

Supplementary Material (ESI) for Chemical Communications  
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## **Stacked Porous Tin Phosphate Nanodisk Anodes**

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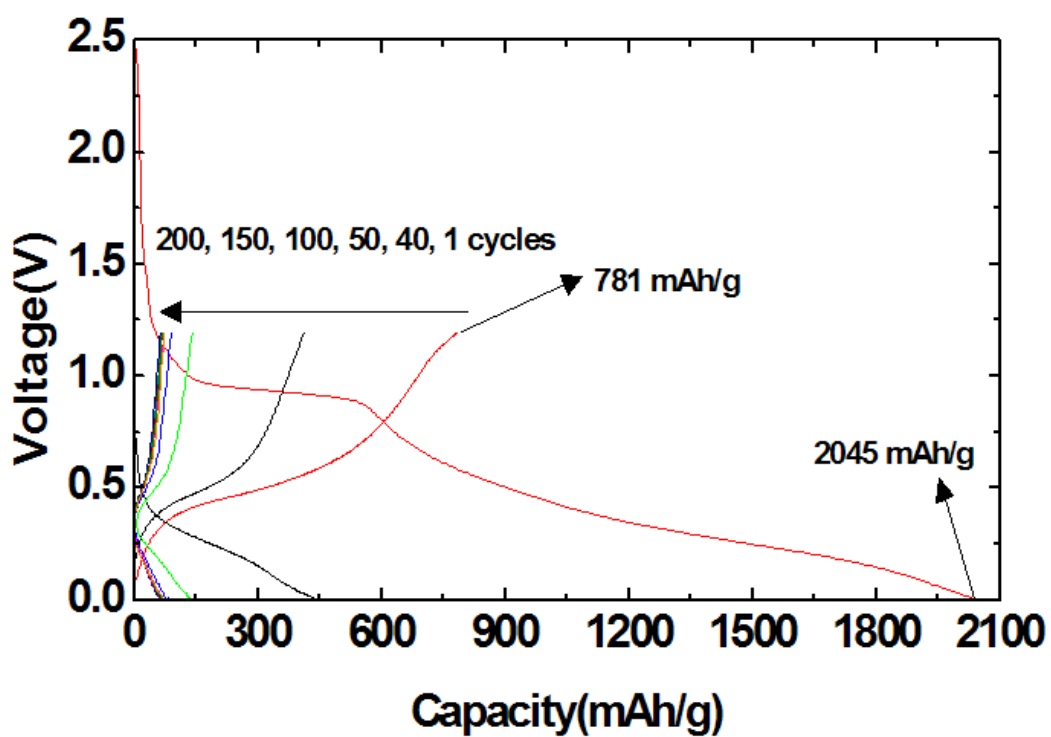
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## Experimental Methods

