Supporting Information

Synthesis of SnO_2 *versus* Sn Crystals within N-doped Porous Carbon Nanofibers via Electrospinning towards High-Performance Lithium Ion Batteries

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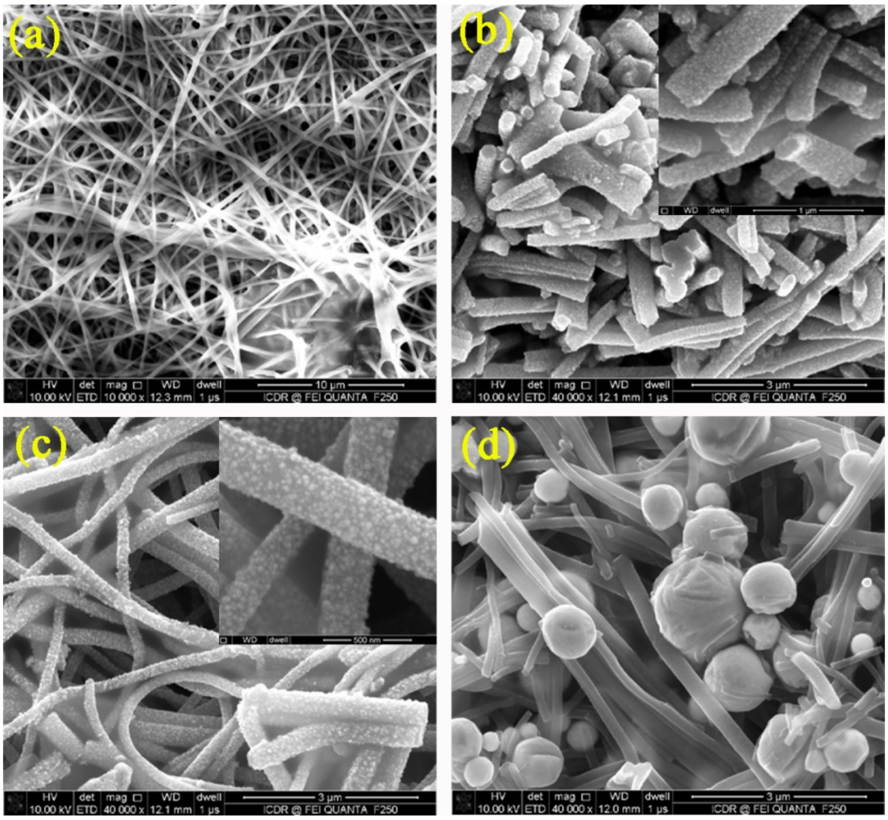


Figure S1. (a, b) SEM images of (a) the as-prepared electrospun PVP/$SnCl_2$ nanofibers and (b) their counterpart after annealing at 350 °C in air for 1 h. (c, d) SEM images of (c) the SnO_2/SCNFs

(d) Sn/SCNFs obtained after annealing (b) at 500 and 800 °C in N_2, respectively. **SCNFs: solid carbon nanofibers**.

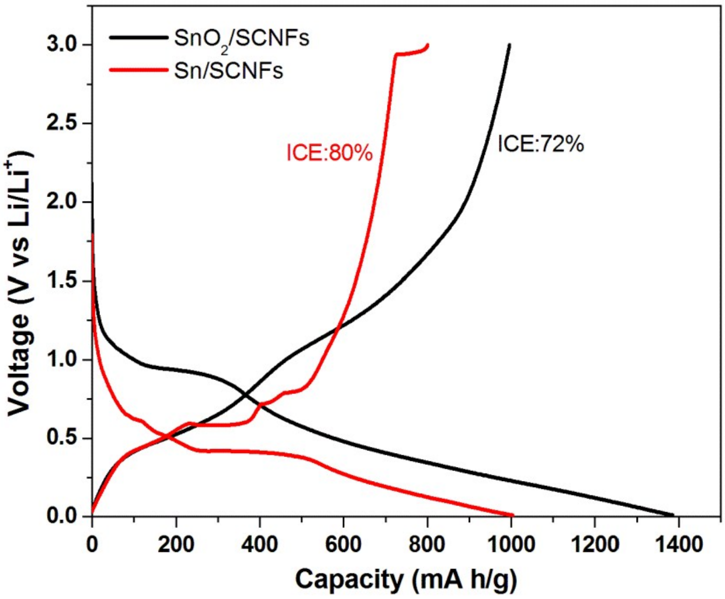


Figure S2. Initial galvanostatic discharge-charge profiles of (a) SnO_2/SCNFs and (b) Sn/SCNFs at 200 mA/g in the range of 0.01-3.0 V.

