

Supporting Information

Coaxial CNT@Si/SiO_x Nanowires Enable High-Capacity and Stable Lithium Storage

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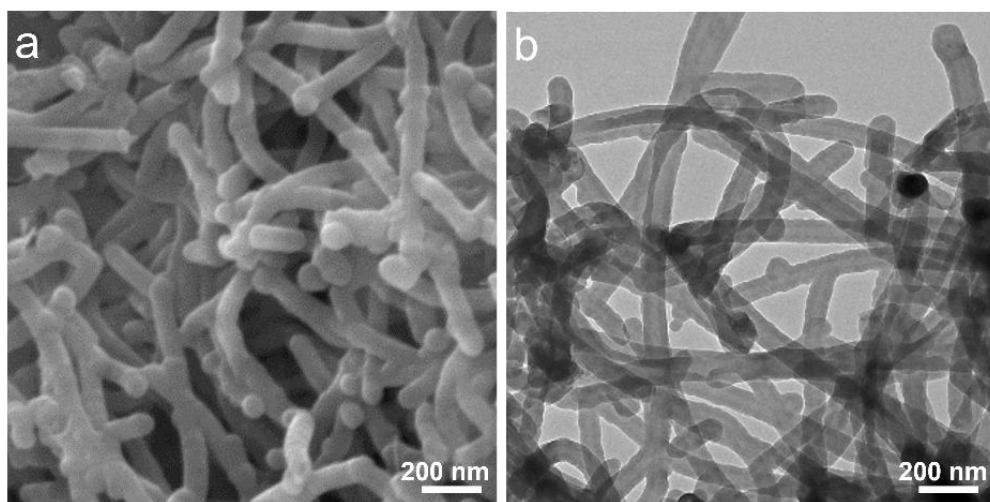


Figure S1. a) SEM and b) TEM images of CNT@HSQ.

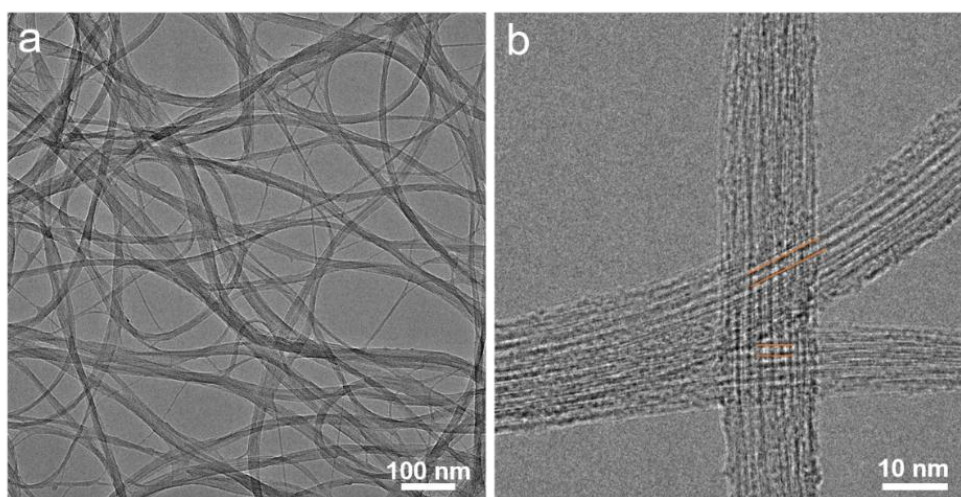


Figure S2. TEM images of CNTs.