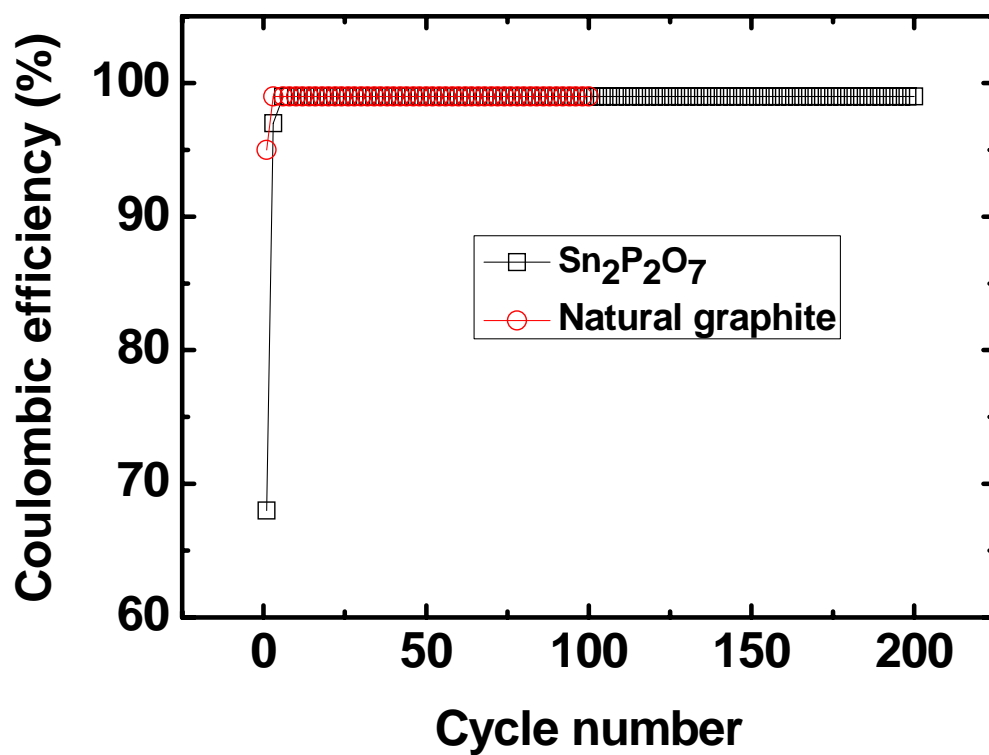
The stacked porous nanodisks was synthesized by mixing 8.8g of  $\text{SnCl}_4 \cdot 5\text{H}_2\text{O}$  and 7.5g of  $\text{H}_3\text{PO}_4$  (85%), which was then followed by the dissolving of 120 ml ethanol. The mixture was stirred at 40°C for 1 h and then loaded in an autoclave at 180°C for 24h. After cooling to room temperature, the precipitate was recovered by centrifugation, followed by repeated washing with distilled water, and dried in a vacuum at 100°C for 10 h. The as-prepared powders were heated at a rate of 300°C/hr to 600°C and were maintained at this temperature for 10 min. before being quenched at a room temperature. The electrolyte for the coin-type half cells (2016 type) was 1 M  $\text{LiPF}_6$  with ethylene carbonate/diethylene carbonate/ethyl-methyl carbonate (EC/DEC/EMC) (30: 30: 40 vol. %). For preparing  $\text{SnO}_2$ , all the process was identical to above except for not using  $\text{H}_3\text{PO}_4$ . The coin-type half cells were cycled at a rate of 0.5 C (1 C = 700 mA/g) for 220 cycles between 0 and 1.2 V. The electrode was composed of 80 wt. % active material, 10 wt. % poly(vinylidene fluoride) binder, and 10 wt. % Super P carbon black.

For reference pitch-coated natural graphite, The binder used was a mixture of SBR with an average particle, size of ~100 nm and CMC (carboxymethyl cellulose) with a 98:2 weight ratio, and deionized water was used as a solvent. SBR particles were believed to be finely distributed between the particles even though it was not water-soluble. The electrode composition was coated NG:binder in a weight ratio of 96:4. In the present case, a conducting agent was not used. During drying of the coated electrode at 110°C, SBR fine particles melted between the NG particles. The electrolyte used and electrochemical test method were same to above.

