Electronic Supplementary Information

3D Co_3O_4 and CoO@C Wall Arrays: Morphology Control, Formation Mechanism, and Their Lithium-Storage Properties

Fangfang Wu,[a] *Xiaojian Ma,*[a] *Jinkui Feng,*[a] *Yitai Qian,*[a,b] *and Shenglin Xiong*[a,c,*]

[a]*Key Laboratory of the Colloid and Interface Chemistry (Shandong University), Ministry of Education, and School of Chemistry and Chemical Engineering, Shandong University, Jinan, 250100, PR China*

[b]*Hefei National Laboratory for Physical Science at Microscale and Department of Chemistry, University of Science and Technology of China, Hefei, Anhui, 230026 (P. R. China)*

[c]*CAS Key Laboratory of Materials for Energy Conversion, University of Science and Technology of China, Hefei, Anhui, 230026 (P. R. China)*

Email: chexsl@sdu.edu.cn

Supplementary Figures

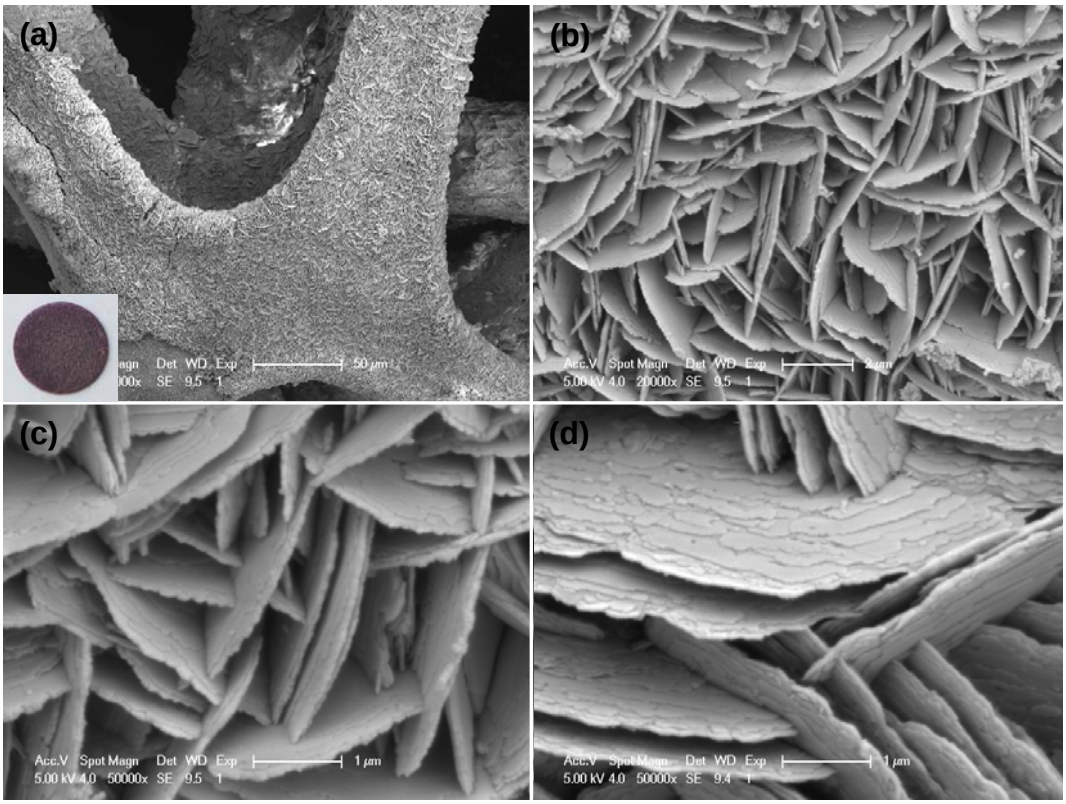

Figure S1. Typical FESEM images of the precursor Co(OH)F-Ni wall arrays prepared with the molar ratio of $NH_4F/CO(NH_2)_2$ = 12:10 at 120 °C for 8 h.

