

**Co₃O₄ Nanoparticles Dotted Hierarchical-Assembled Carbon
Nanosheet Frameworks Catalysts with Formation/Decomposition
Mechanisms of Li₂O₂ for Smart Lithium-Oxygen Batteries**

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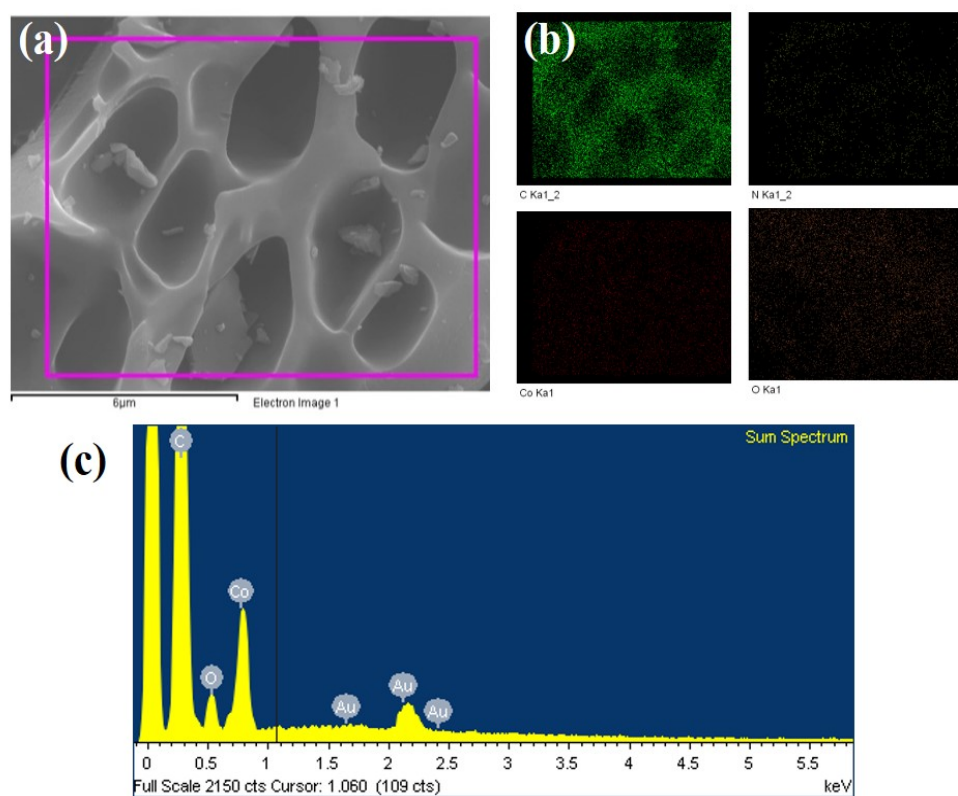


Figure S1 X-ray spectroscopy (EDS) elemental mapping images revealed the coexistence and homogeneous dispersion of C, N, Co, and O.

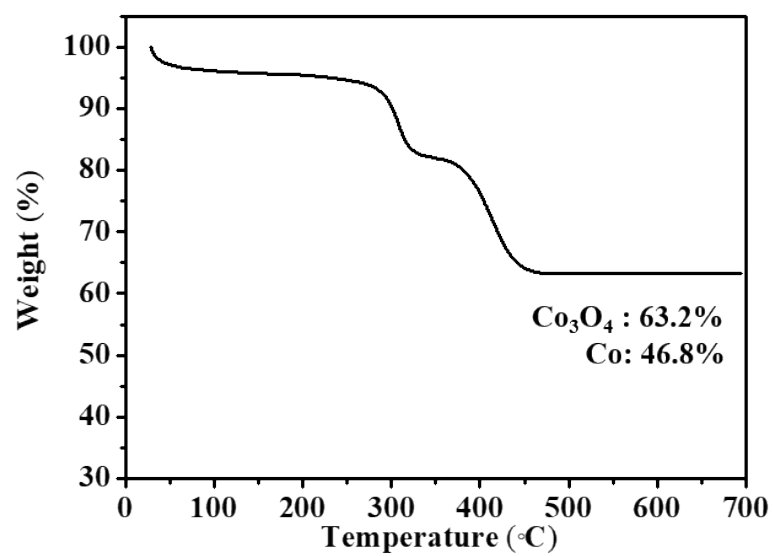


Figure S2 Thermal gravimetric analysis (TGA) of $\text{Co}_3\text{O}_4\text{-HCNF}$ catalyst.

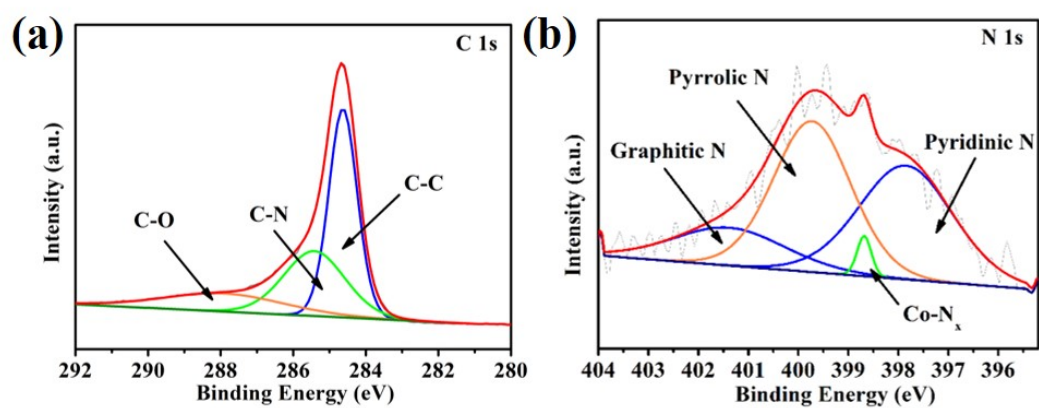


Figure S3 High-resolution (a) C 1s and (b) N 1s XPS spectrum of $\text{Co}_3\text{O}_4\text{-HCNF}$ catalyst.