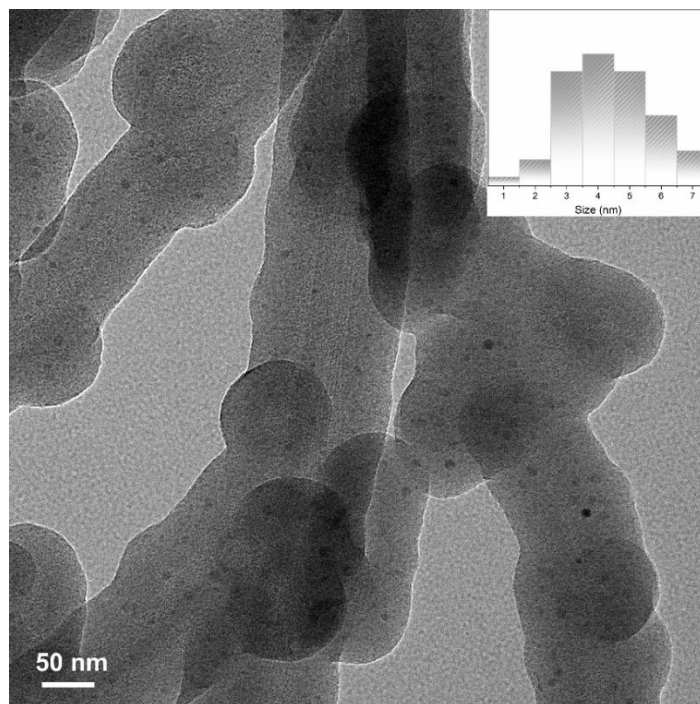


Figure S3. HRTEM image and size distribution histogram of Si nanocrystals in CNT@Si/SiO_x.

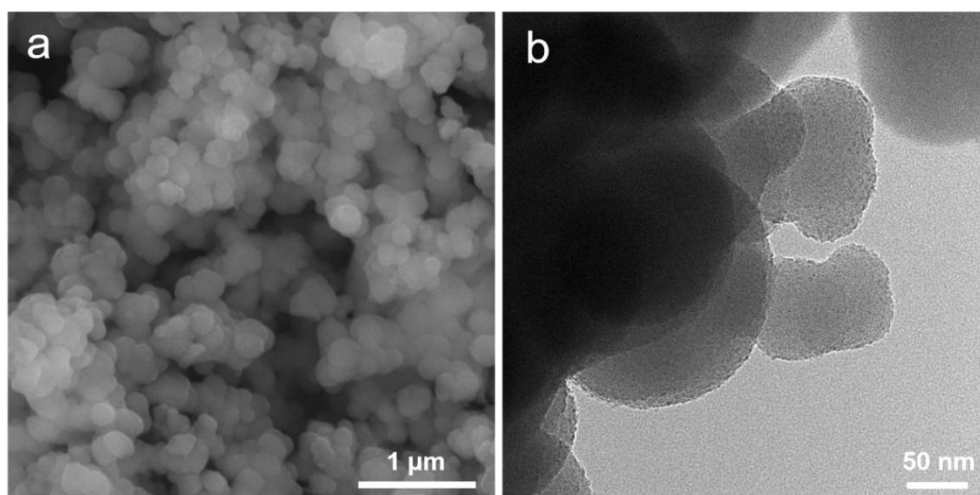


Figure S4. a) SEM and b) TEM images of Si/SiO_x nanoparticles.

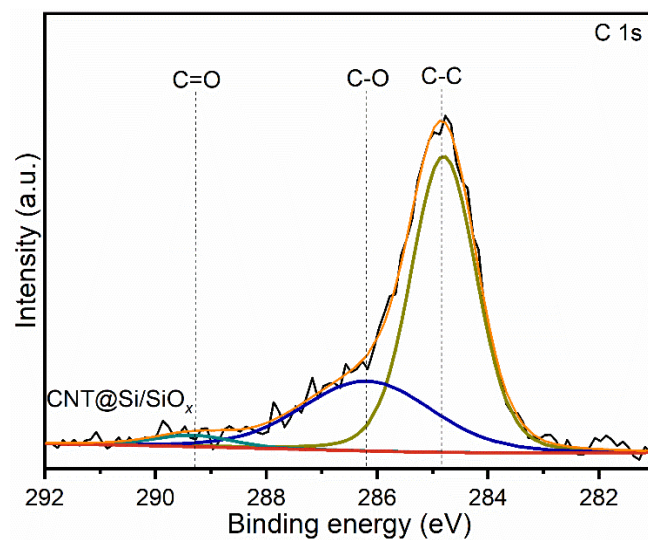


Figure S5. The C 1s XPS spectrum of CNT@Si/SiO_x.