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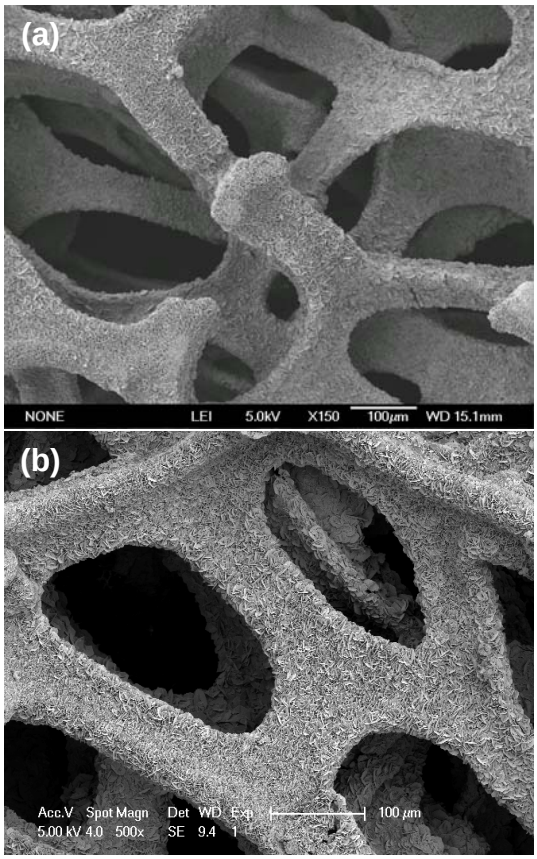

Figure S2. Low-magnification FESEM images of the intermediate Co_3O_4-Ni (a), and CoO@C-Ni (b) wall arrays.

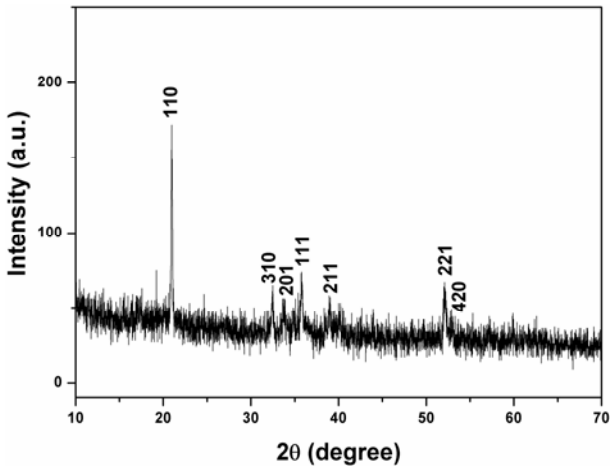

Figure S3. The XRD pattern of of Co(OH)F wall arrays assembled by ultrathin nanosheets scraped off from the nickel foam substrates.

