

Porous cobalt oxides with tunable hierarchical morphologies for supercapacitor electrodes

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Supporting Information:

Figure S1. SEM image of cobalt hydroxide prepared using cobalt chloride under a low magnification, showing microspherical particles are formed.

Figure S2. SEM images of cobalt hydroxides prepared using (a) chloride and (b) acetate, where 0.02 ml NaOH substituted ammonia solution, showing that small plate-like products are generated instead of hierarchical structure.

Figure S3. SEM images of cobalt hydroxides prepared using cobalt nitrate for 40 min reaction, showing nanocolumns consist of also (0001) hexagonal Co(OH)₂ nanosheets.

Figure S4. SEM image of the cobalt hydroxide prepared with reduced cobalt nitrate concentration (0.05 Mol/L) and ammonia solution at 70 °C for 1 hour.

Figure S5. XPS spectrum of cobalt oxide prepared by annealing cobalt hydroxide using acetate salt. The Co 2p XPS spectra of the cobalt oxide exhibit two peaks at about 795 and 780 eV, corresponding to the Co 2p_{1/2} and Co 2p_{3/2} spin-orbit peaks of Co₃O₄.

Figure S6. Discharge curves for the Co₃O₄ samples fabricated with different cobalt salts, (a) nitrate, (b) chloride, and (c) acetate at different rates. The calculated specific capacitance values of the three samples prepared using nitrate, chloride and acetate are 218, 187 and 171 F g⁻¹ at 1.25 A g⁻¹, respectively, consistent with these values calculated from CV curves.