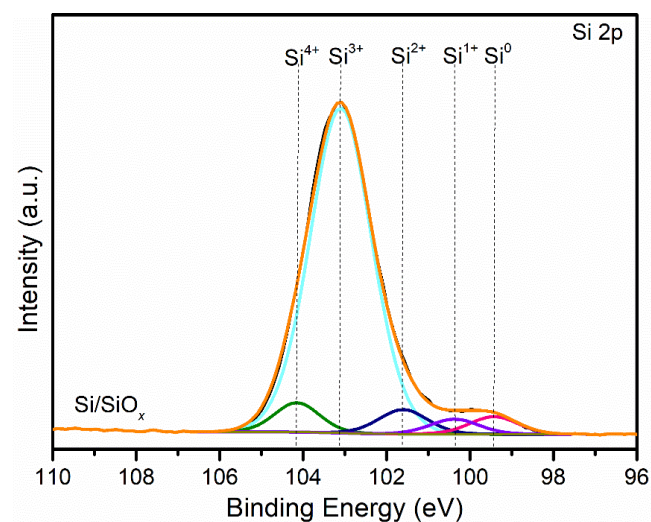


Figure S6. The Si 2p XPS spectrum of Si/SiO_x.

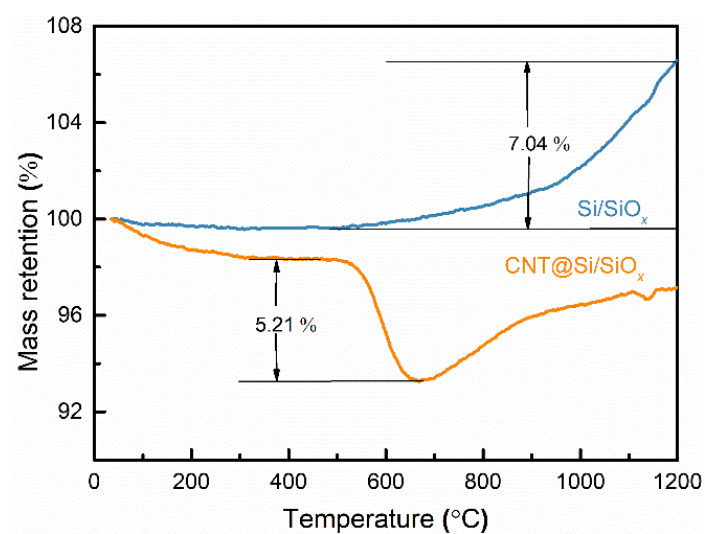


Figure S7. TGA curves of Si/SiO_x and CNT@Si/SiO_x.

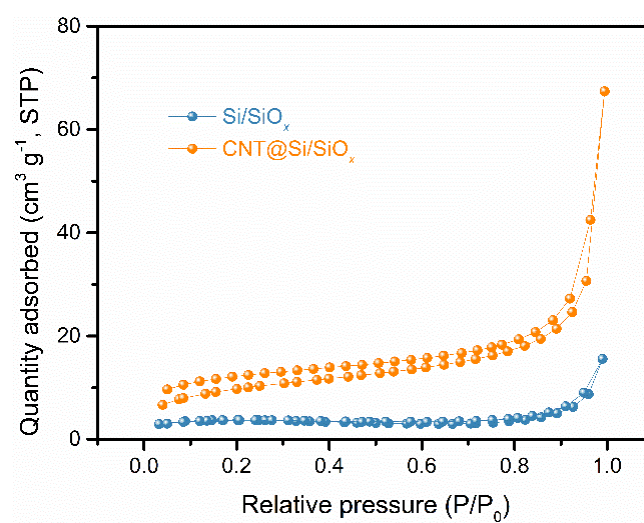


Figure S8. Nitrogen sorption isotherms of Si/SiO_x and CNT@Si/SiO_x.

