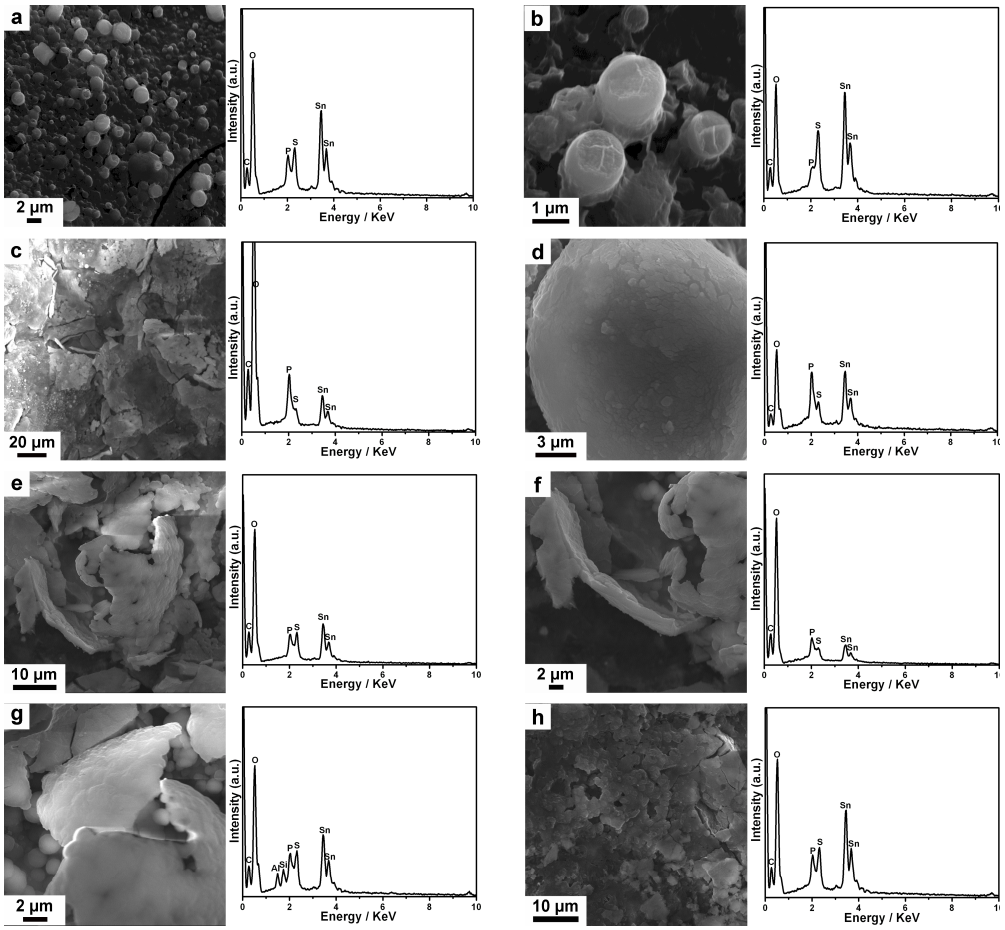

Figure S2. SEM images and corresponding EDS spectra from the different areas of SnS nanosheet electrodes after the 5th electrochemical discharge reaction.