

# Supporting Information

## Compact-Nanobox Engineering of Transition Metal Oxides with Enhanced Initial Coulombic Efficiency for Lithium-Ion Battery Anodes

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## Note S1

Because the CoO-CNB has experienced thermal annealing process, we calculate the average crystal size of CoO nanograin *via* Scherrer Equation as the following,

$$\text{Size} = \frac{K\lambda}{FW(S) * \cos(\theta)} \quad \text{Equation S1}$$

where  $K$  denotes a constant,  $\lambda$  denotes wavelength of X-ray (nm),  $FW(S)$  denotes width of sample,  $\theta$  denotes diffraction angle (Rad).

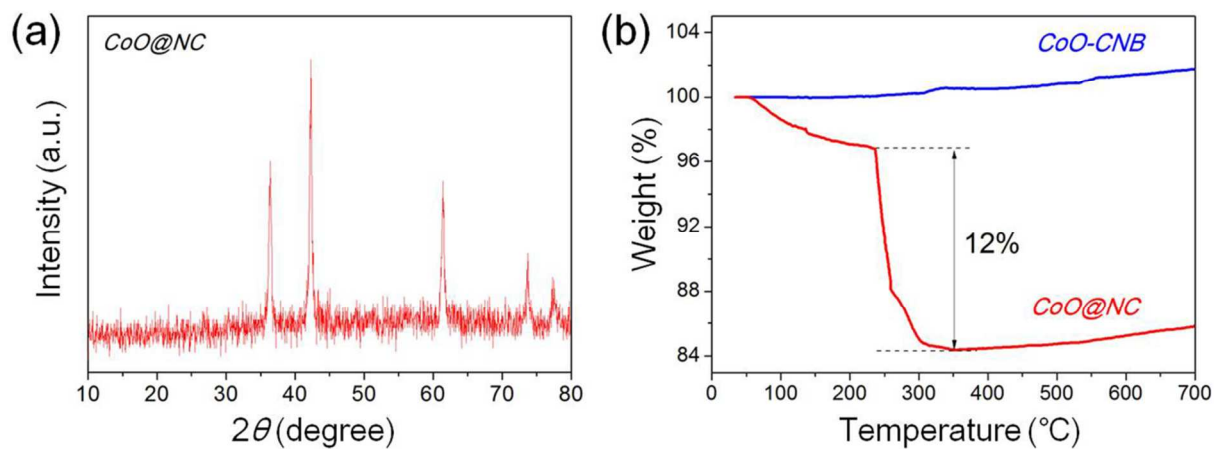


Figure S1. (a) X-ray diffraction pattern of CoO@NC; (b) Thermogravimetric analysis profiles of CoO-CNB and CoO@NC under simulated air atmosphere at a heating rate of  $5^\circ\text{C min}^{-1}$ .