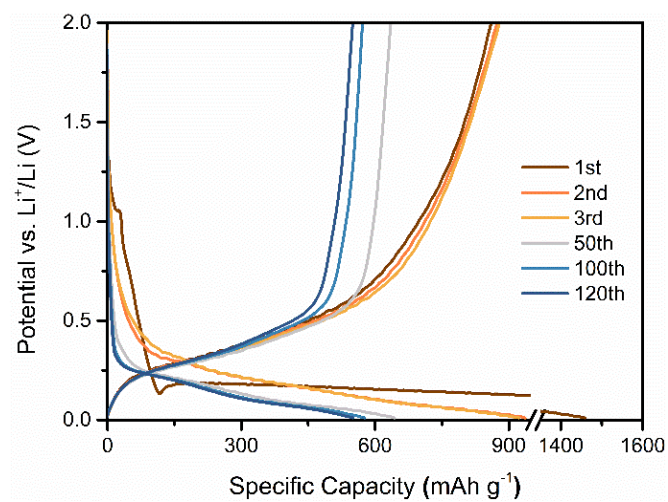


Figure S9. GCD curves of Si/SiO_x at 0.1 A g⁻¹.

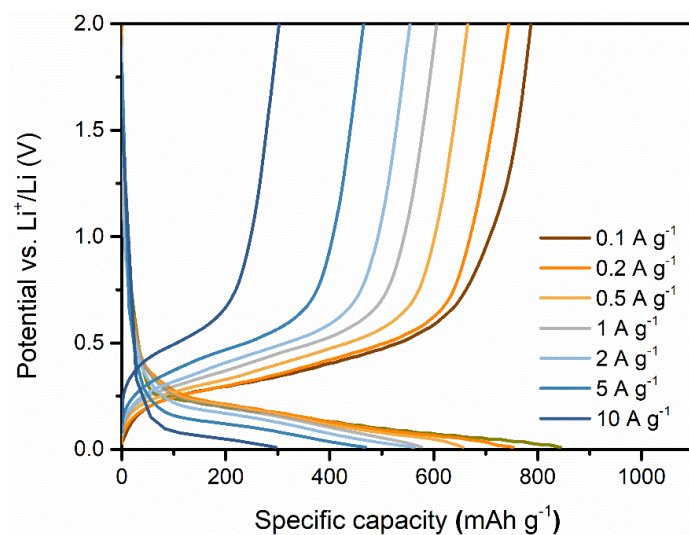


Figure S10. GCD curves of Si/SiO_x at different current densities.

Table S1. Comparison of the electrochemical performances of CNT@Si/SiO_x with previously reported SiO_x-based anode materials.