As shown in Figure S2, the initial Coulombic efficiencies in the SnO_2/SCNFs (72%) and Sn/SCNFs (80%) electrodes are comparable with that of their SnO_2/PCNFs (71.2%) and Sn/PCNFs (83.3%) counterparts, indicating the porous carbon nanofibers with large surface area does not contribute to larger irreversible capacity in the first discharge process. Therefore, we propose that the formation of SEI layer involving the electrolyte decomposition mainly happens on the out surface of carbon nanostructures, as SEI is dense thin layer on surface, which prevents the SEI formation in the inner surface of carbon nanofibers.

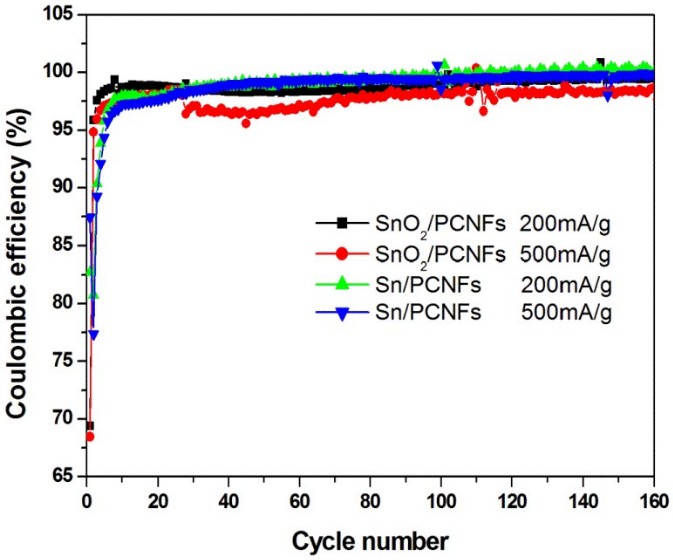


Figure S3. Coulombic efficiencies along with cycle numbers for SnO_2/PCNFs and Sn/PCNFs electrodes at different current densities.

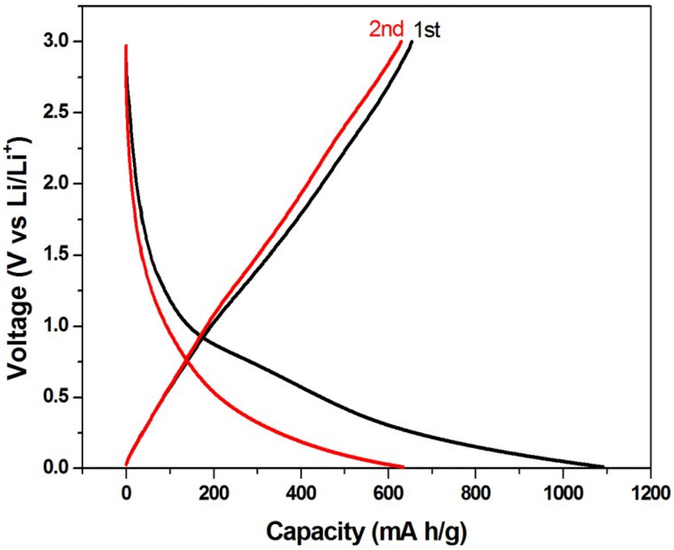


Figure S4. Galvanostatic discharge-charge profiles of PCNFs at 200mA/g in the range of 0.01-3.0 V. The PCNFs were obtained by etching Sn in Sn/PCNFs with HF, whose carbon content is ~15 wt% as revealed by TGA. The initial reversible discharge capacity of carbon nanofibers is 634 mA h/g, so the carbon nanofibers contributed only 95 mA h/g in Sn/PCNFs (the initial reversible discharge is 1021 mA h/g). The capacity contribution of PCNFs in Sn/PCNFs is only 9.3%.