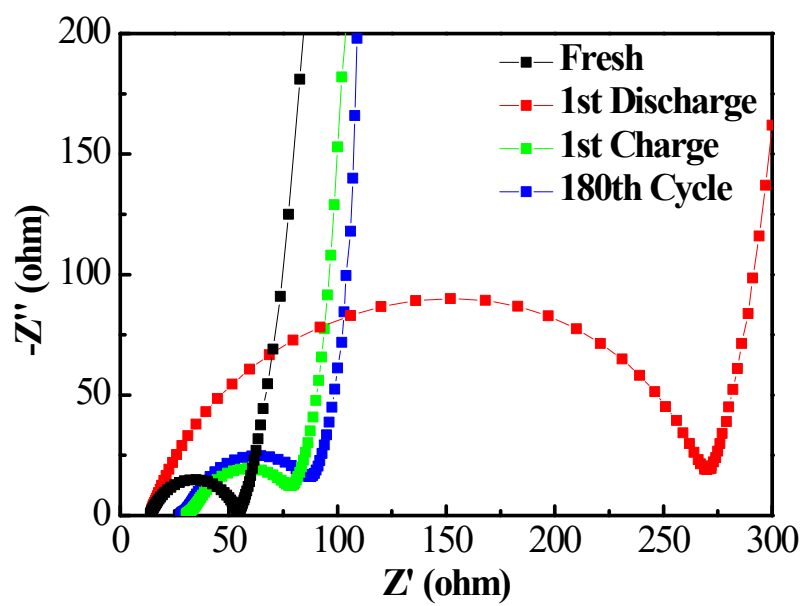


Figure S4 The Electrochemical Impedance Spectroscopy (EIS) data at 4 stages of $\text{Co}_3\text{O}_4\text{-HCNF}$ catalyst.

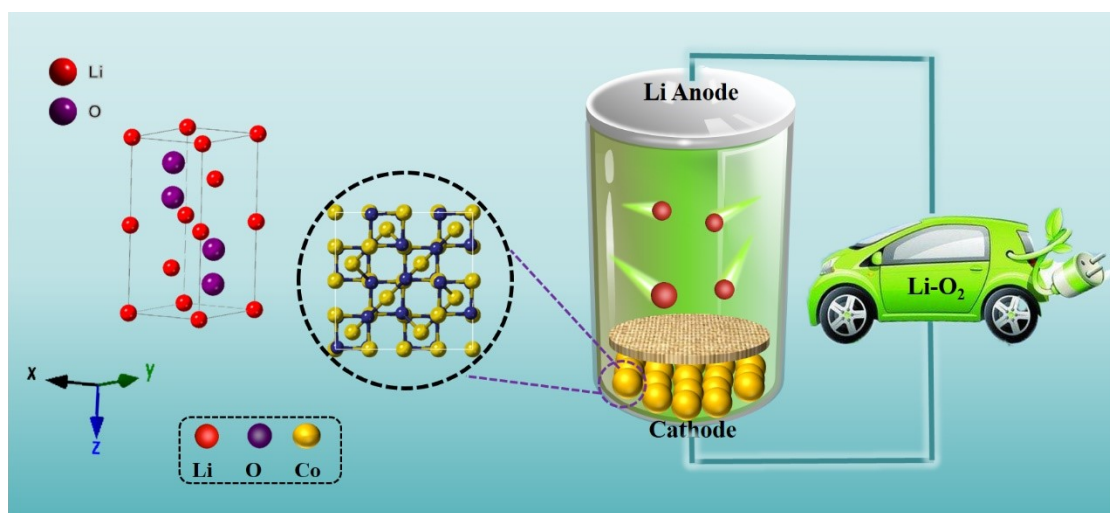


Figure S5. Schematic of the feasible mechanism for $\text{Co}_3\text{O}_4\text{-HCNF}$ in Li-O_2 batteries.

Table S1 Performance comparison of the Co@PNCS cathode with those of representative Co decorated N-doped carbon cathodes reported in the literature.

Catalyst	Electrolyte	Current Density mA g ⁻¹	Capacity mAh g ⁻¹	Cycles/Fixed Capacity mAh g ⁻¹	Ref.
Co@PNCS	TEGDME	100	11329	120/600	1
Co/CoO@PCNS	DMSO	100	2660	55/800	2
Co/CoO@NGNS	TEGDME	100	7800	70/500	3
Co ₃ O ₄ , MnO ₂	TEGDME	100	6000	43/1000	4
Co ₃ O ₄ -300	TEGDME	100	8398	190/1000	5
Co ₃ O ₄ HPNS	TEGDME	100	13632	57/500	6
Co ₃ O ₄ @Co ₃ O ₄ /Ag	TEGDME	200	12000	65/1000	7
Co ₃ O ₄ -HCNF	TEGDME	100	14948	180/600	This work

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