Materials	Discharge Capacity	Rate Capability	Cycling stability
CNT@Si/SiO_x (This work)	1078 mAh g⁻¹ at 0.1 A g⁻¹	540 mAh g⁻¹ at 10 A g⁻¹	867 mAh g⁻¹ after 200 cycles at 2 A g⁻¹
P/SiO _x /C ^[1]	950 mAh g ⁻¹ at 0.1 A g ⁻¹	510 mAh g ⁻¹ at 5 A g ⁻¹	720 mAh g ⁻¹ after 200 cycles at 1 A g ⁻¹
CNT@SiO _x /C@ C ^[2]	857 mAh g ⁻¹ at 0.5 A g ⁻¹	333 mAh g ⁻¹ at 10 A g ⁻¹	395 mAh g ⁻¹ after 1000 cycles at 2 A g ⁻¹
Gr-SiO _x @C ^[3]	1460 mAh g ⁻¹ at 0.1 A g ⁻¹	429 mAh g ⁻¹ at 2 A g ⁻¹	652 mAh g ⁻¹ after 1000 cycles at 1 A g ⁻¹
Li ₃ Sb/LiF-SiO _x ^[4]	1092.4 mAh g ⁻¹ at 0.1 C	454.5 mAh g ⁻¹ at 2 C	697.5 mAh g ⁻¹ after 200 cycles at 0.5 C
SiO _x @Gr/AG ^[5]	630 mAh g ⁻¹ at 0.34 A g ⁻¹	400 mAh g ⁻¹ at 3.4 A g ⁻¹	423 mAh g ⁻¹ after 50 cycles at 0.85 A g ⁻¹
SiO _x @C ^[6]	506.9 mAh g ⁻¹ at 0.1 A g ⁻¹	442.9 mAh g ⁻¹ at 2 A g ⁻¹	506.9 mAh g ⁻¹ after 400 cycles at 1 A g ⁻¹
SiO _x @C sheets ^[7]	717.4 mAh g ⁻¹ at 0.1 A g ⁻¹	389 mAh g ⁻¹ at 2 A g ⁻¹	589 mAh g ⁻¹ after 300 cycles at 1 A g ⁻¹
MgSiO ₃ - SiO _x @C ^[8]	1713 mAh g ⁻¹ at 0.5 C	1041 mAh g ⁻¹ at 1 C	759 mAh g ⁻¹ after 100 cycles at 0.5 C
SiO _x /C ^[9]	823 mAh g ⁻¹ at 0.1 C	454.5 mAh g ⁻¹ at 2 C	802 mAh g ⁻¹ after 100 cycles at 0.1 C
bamboo-like SiO _x /C@C ^[10]	921 mAh g ⁻¹ at 0.1 A g ⁻¹	357 mAh g ⁻¹ at 5 A g ⁻¹	511 mAh g ⁻¹ after 450 cycles at 0.5 A g ⁻¹
Porous SiO _x @C ^[11]	935 mAh g ⁻¹ at 0.1 A g ⁻¹	226 mAh g ⁻¹ at 5 A g ⁻¹	740 mAh g ⁻¹ after 1200 cycles at 0.3 A g ⁻¹

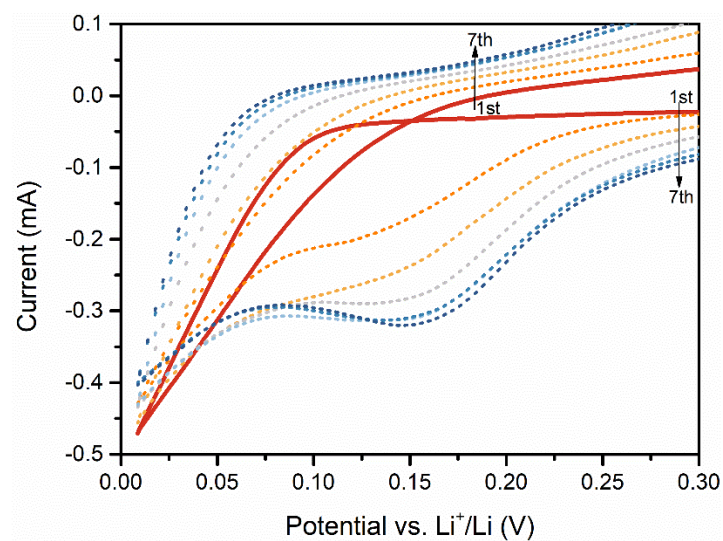


Figure S11. Enlarged CV curves of Si/SiO_x at 0.1 mV s⁻¹.