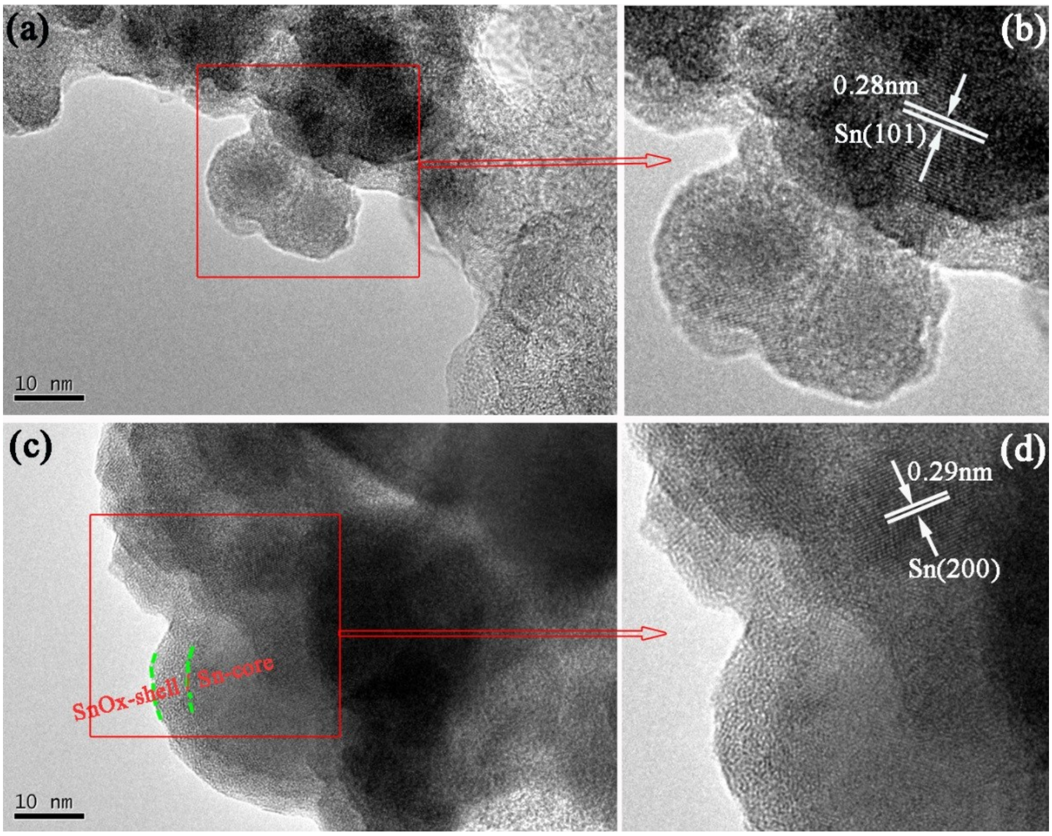
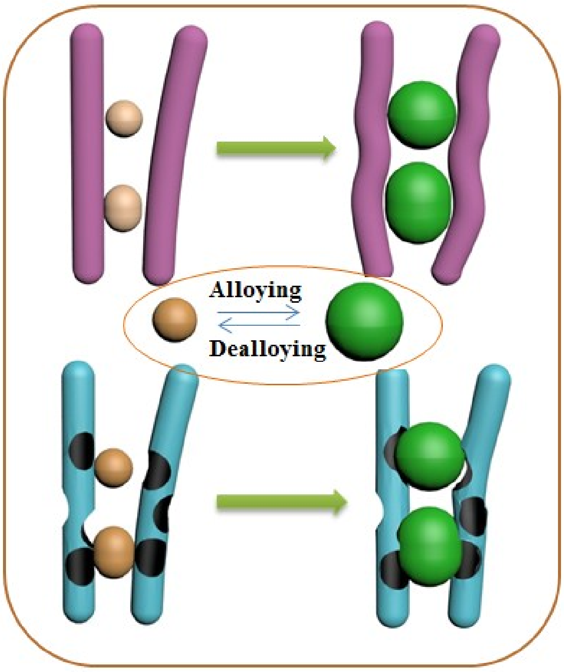


Figure S5. TEM and HRTEM images of the charged (a, b) SnO_2/PCNFs and (c, d) Sn/PCNFs electrodes after cycling at 200 mA/g for 200 cycles.



Scheme S1. Comparison of the Li-Sn alloying-dealloying process within solid and porous carbon nanofibers.