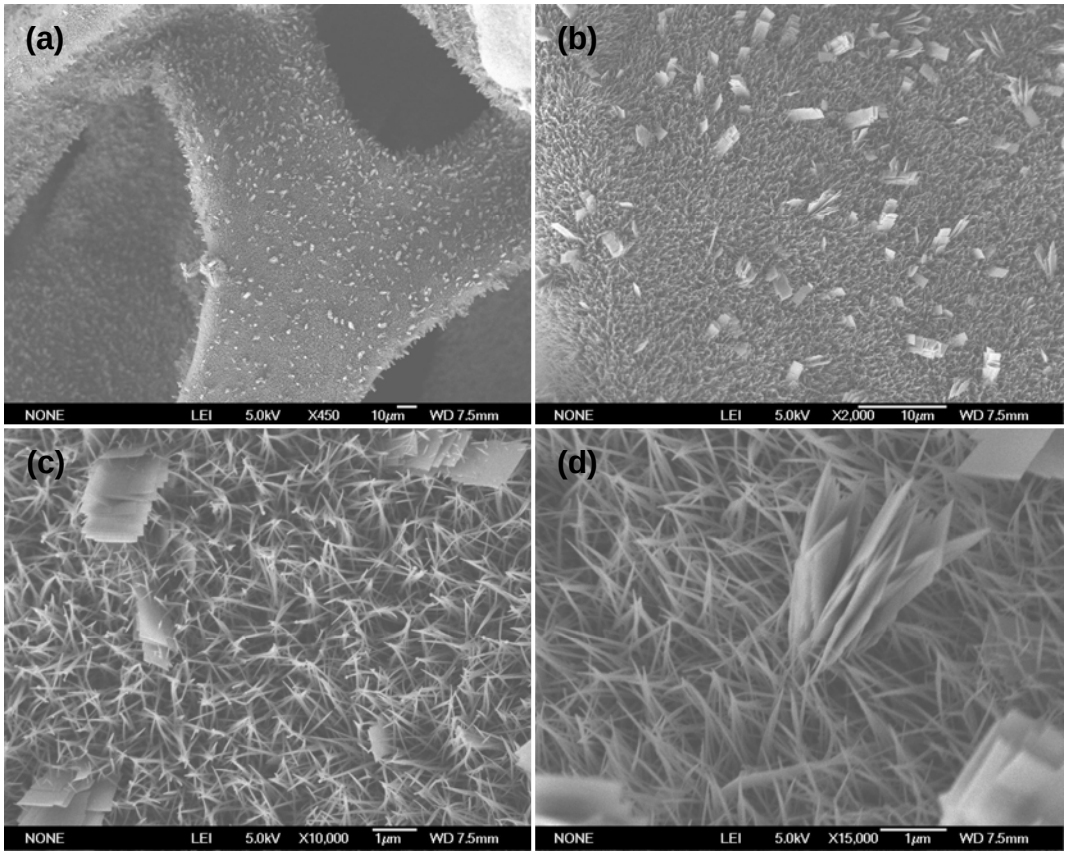

Figure S4. FESEM images of the corresponding precursor samples prepared with $Co(NO_3)_2$ as the cobalt precursor salts at 120 °C for 8 h in the absence of NH_4F.

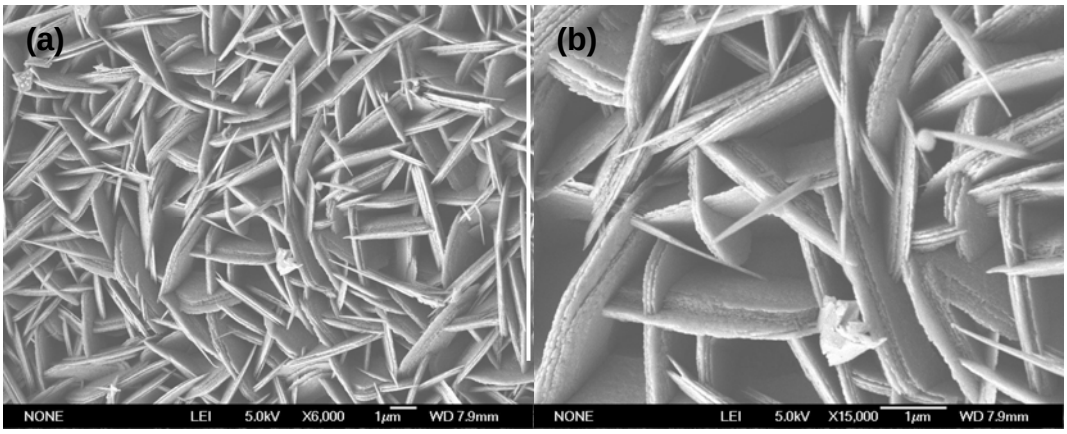

Figure S5. FESEM images of the corresponding precursor samples prepared with the molar ratio of $NH_4F/CO(NH_2)_2$ = 10:10 at 120 °C for 8 h.

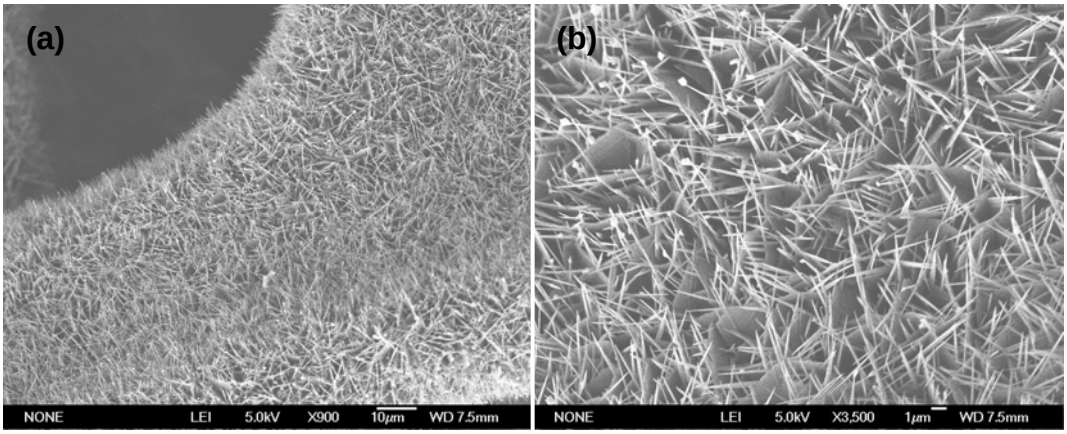

Figure S6. FESEM images of the corresponding precursor samples prepared with the molar ratio of $NH_4F/CO(NH_2)_2$ = 5:10 at 120 °C for 8 h.