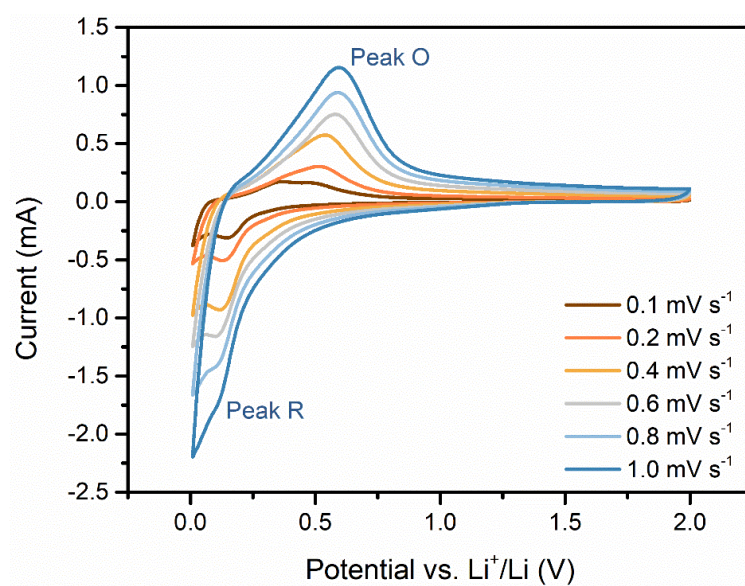


Figure S12. CV curves of Si/SiO_x at various scan rates.

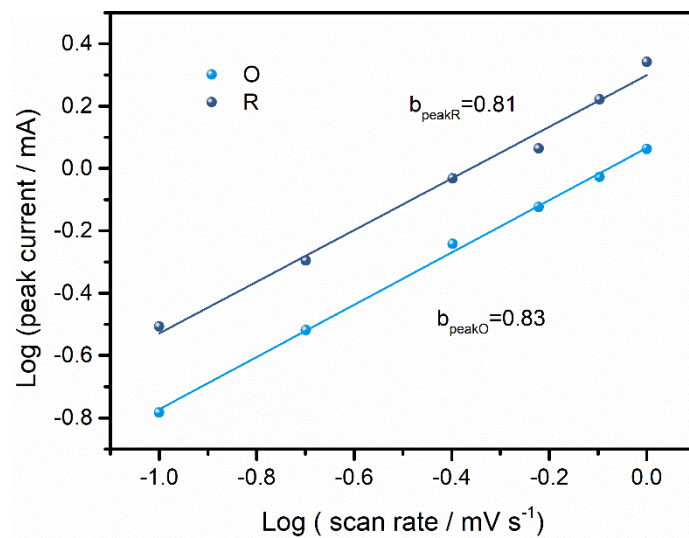


Figure S13. Log(*i*) versus log(*v*) plots and the corresponding linear fits of Si/SiO_x.

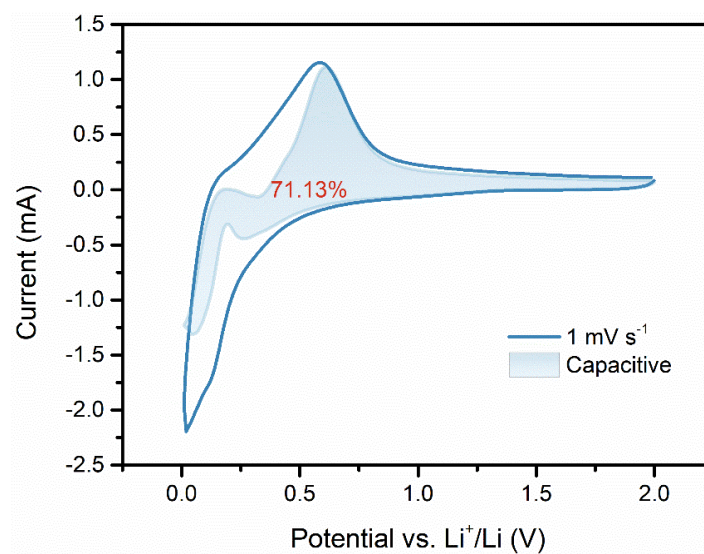


Figure S14. CV curve and the calculated capacitive contribution of Si/SiO_x at 1 mV s⁻¹.