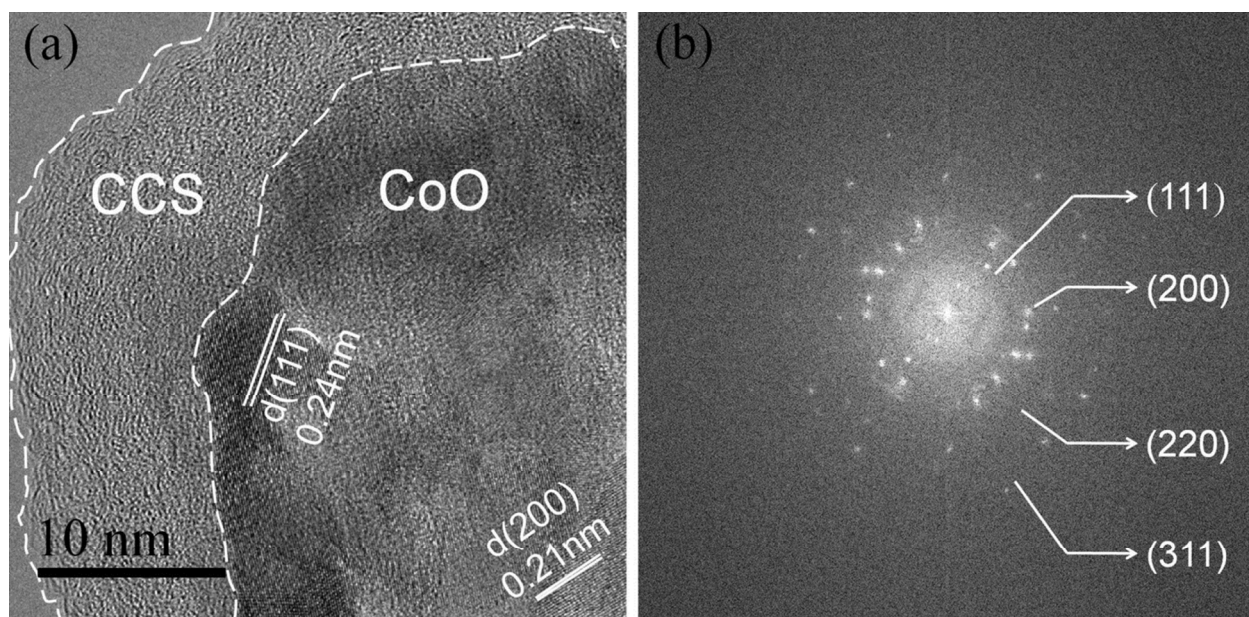


Figure S2. (a) High-resolution transmission electron microscope image of CoO@NC with detailed microstructure information about lattice fringes of CoO and amorphous carbon in the thickness of  $\sim 10$  nm. (b) Corresponding fast Fourier transform pattern of CoO@NC.

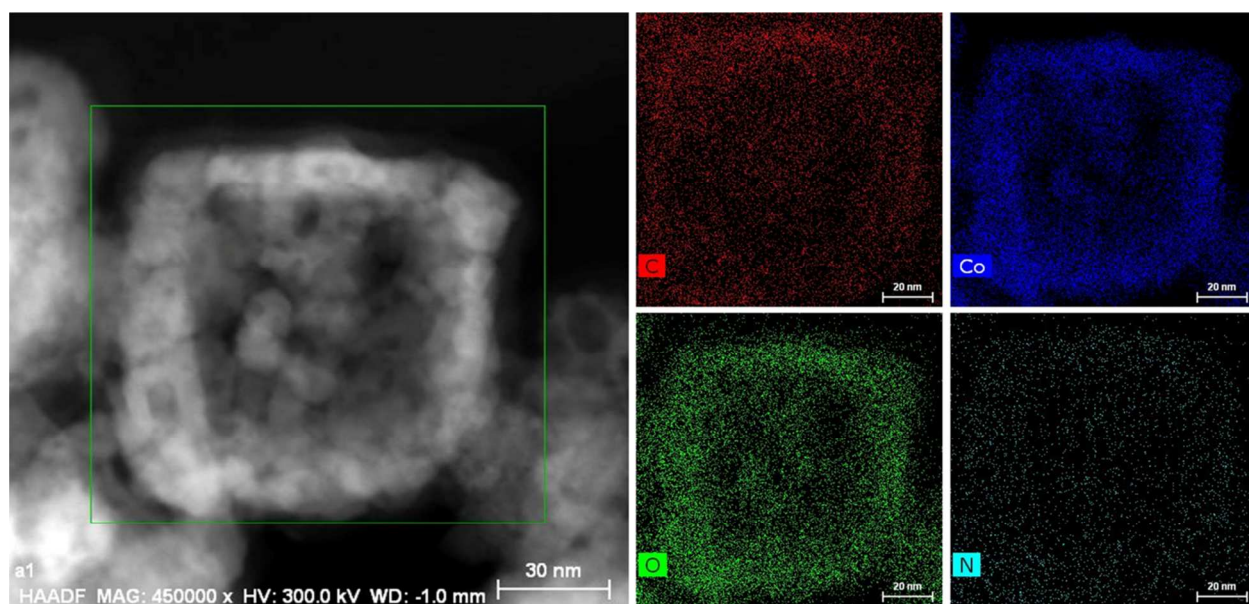


Figure S3. Elemental mapping of CoO@NC sample.