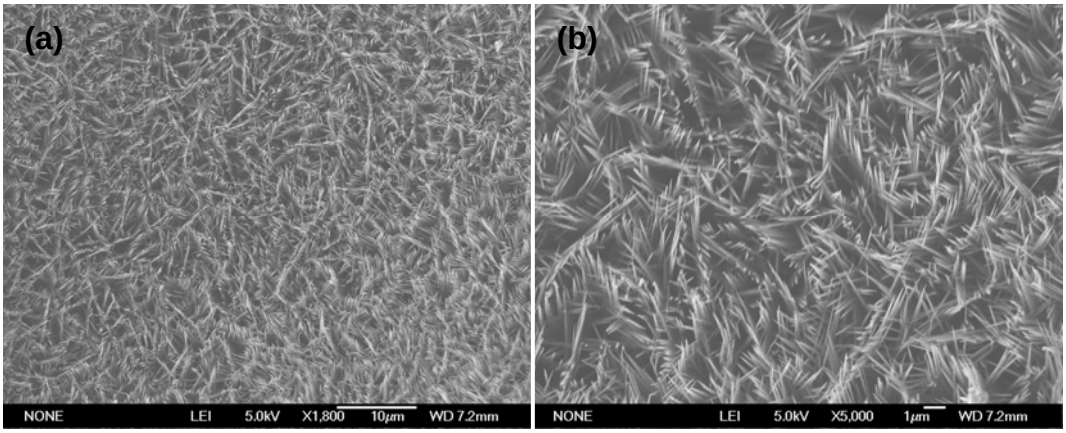

Figure S7. FESEM images of the corresponding precursor samples prepared with the molar ratio of $NH_4F/CO(NH_2)_2$ = 2:10 at 120 °C for 8 h.

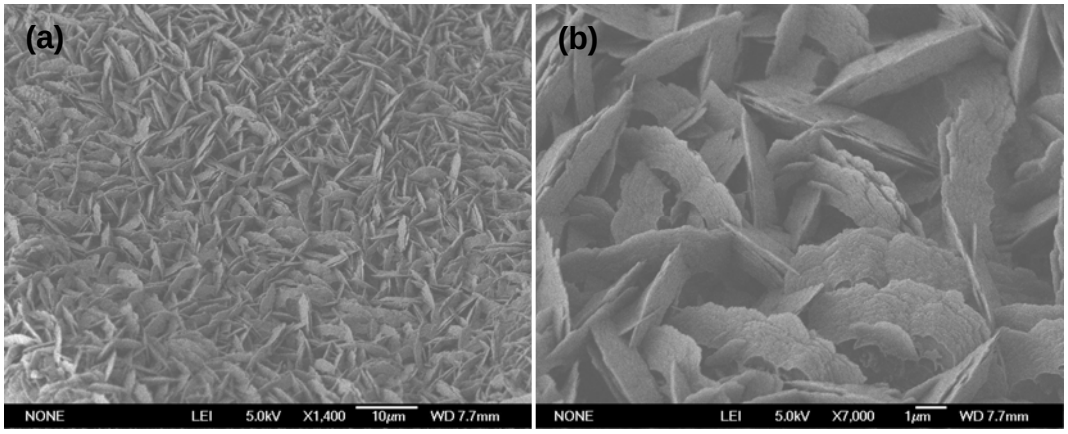

Figure S8. FESEM images of the corresponding precursor samples prepared with the molar ratio of $NH_4F/CO(NH_2)_2$ = 12:6 at 120 °C for 8 h.