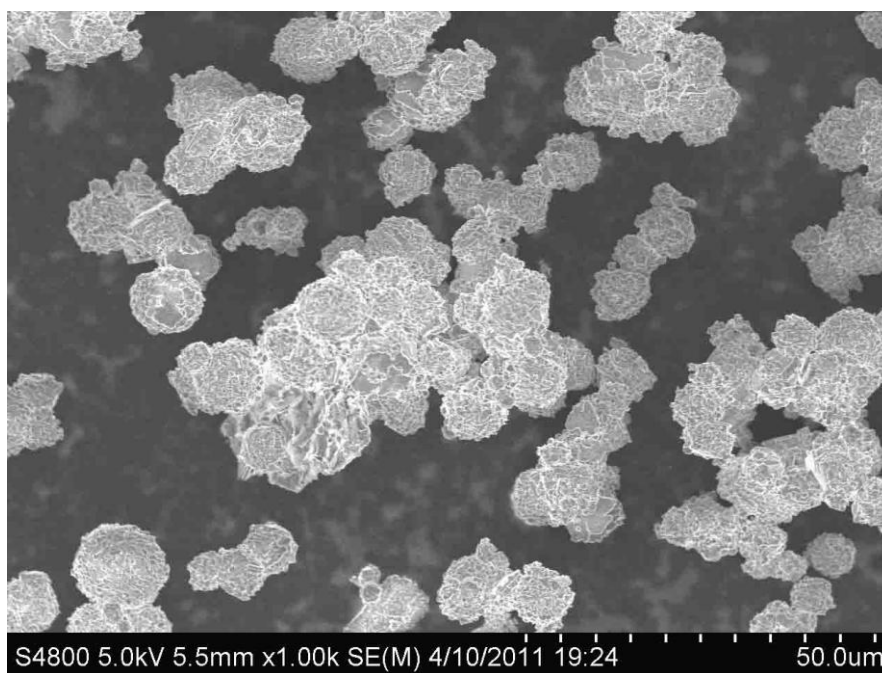


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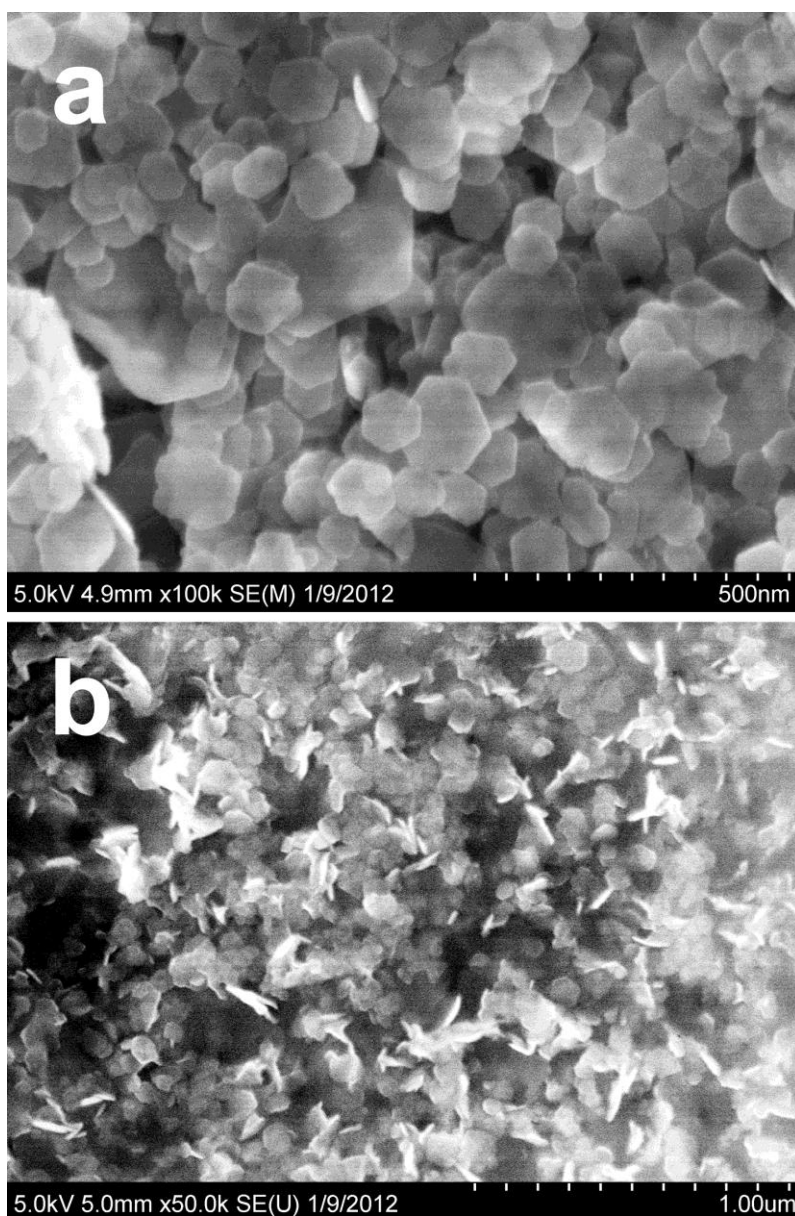


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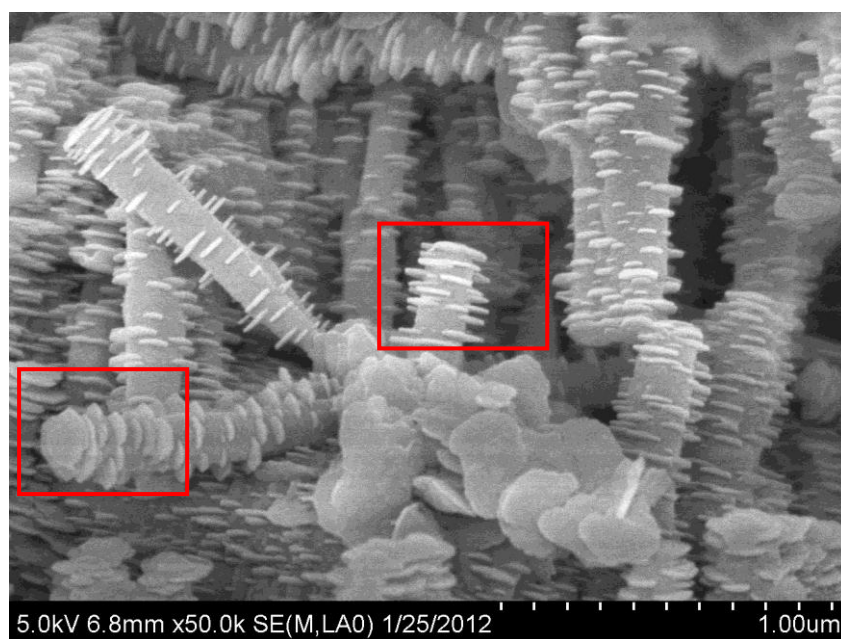


Figure S3. SEM images of cobalt hydroxides prepared using cobalt nitrate for 40 min reaction, showing nanocolumns consist of also (0001) hexagonal $\text{Co}(\text{OH})_2$ nanosheets.