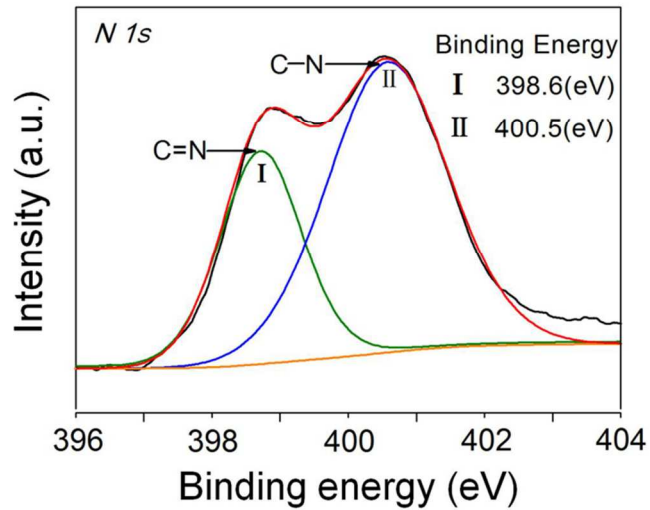


Figure S4. High-resolution X-ray photoelectron spectroscopy of N 1s in CoO@NC sample.

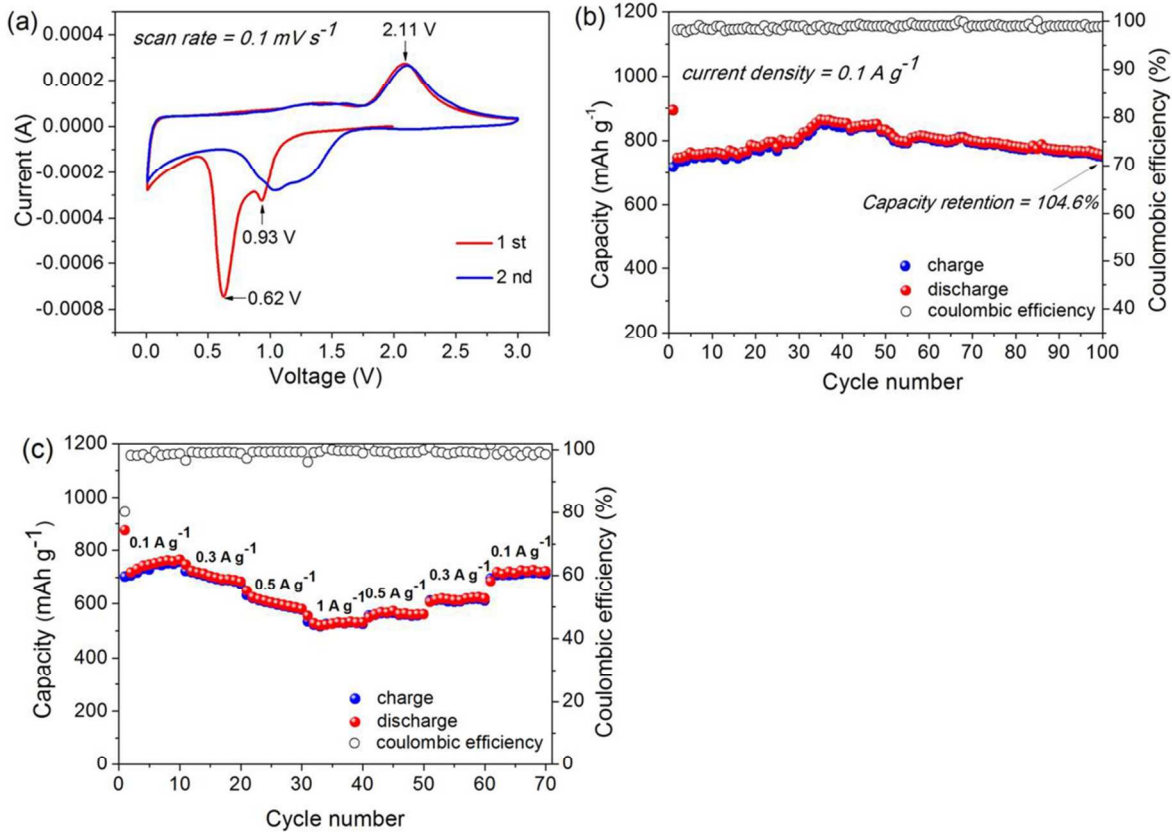




Figure S5. Electrochemical performance of CoO@NC electrode: (a) Cyclic voltammetry curves at a scan rate of  $0.1 \text{ mV s}^{-1}$  in the potential range from 3.0 to 0.01 V; (b) Cycling performance and corresponding Coulombic efficiency with initial 100 cycles performed at  $0.1 \text{ A g}^{-1}$ ; (c) Rate capabilities and corresponding Coulombic efficiency at current densities of 0.1, 0.3, 0.5 and  $1.0 \text{ A g}^{-1}$ , respectively.