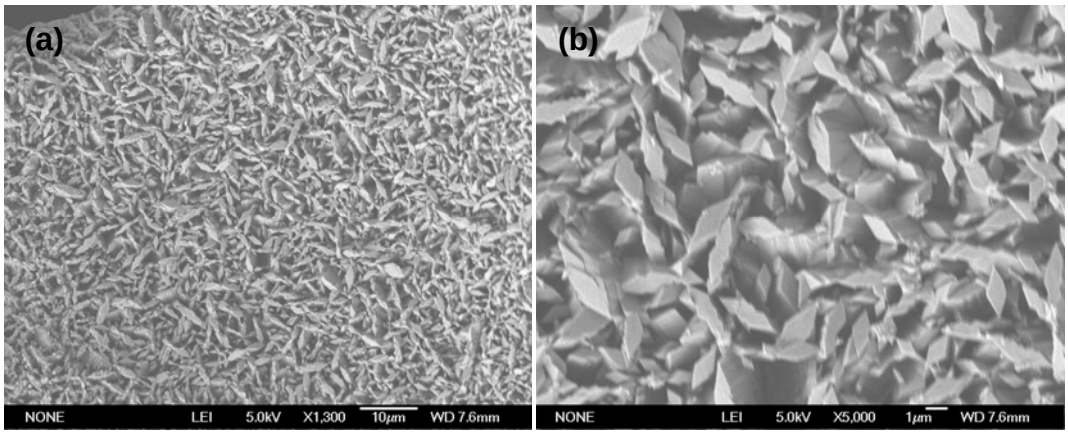

Figure S9. FESEM images of the corresponding precursor samples prepared with the molar ratio of $NH_4F/CO(NH_2)_2$ = 12:2 at 120 °C for 8 h.

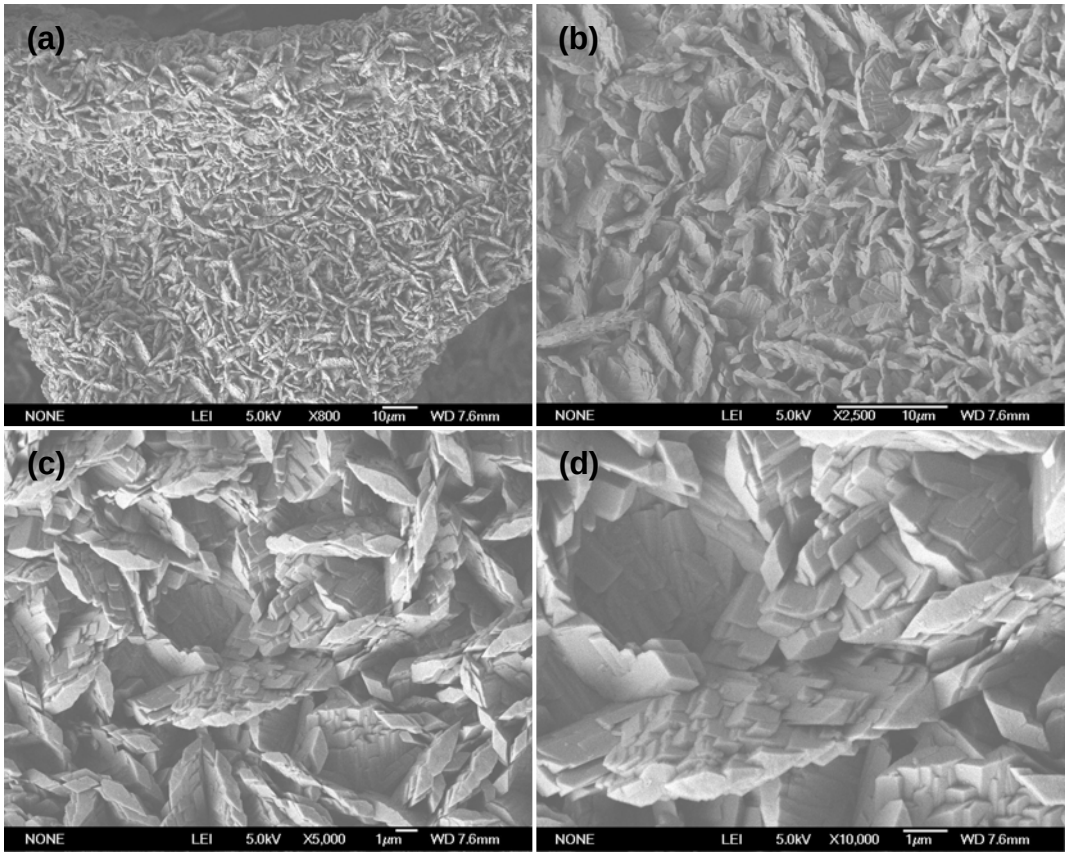

Figure S10. FESEM images of the corresponding precursor samples prepared with $Co(NO_3)_2$ as the cobalt precursor salts at 120 °C for 8 h in the absence of urea.

