

Electronic Supplementary Information (ESI)

Rationally Designed Hierarchical Porous CNFs/Co₃O₄ Nanofiber-based Anode for Realizing High Lithium Ion Storage

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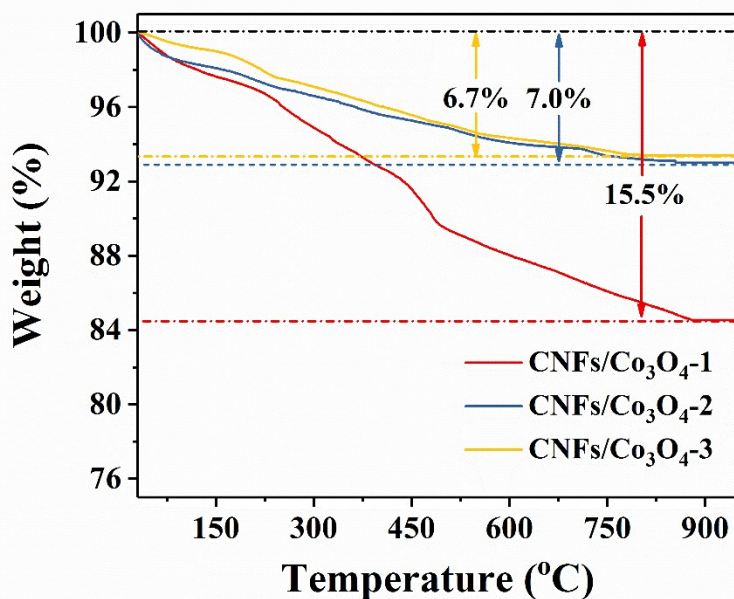


Fig. S1 TGA curves for the (a) hierarchical porous CNFs/Co₃O₄-1, (b) CNFs/Co₃O₄-2 and (c) CNFs/Co₃O₄-3.

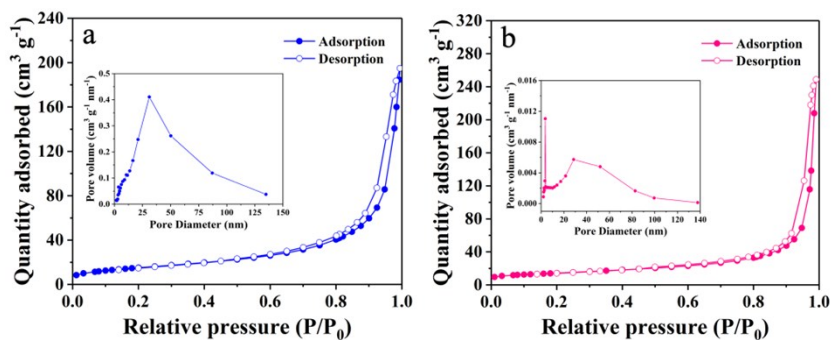


Fig. S2 Nitrogen adsorption-desorption isotherms of the (a) CNFs/Co₃O₄-2, and (b) CNFs/Co₃O₄-3 inset: the corresponding pore size distribution curves, respectively.

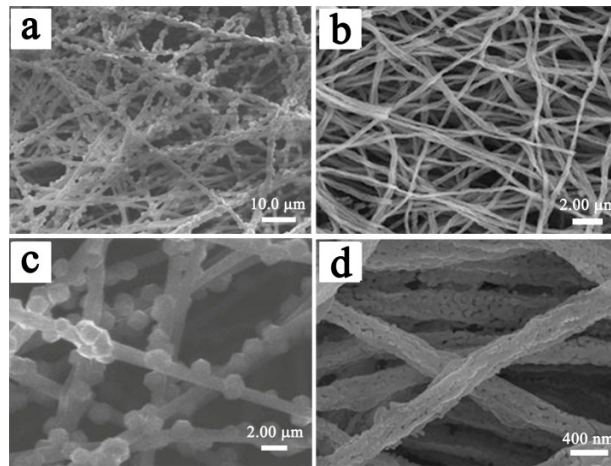


Fig. S3 SEM images of (a) PAN/ZIF-67-2 composite nanofibers, and (b) CNFs/Co₃O₄-2, (c, d) magnified view of the images of (a, b).

