- Supporting Information-

Three-dimensional ultrathin Sn/polypyrrole nanosheets network as high performance lithium-ion battery anode

Xin Fan[a] · Anni Jiang[a] · Peng Dou[a] · Jin Zhu[a] · Xinhua Xu[a,b*]

[a]*School of Materials Science and Engineering, Tianjin University, Tianjin 300072, P.R. China*

[b]*Tianjin Key Laboratory of Composite and Functional Materials, Tianjin 300072, P.R. China*

[*]Corresponding author. Tel: +86-22-27406127; fax: +86-22-27406127.

Email address: xhxutju@gmail.com

**Corresponding Author*

Synthesis of Sn@PPy/PVDF electrode materials

The as-prepared Sn nanoparticles and 0.1 M SDS were evenly dispersed in deionized water under strong magnetic stirring at room temperature. Then 30 μL pyrrole monomer (98% reagent grade, Sigma Aldrich) was added in the brown suspension. After sufficient stirring for an hour, 600 μL 0.7 M ammonium persulfate aqueous solution was slowly dropped into the above solution. Then the solution was stirred for another 5 h to form a homogeneous black Sn@PPy liquid product. Then, Sn@PPy nanoparticles were collected by centrifugation and then washed with distilled water 5 times and ethanol 3 times.

Fabrication of Sn@PPy/PVDF electrode and Sn/PPy electrode

The electrodes were prepared by coating the slurry made by dissolving the active material powders (Sn@PPy nanoparticles, or Sn nanoparticles, 80 wt.%), acetylene black (10 wt.%) and polyvinylidene fluoride (PVDF) (10 wt.%) in n-methyl pyrrolidinone onto Cu foil substrates. Then, the electrodes were pressed at 10 MPa and dried at 90 ℃ under vacuum for 4 h.

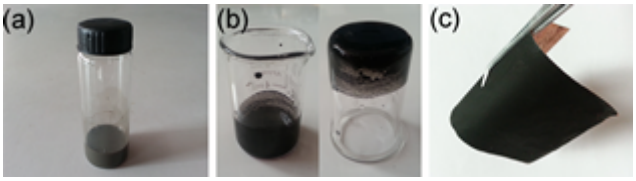

Fig. S1 Photographs showing the key steps of the 3D Sn/PPy electrode fabrication process. (a) First, Sn nanoparticles and SDS are dispersed in the solution containing the crosslinker (phytic acid) and the pyrrole monomer. (b) Several minutes after adding APS, a homogeneous black Sn/PPy hydrogel product is formed. (c) The electrode material is bladed onto a 5 cm × 20 cm copper foil current collector.

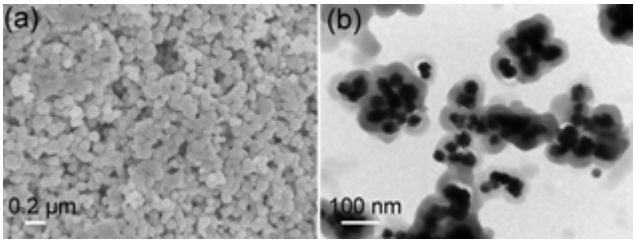

Fig. S2 (a) SEM image and (b) TEM image of the Sn@PPy nanoparticles composite.

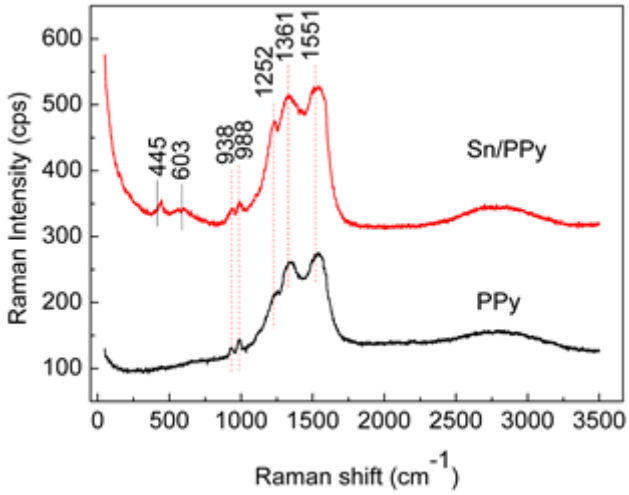

Fig. S3 Raman spectra of PPy and 3D Sn/PPy composite.

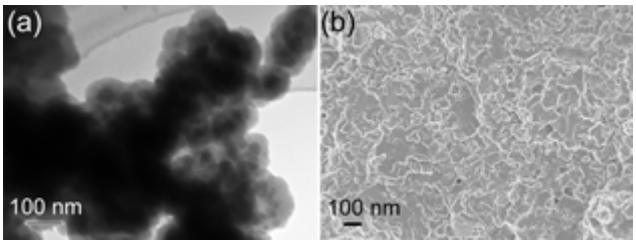

Fig. S4 (a) SEM and (b) TEM images of the Sn@PPy/PVDF electrode after 200 cycles at a charge/discharge current of 200 mA g^{-1}.