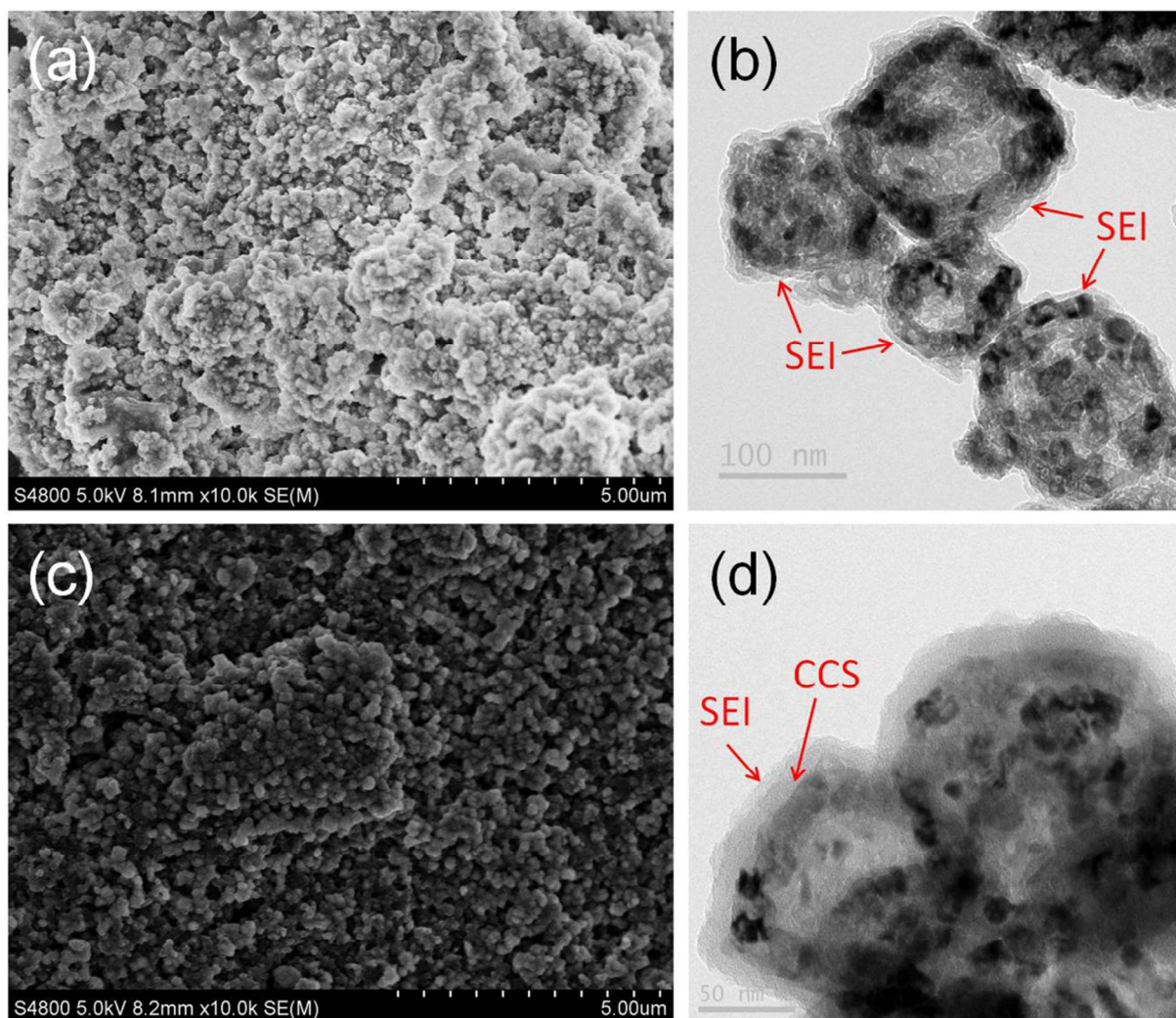


Figure S6. Field-emission scanning electron microscopy (FESEM) and transmission electron microscopy (TEM) images of CoO-CNB and CoO@NC electrodes after rate performance tests:

(a, b) FESEM and TEM images of cycled CoO-CNB, respectively; (c, d) FESEM and TEM images of cycled CoO@NC, respectively.