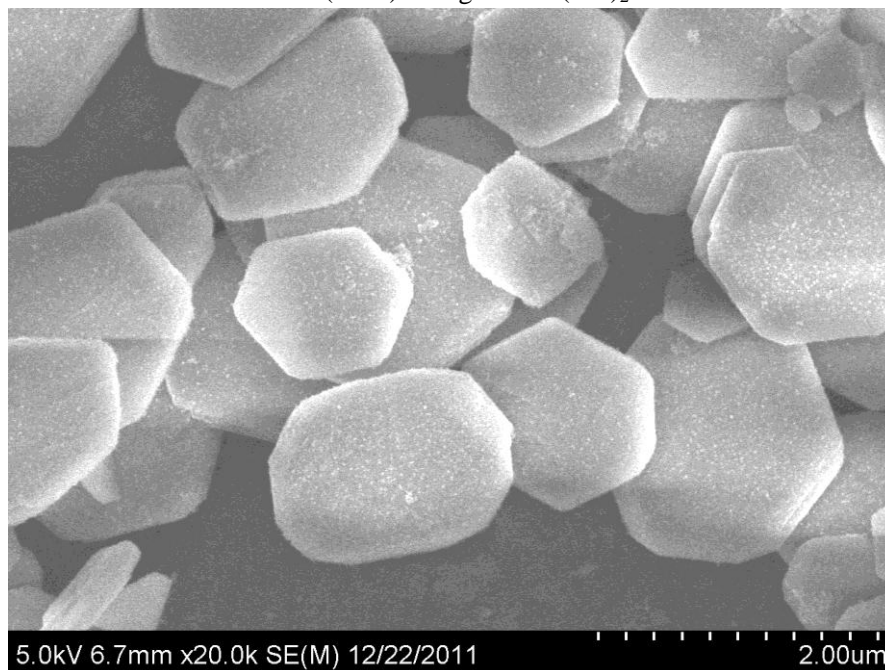


Figure S4. SEM image of the cobalt hydroxide prepared with reduced cobalt nitrate concentration (0.05 Mol/L) and ammonia solution at 70 °C for 1 hour.

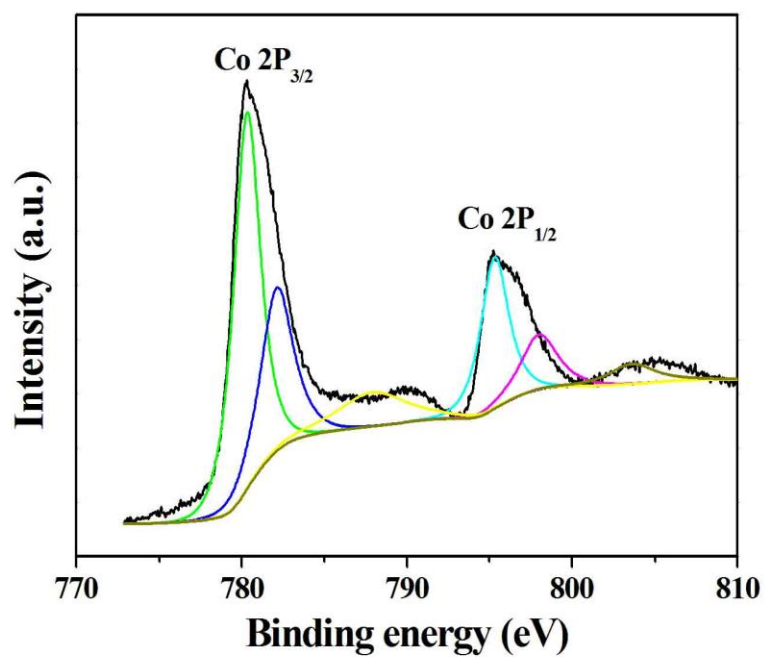


Figure S5. XPS spectrum of cobalt oxide prepared by annealing cobalt hydroxide using acetate salt. The Co 2p XPS spectra of the cobalt oxide exhibit two peaks at about 795 and 780 eV, corresponding to the Co 2p_{1/2} and Co 2p_{3/2} spin-orbit peaks of Co₃O₄.

