

Branched CNT@SnO₂ nanorods@carbon hierarchical heterostructures for lithium ion batteries with high reversibility and rate capability

Shuai Chen, Yuelong Xin, Yiyang Zhou, Feng Zhang, Yurong Ma, Henghui Zhou*
and Limin Qi*

Beijing National Laboratory for Molecular Sciences, State Key Laboratory for Structural Chemistry of Unstable and Stable Species, College of Chemistry, Peking University, Beijing 100871, China.

Electronic supplementary information

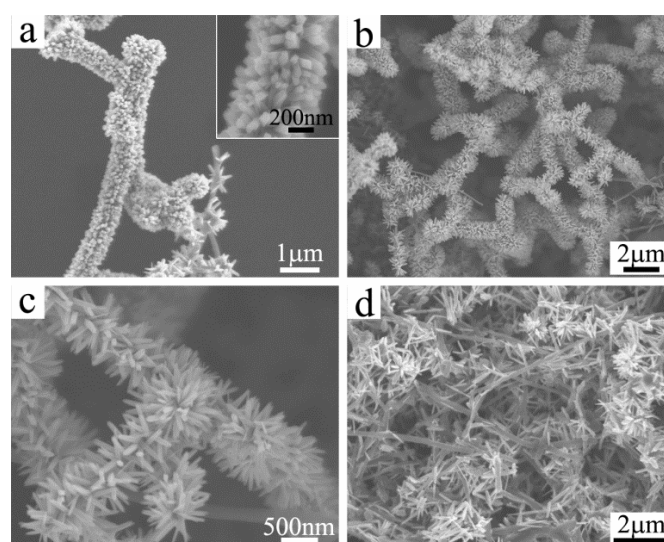


Fig. S1 SEM images of CNT@SnO₂ heterostructures obtained with different amounts of CNTs: (a) 0.05 mg, (b, c) 2 mg, (d) 4 mg. The inset in (a) shows a high-magnification image.

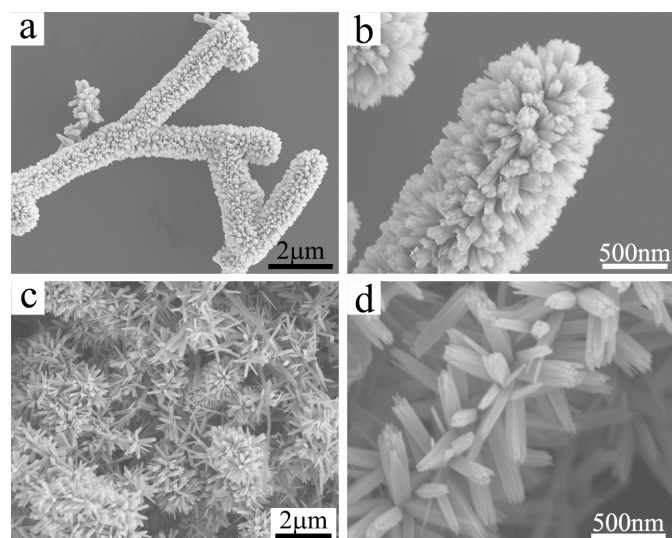


Fig. S2 SEM images of CNT@SnO₂ heterostructures obtained with different amounts of glacial acetic acid: (a, b) 5 mL, (c, d) 7 mL.

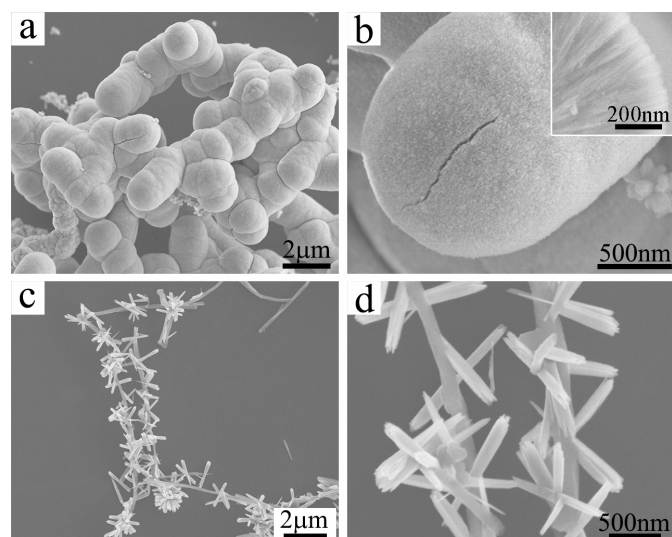


Fig. S3 SEM images of CNT@SnO₂ heterostructures obtained with different amounts of NaBr: (a, b) 0 mmol, (c, d) 0.35 mmol. Inset shows a cross section the thick SnO₂ shell, suggesting that the SnO₂ shell consists of densely packed rod-like subunits.

