

Supplementary Information

Diffusion-Controlled Evolution of Core-Shell Nanowire Array into Integrated Hybrid Nanotube Array for Li-Ion Batteries

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I. Figures

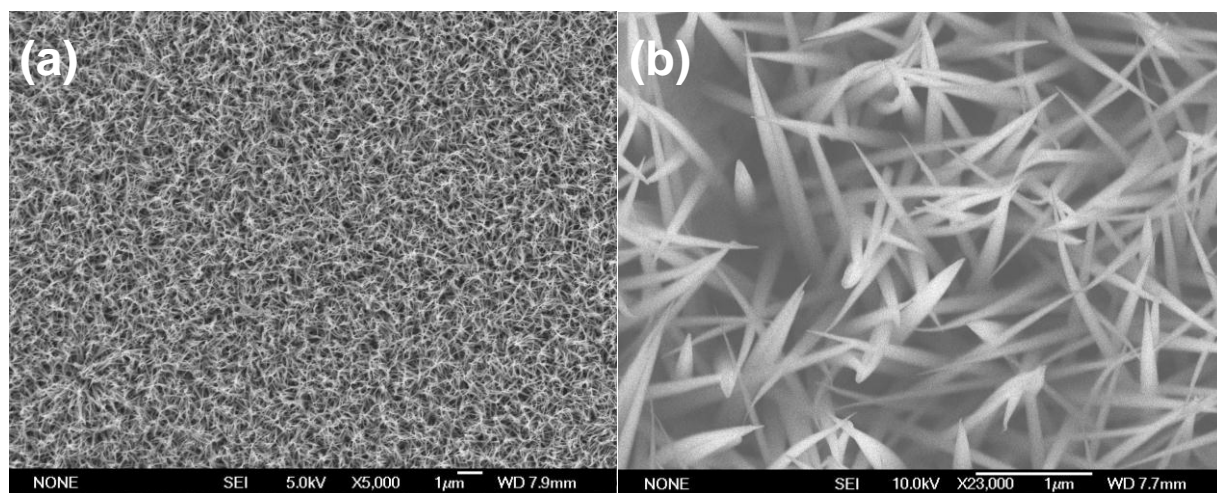


Fig. S1 (a-b) SEM images of single-crystalline $\text{Co}(\text{CO}_3)_{0.5}(\text{OH})_{0.11}\text{H}_2\text{O}$ NWs grown on a Ti metal substrate.

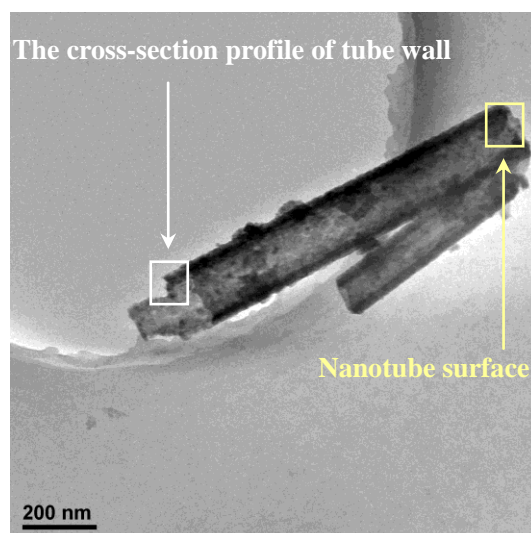


Fig. S2 TEM observation toward different places of a hybrid $\text{CoO}/\text{CoTiO}_3$ nanotube.

