

## Supplementary Information

### Improved Coulombic efficiency and cycleability of SnO<sub>2</sub>-Cu-Graphite composite anode with dual scale embedding structure

Bin Lu<sup>a,b</sup>, Renzong Hu<sup>a,b</sup>, Jiangwen Liu<sup>a,b</sup>, Jun Liu<sup>a,b</sup>, Hui Wang<sup>a,b,\*</sup>, Min Zhu<sup>a,b</sup>

<sup>a</sup> School of Materials Science and Engineering, Key Laboratory of Advanced Energy Storage Materials of

Guangdong Province, South China University of Technology, Guangzhou, 510641, China

<sup>b</sup> China-Australia Joint Laboratory for Energy & Environmental Materials, South China University of

Technology, Guangzhou, 510641, China

\* Corresponding author.

Tel.: +86-20-87112762; Fax: +86-20-87111317

E-mail address: [mehwang@scut.edu.cn](mailto:mehwang@scut.edu.cn) (H Wang)

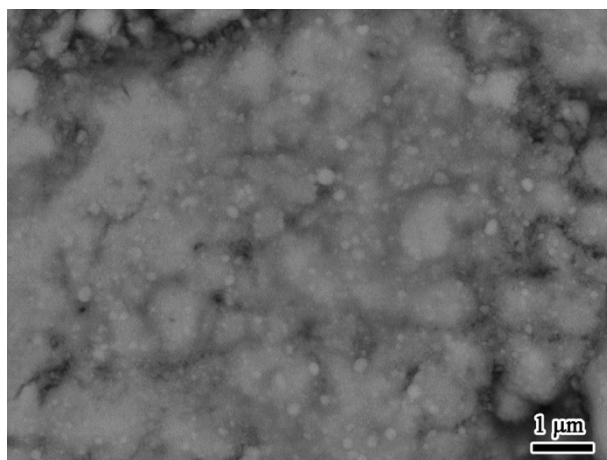
### **Calculation process of the theoretical capacity SnO<sub>2</sub>-Cu composite:**

The theoretical capacity of SnO<sub>2</sub> is 1494 mAh g<sup>-1</sup> when the Li<sub>2</sub>O is fully reversible, the molar ratio of SnO<sub>2</sub>: Cu is 1:2, then the corresponding weight ratio of SnO<sub>2</sub> is 54.25% ( $150.71/(150.71 + 63.55 \times 2) = 54.25\%$ ), so the corresponding theoretical capacity of the SnO<sub>2</sub>-Cu composite is 810.5 mAh g<sup>-1</sup> ( $1494 \times 54.25\% \text{ mAh g}^{-1} = 810.5 \text{ mAh g}^{-1}$ ).

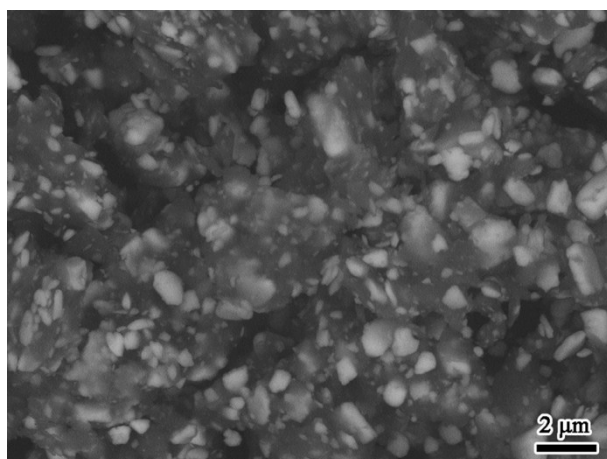
### **Calculation process of the theoretical capacity SnO<sub>2</sub>-Cu-C composite:**

The weight percent of SnO<sub>2</sub> in the SnO<sub>2</sub>-Cu-50h composite (SnO<sub>2</sub>:Cu=1:2 molar ratio) is 54.25% ( $150.71/(150.71+63.55 \times 2)=54.25\%$ ), and the weight percent of SnO<sub>2</sub> in the SnO<sub>2</sub>-Cu-50h-30%C composite is 37.9 % ( $54.25\% \times 0.7 = 37.9\%$ ), so the theoretical capacity of SnO<sub>2</sub>-Cu-50h-30%C is 678.9 mAh g<sup>-1</sup> when the Li<sub>2</sub>O is fully reversible ( $1494 \times 37.9\% + 372 \times 30\%$ ) mAh g<sup>-1</sup> = 678.9 mAh g<sup>-1</sup>). Accordingly, the theoretical capacity of SnO<sub>2</sub>-Cu-50h-30%C is 408.5 mAh g<sup>-1</sup> when the Li<sub>2</sub>O is irreversible ( $(782 \times 37.9\% + 372 \times 30\%) \text{ mAh g}^{-1} = 408.5 \text{ mAh g}^{-1}$ ), so the theoretical capacity range of SnO<sub>2</sub>-Cu-50h-30%C is 408.5~678.9 mAh g<sup>-1</sup>. Similarly, the SnO<sub>2</sub>-Cu-50h-10%C, SnO<sub>2</sub>-Cu-50h-20%C and SnO<sub>2</sub>-30%C composites have the theoretical reversible capacity range of 419.0~766.6, 413.8~722.8 and 659~1157.4 mAh g<sup>-1</sup>, respectively

## Figures



**Fig. S1** Back-scattered electron SEM image of SnO<sub>2</sub>-Cu-10h composite.



**Fig. S2** Back-scattered electron SEM image of SnO<sub>2</sub>-Cu-50h-30%C composite.