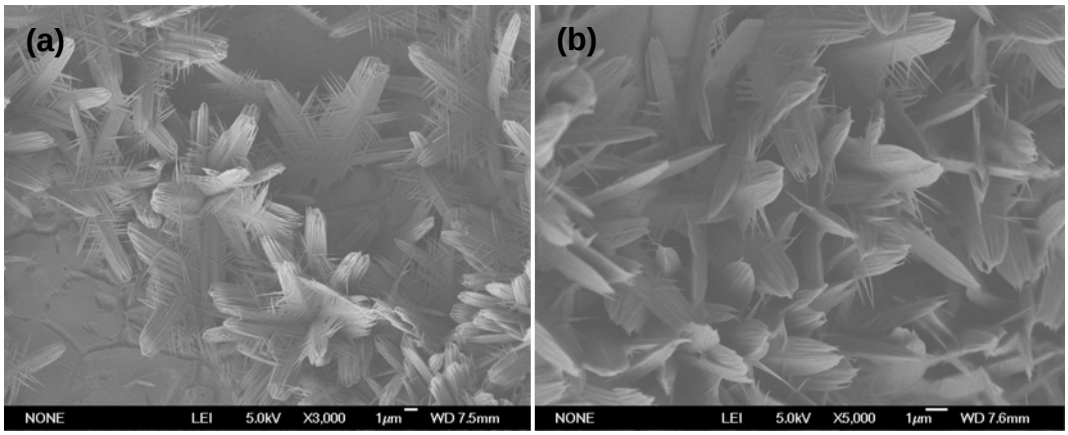

Figure S11. FESEM images of the corresponding precursor samples prepared with the molar ratio of $NH_4F/CO(NH_2)_2$ = 12:10 at 120 °C for 8 h only replacing $Co(NO_3)_2$ with $Co(Ac)_2$.