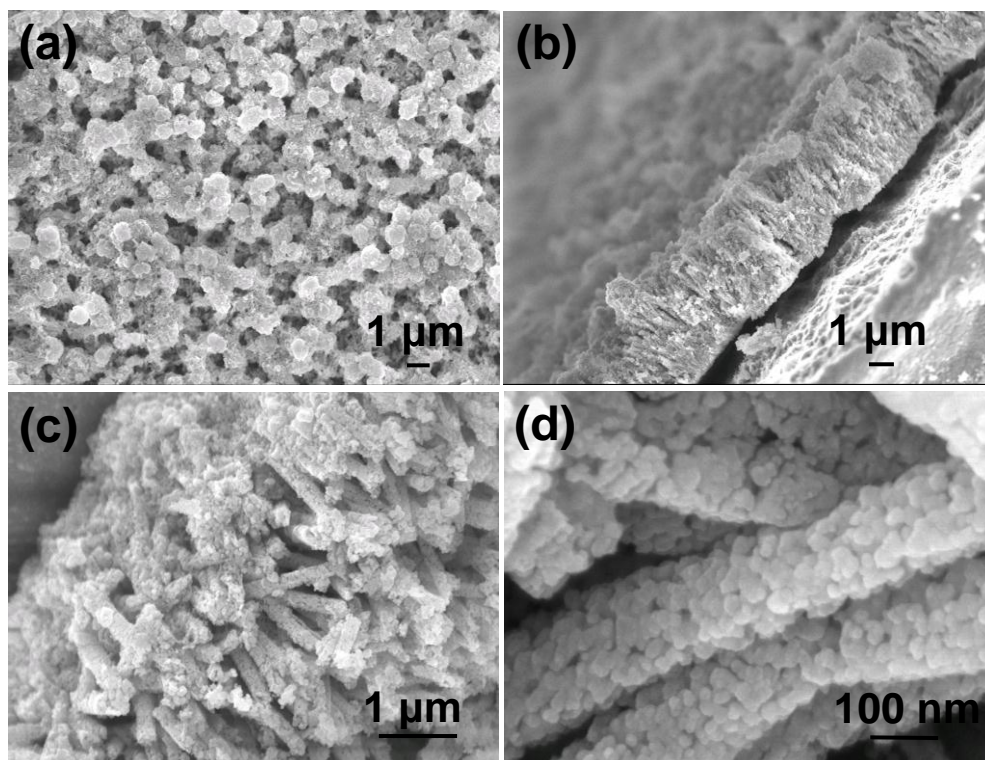


Fig. S3 (a) Top-view, (b) cross-sectional and (c-d) inclined-view SEM observations toward CoO/CoTiO₃ hybrid NTs after 150 cycles.

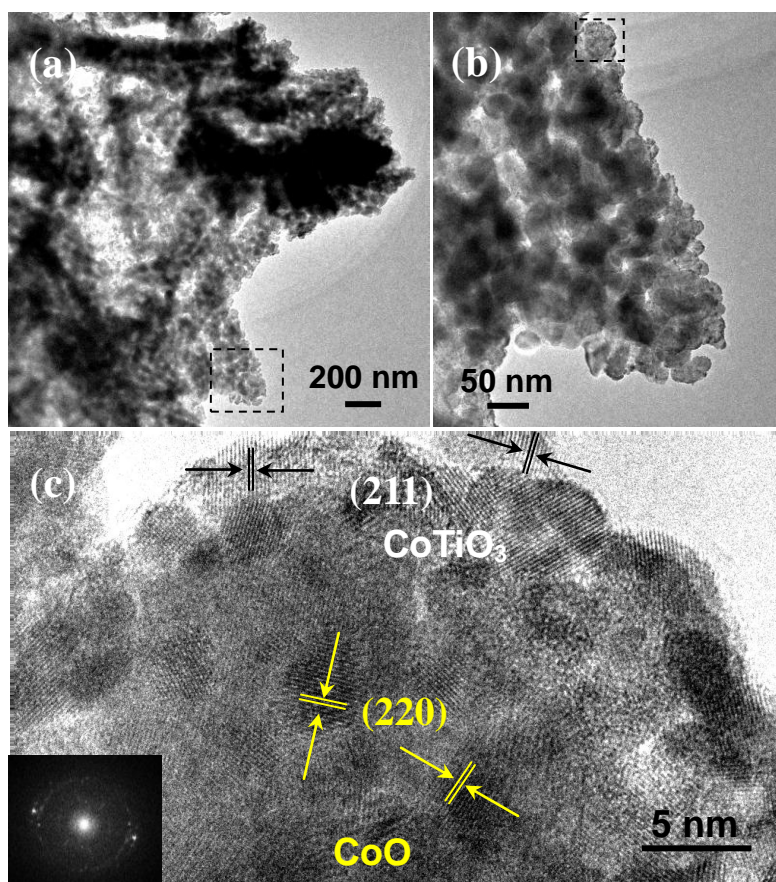
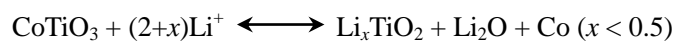


Fig. S4 (a-c) TEM observations toward CoO/CoTiO₃ hybrid NTs after 150 cycles.

II. The calculation details of CoTiO₃ theoretical capacity

For CoTiO₃ anode, the reversible electrochemical reaction is listed below,



wherein x is the insertion coefficient of Li ions (the maximum theoretical value is ~0.5) [1-3]. The theoretical capacity of CoTiO₃ was calculated according to the equation:

$$C = \frac{26.8 \times n}{M} \times 1000$$

in which the maximum number “ n ” of electrons transfer is 2.5, and the molar mass “ M ” is 155. Thus, its capacity value is below 432 mAh/g.

References

- [1] J.S. Chen, Y.L. Tan, C.M. Li, Y.L. Cheah, S. Madhavi, F.Y.C. Boey, L.A. Archer and X.W. Lou, *J. Am. Chem. Soc.*, 2010, **132**, 6124.
- [2] X.W. Lou and L.A. Archer, *Adv. Mater.*, 2008, **20**, 1853.
- [3] L. Kavan, M. Gratzel, J. Rathousky and A. Zukal, *J. Electrochem. Soc.*, 1996, **143**, 394.