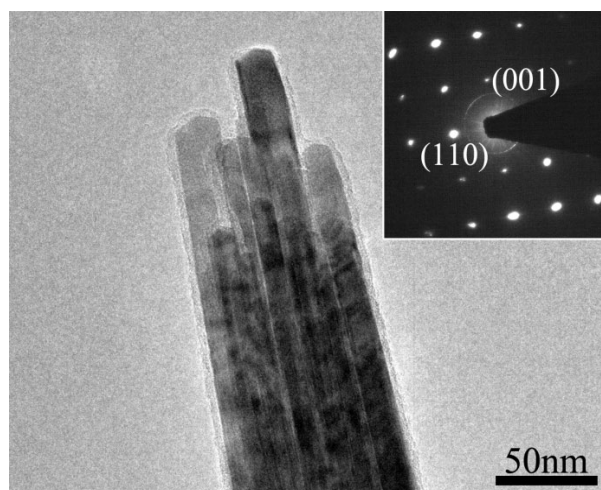


Fig. S4 TEM image of polymeric carbon-coated SnO₂ nanorod after hydrothermal carbonization of glucose in solution. The inset is the corresponding SAED pattern.

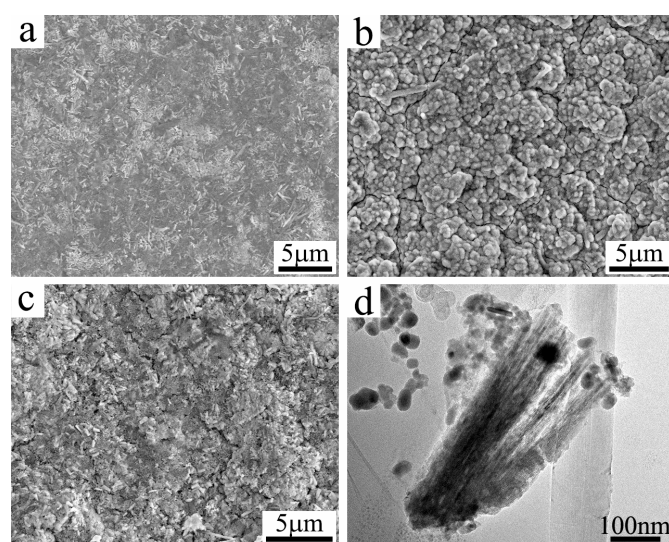


Fig. S5 (a-c) SEM images of the CNT@SnO₂@C anode before and after cycling: (a) as prepared, (b) after 40 cycles, (c) after 40 cycles followed by soaking in N-methylpyrrolidone for 2 days to dissolve binder polymers and SEI. (d) TEM image of nanorod bundles separated from the electrode after 40 cycles by ultrasonic treatment.

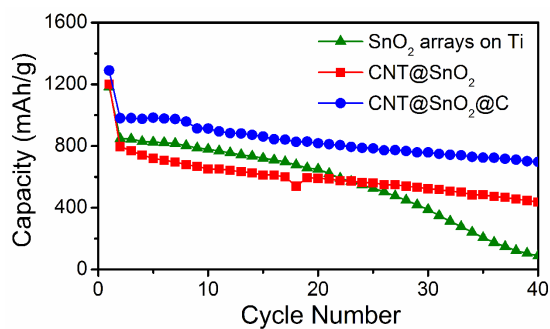


Fig. S6 Comparative cycling performance of branched $\text{CNT@SnO}_2\text{@C}$ and CNT@SnO_2 heterostructures at a current density of 720 mA g^{-1} and SnO_2 nanorod arrays grown on Ti substrate at a current density of 780 mA g^{-1} .

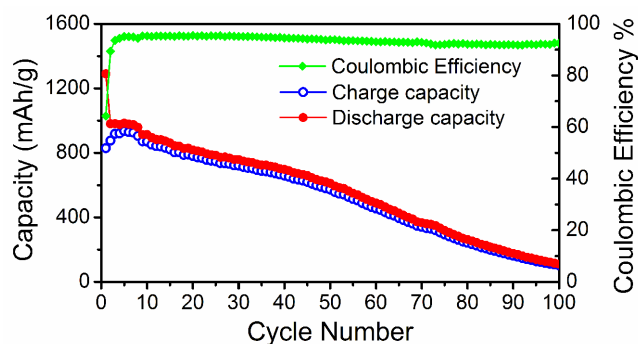


Fig. S7 Cycling performance of branched $\text{CNT@SnO}_2\text{@C}$ heterostructures up to 100 cycles at a current density of 720 mA g^{-1} .

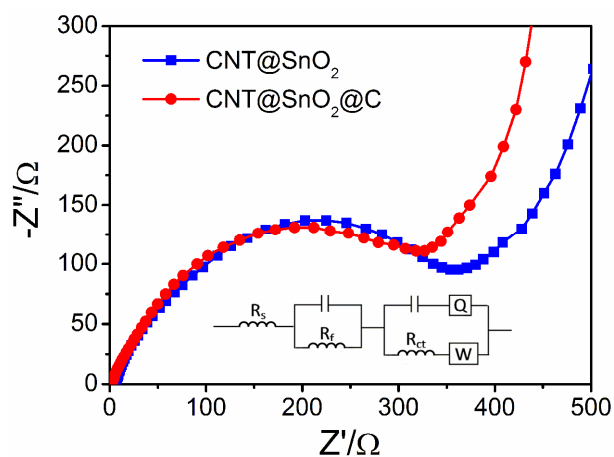


Fig. S8 Nyquist plots of branched $\text{CNT@SnO}_2\text{@C}$ and CNT@SnO_2 heterostructures.