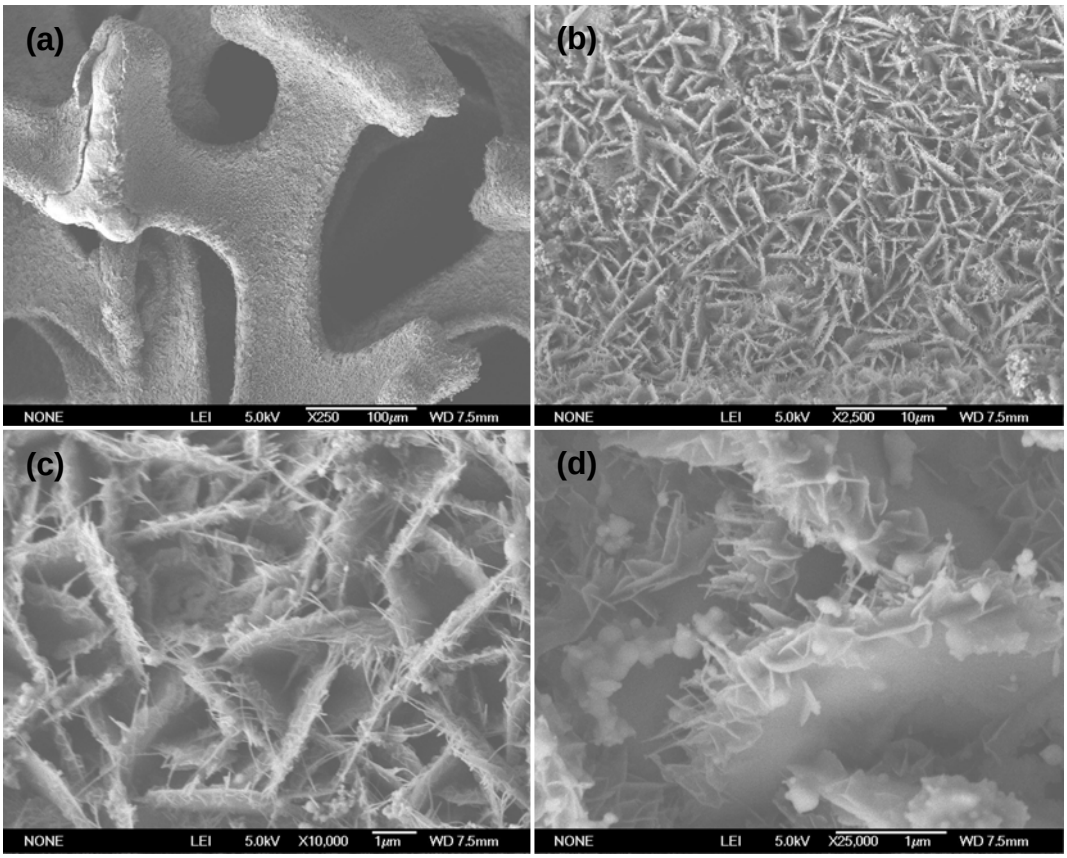

Figure S12. FESEM images of the corresponding precursor samples prepared with the molar ratio of $NH_4F/CO(NH_2)_2$ = 12:10 at 120 °C for 8 h only replacing $Co(NO_3)_2$ with $CoSO_4$.

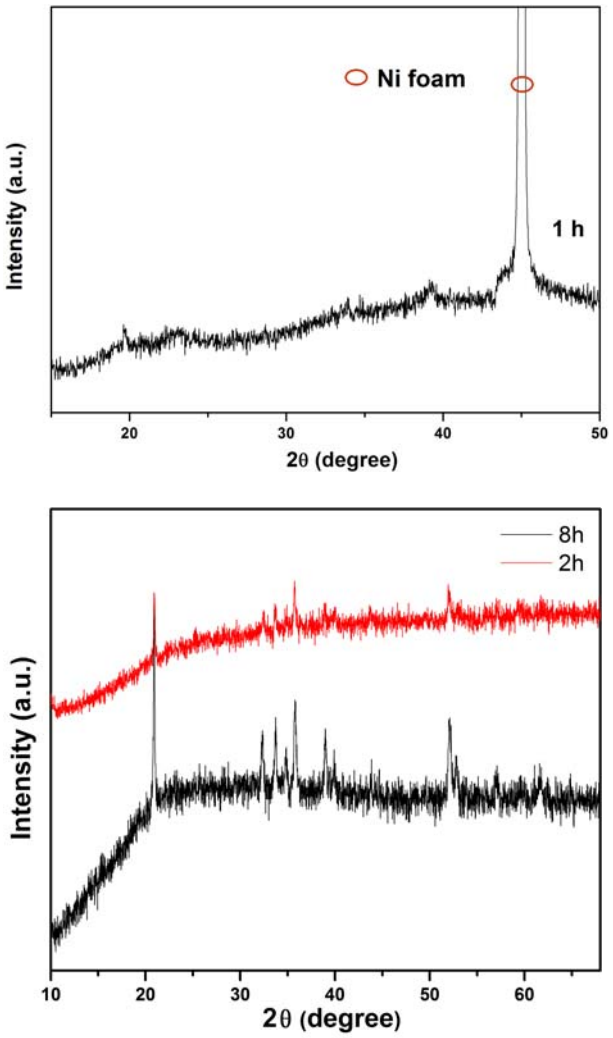

Figure S13. The XRD pattern of of Co(OH)F wall arrays assembled by ultrathin nanosheets obtained via reaction for different reaction duration.

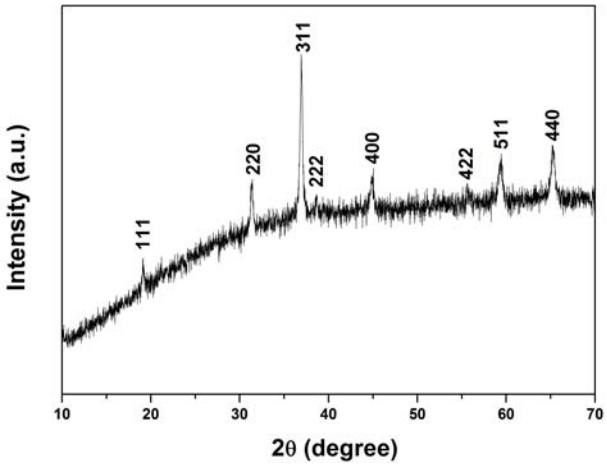

Figure S14. The XRD pattern of of Co_3O_4 wall arrays assembled by ultrathin nanosheets scraped off from the nickel foam substrates.