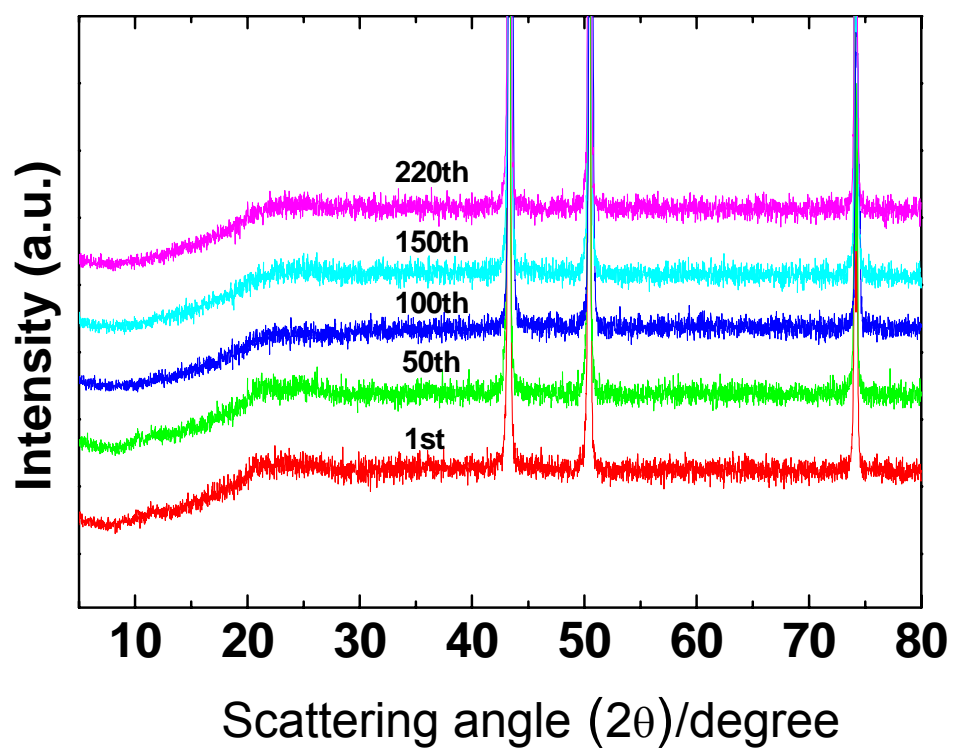
Powder X-ray diffraction (XRD) (D/Max2000, Rigaku) measurements using Cu K $\alpha$  radiation was used to identify the phase. Samples were observed using scanning electron microscopy (SEM) (JSM 6400, JEOL) and transmission electron microscopy (TEM) (JEOL 2010F).



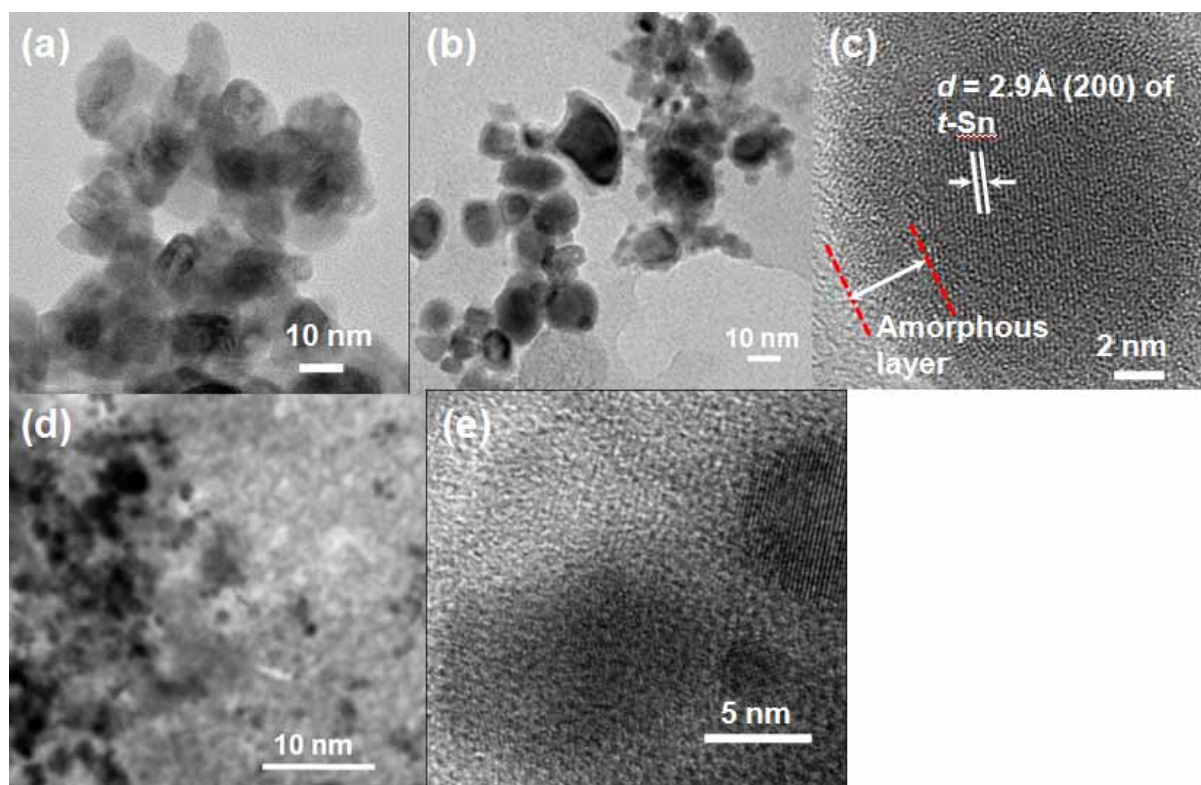
**S1.** Voltage profiles of SnO<sub>2</sub> nanoparticles after 1<sup>st</sup>, 40<sup>th</sup>, 50<sup>th</sup>, 100<sup>th</sup>, 150<sup>th</sup>, 220<sup>th</sup> cycles between 1.2 and 0V in coin-type half cell at a rate of 0.5C (= 350 mA/g).