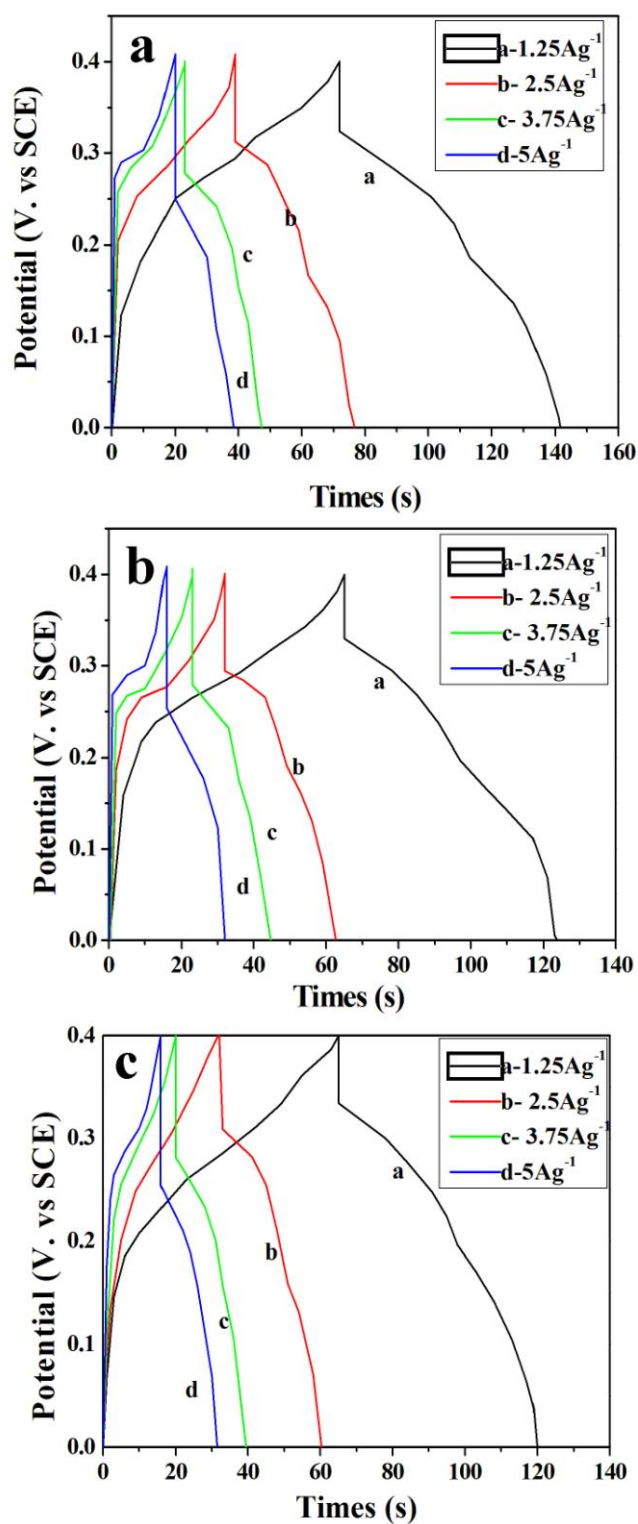


Figure S6 Discharge curves of for the Co_3O_4 samples fabricated with different cobalt salts, (a) nitrate, (b) chloride, and (c) acetate at different rates. The calculated specific capacitance values of the three samples prepared using nitrate, chloride and acetate are 218, 187 and 171 F g^{-1} at 1.25 A g^{-1} , respectively, consisting with these values calculated from CV curves.