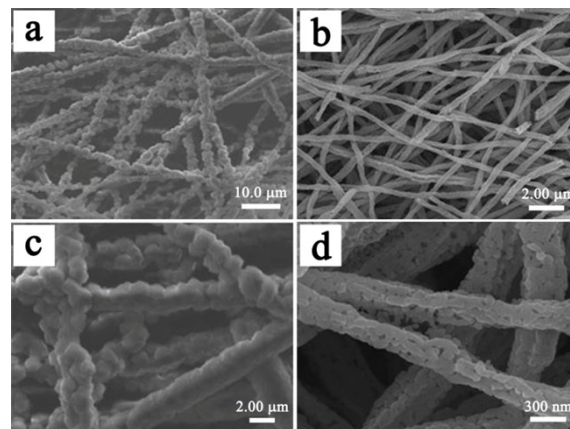


Fig. S4 SEM images of (a) PAN/ZIF-67-3 composite nanofibers, and (b) CNFs/Co₃O₄-3, (c, d) magnified view of the images of (a, b).

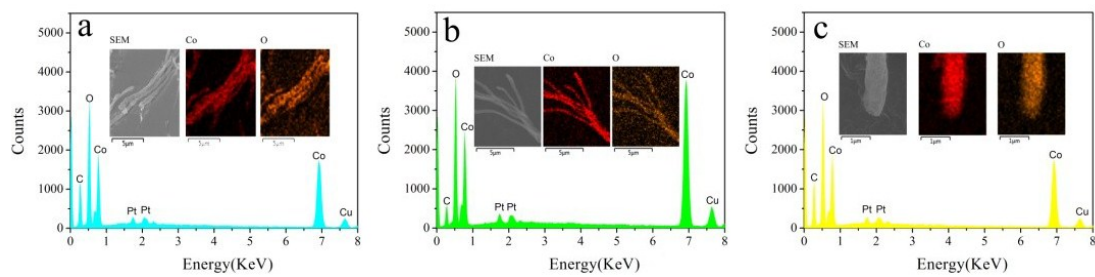


Fig. S5 EDX mapping images of hierarchical porous CNFs/Co₃O₄-1, CNFs/Co₃O₄-2 and CNFs/Co₃O₄-3.

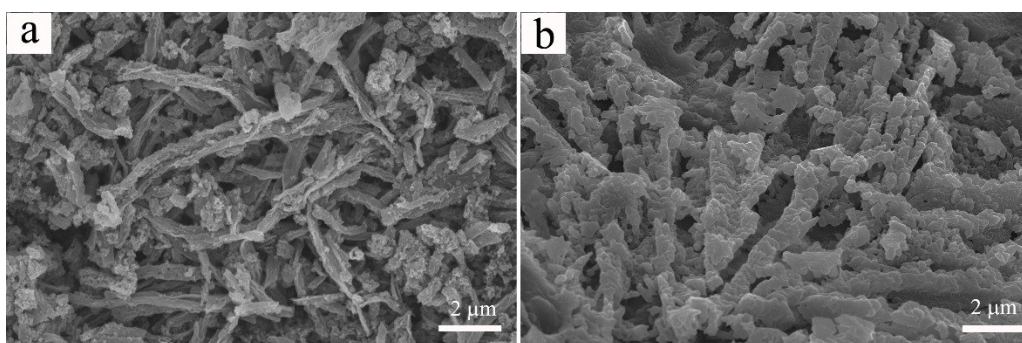


Fig. S6 SEM images of hierarchical porous CNFs/Co₃O₄-1 (a) before and (b) after 150 cycles at a current density of 1 A g⁻¹.