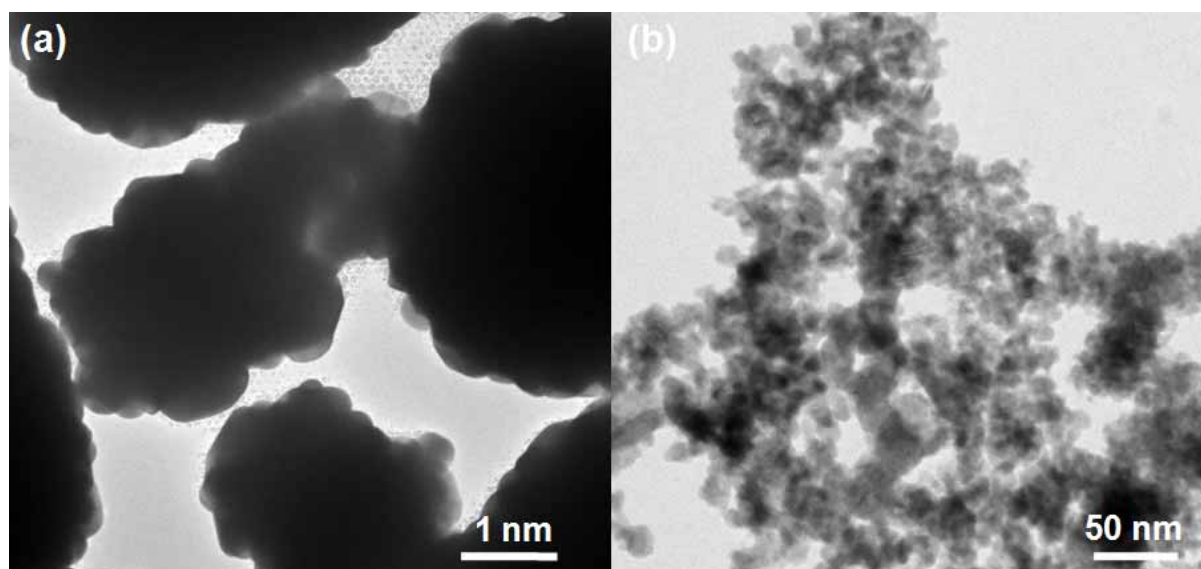
**S2.** Plot of coulombic efficiency of Sn<sub>2</sub>P<sub>2</sub>O<sub>7</sub> and natural graphite as a function of cycle number.



**S3.** Ex-situ XRD patterns of the  $\text{Sn}_2\text{P}_2\text{O}_7$  nanodisk electrodes after 1, 50, 100, 150, 220 cycles.



**S4.** TEM images of (a) as-prepared SnO<sub>2</sub> nanoparticles, (b and c) after 20 cycles, and (d and e) after 100 cycles.



**S5.** TEM images of bulk  $\text{Sn}_2\text{P}_2\text{O}_7$  particles; (a) as-prepared and (b) after 50 cycles.