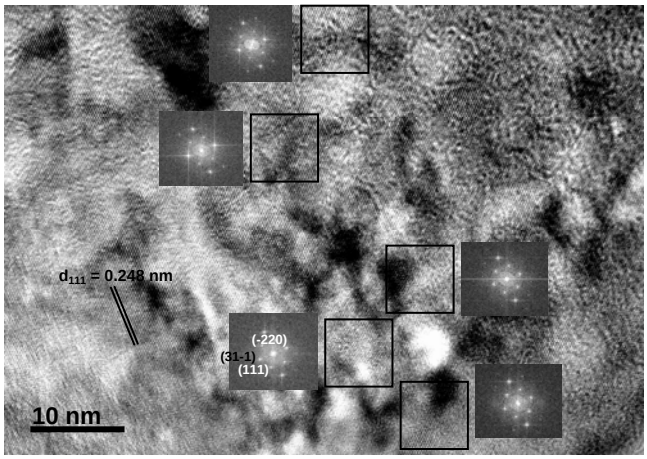

Figure S15. HR-TEM image of individual carbon-decorated CoO wall (CoO@C) and the corresponding FFT-electronic diffraction (FFT-ED) pattern.

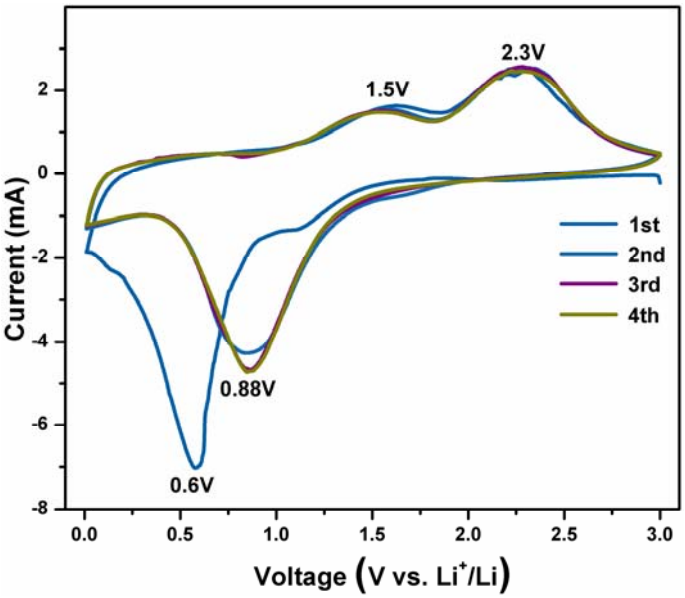

Figure S16. The first four cyclic voltammetry (CV) curves for the Co_3O_4-Ni at a scan rate of 0.1 mV s^{-1} in the voltage window of 0.01-3.0 V.

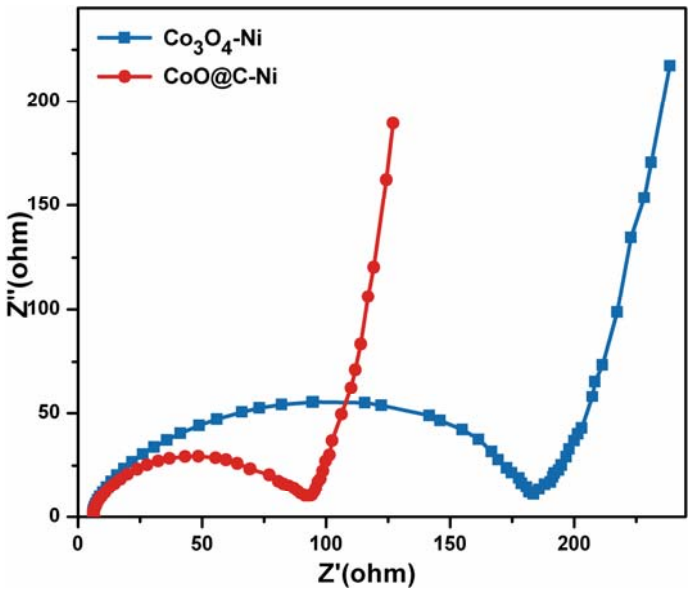

Figure S17. Nyquist plots of CoO@C-Ni and Co_3O_4-Ni at fresh cells in the frequency range from 0.1MHz to 0.01 Hz.