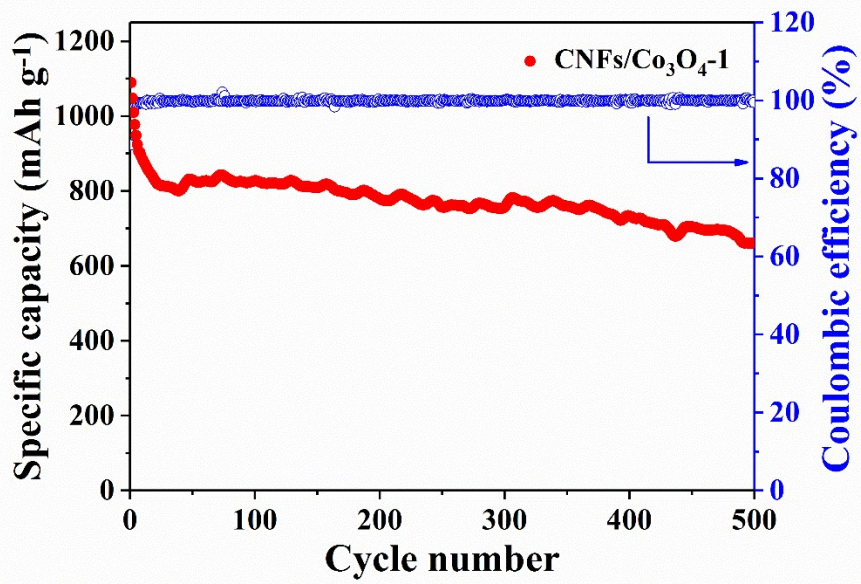


Fig. S7 Discharge-charge capacity and Coulombic efficiency of hierarchical porous CNFs/Co₃O₄-1 at a current density of 2 A g⁻¹.

Table S1 Comparison of lithium storage performance for the hierarchical porous CNFs/Co₃O₄-1 with other Co₃O₄-based electrodes.

Materials	Specific capacity	Cycle number	Ref.
Hierarchical porous CNFs/Co ₃ O ₄ -1	1352 mAh g ⁻¹ at 0.2A g ⁻¹ 661 mAh g ⁻¹ at 2A g ⁻¹	500	This work
Co ₃ O ₄ @nitrogen-doped Grapheme network	995 mAh g ⁻¹ at 0.2A g ⁻¹ 676 mAh g ⁻¹ at 1A g ⁻¹	100 400	1
Porous Co ₃ O ₄ hollow Tetrahedral	1196 mAh g ⁻¹ at 0.05A g ⁻¹ 1052 mAh g ⁻¹ at 0.2 A g ⁻¹	60	2
Graphene-embedded Co ₃ O ₄ rose-spheres	990.8 mAh g ⁻¹ at 0.1 C (0.09 A g ⁻¹) 655.9 mAh g ⁻¹ at 2 C (1.8 A g ⁻¹)	200	3
Porous hollow Co ₃ O ₄ parallelepipeds	1115 mAh g ⁻¹ at 0.1A g ⁻¹	50	4
Porous N-doped carbon coated Co ₃ O ₄ fish-scale	612 mAh g ⁻¹ at 1 A g ⁻¹	500	5
Hierarchical three-dimensional flower-like Co ₃ O ₄	1588 mAh g ⁻¹ at 0.1 A g ⁻¹ 1051 mAh g ⁻¹ at 1.12 C (1 A g ⁻¹)	100 800	6
Snowflake-shaped Co ₃ O ₄	1044 mAh g ⁻¹ at 0.5 A g ⁻¹ 1051 mAh g ⁻¹ at 1 A g ⁻¹ 939 mAh g ⁻¹ at 2 A g ⁻¹	100	7
Porous hollow Co ₃ O ₄ microspheres	1012.7 mAh g ⁻¹ at 0.2 C (0.18 A g ⁻¹) 881.3 mAh g ⁻¹ at 2 C (1.8 A g ⁻¹)	100 300	8
Hierarchically structured Co ₃ O ₄ @carbon porous fibers	1110 mAh g ⁻¹ at 0.1A g ⁻¹ 647 mAh g ⁻¹ at 1 A g ⁻¹	200 700	9
Porous starfish-like Co ₃ O ₄ @nitrogen-doped carbon	795 mAh g ⁻¹ at 0.5A g ⁻¹	500	10
Porous Co ₃ O ₄ cubes@graphene	980 mAh g ⁻¹ at 0.2A g ⁻¹	80	11
MWCNTs/Co ₃ O ₄	813 mAh g ⁻¹ at 0.1A g ⁻¹	100	12
Mesoporous perforated Co ₃ O ₄ nanoparticles with a thin carbon layer	1115.1 mAh g ⁻¹ at 0.2 C (0.18 A g ⁻¹)	100	13