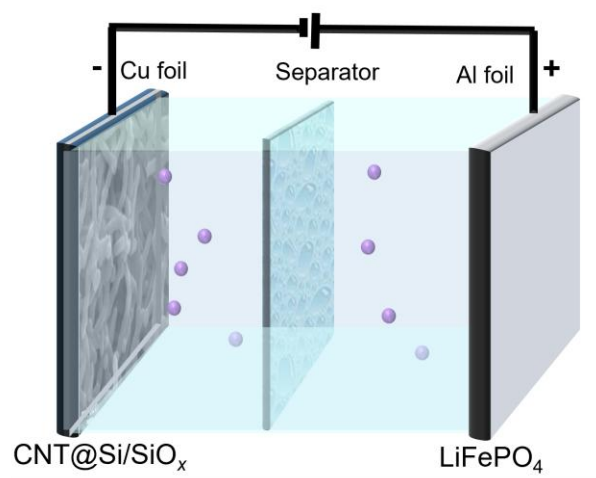


Figure S15. The schematic diagram of the $\text{CNT@Si/SiO}_x||\text{LFP}$ full cell.

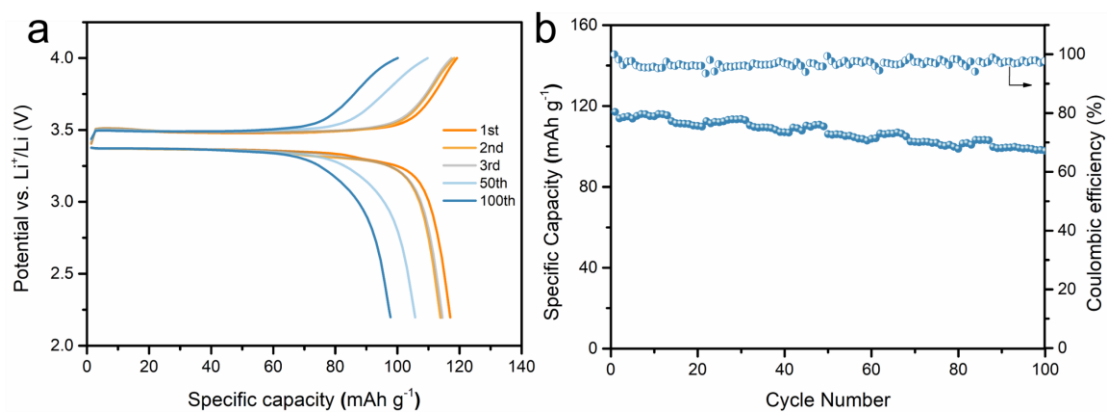


Figure S16. a) GCD profiles of LFP cathode and b) cycling performance at 1.0 C in Li half cells.

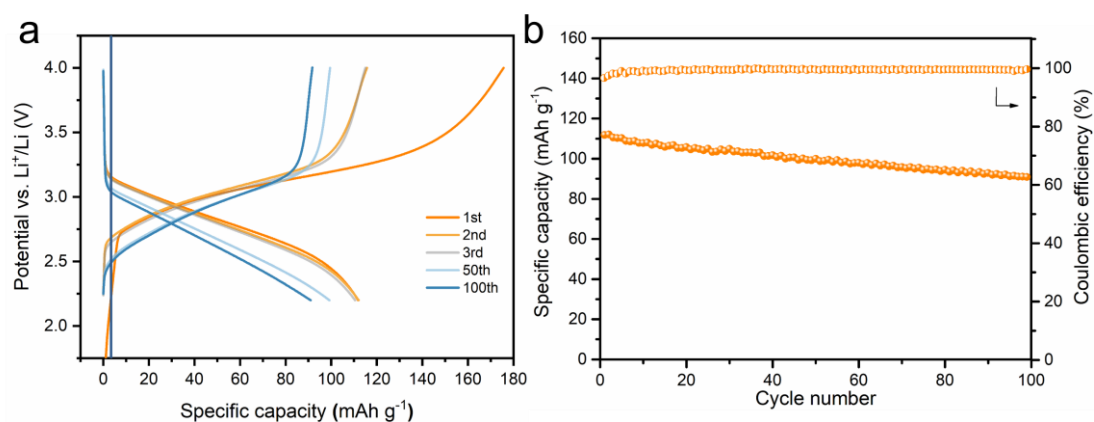


Figure S17. a) GCD profiles of CNT@Si/SiO_x||LFP full cell and b) cycling performance at 1.0 C.

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