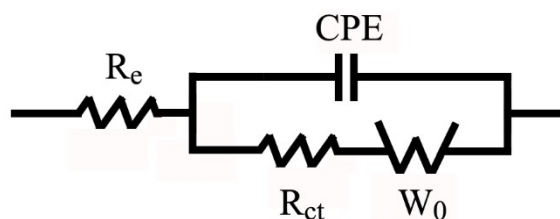


Fig. S8 Randles equivalent circuit.

Table S2 Fitted EIS results of the hierarchical porous CNFs/Co₃O₄-1, CNFs/Co₃O₄-2, CNFs/Co₃O₄-3 and Co₃O₄ NPs electrode.

	Hierarchical porous CNFs/Co ₃ O ₄ -1	Hierarchical porous CNFs/Co ₃ O ₄ -2	Hierarchical porous CNFs/Co ₃ O ₄ -3	Co ₃ O ₄ NPs
R _e (Ω)	4.182	4.847	5.474	5.479
R _{ct} (Ω)	100.27	369.86	390.14	652.99

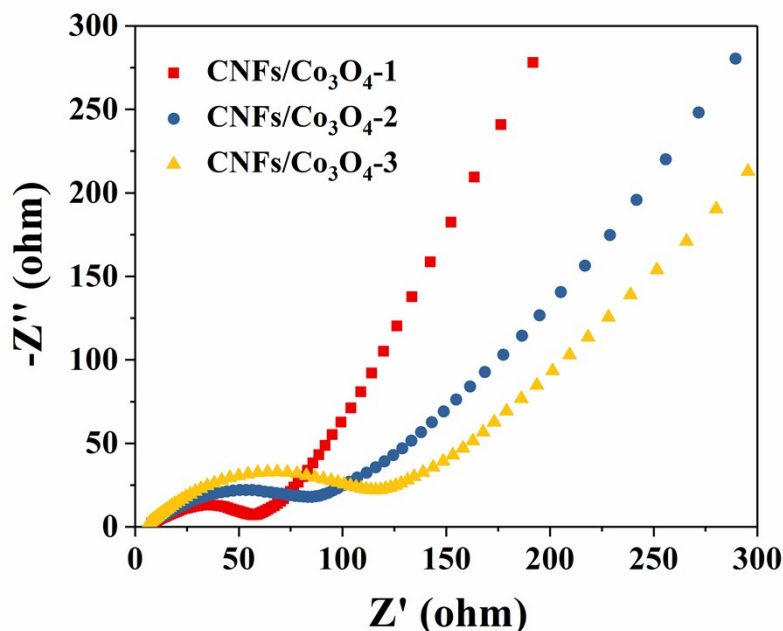


Fig. S9 EIS spectra of hierarchical porous CNFs/Co₃O₄-1, CNFs/Co₃O₄-2 and CNFs/Co₃O₄-3 electrode after 150 cycles at current of 1 A g⁻¹.

References

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