Supplementary Information

Microwave-assisted rapid synthesis of mesoporous nanostructured $ZnCo_2O_4$ anode material for high-performance lithium-ion batteries

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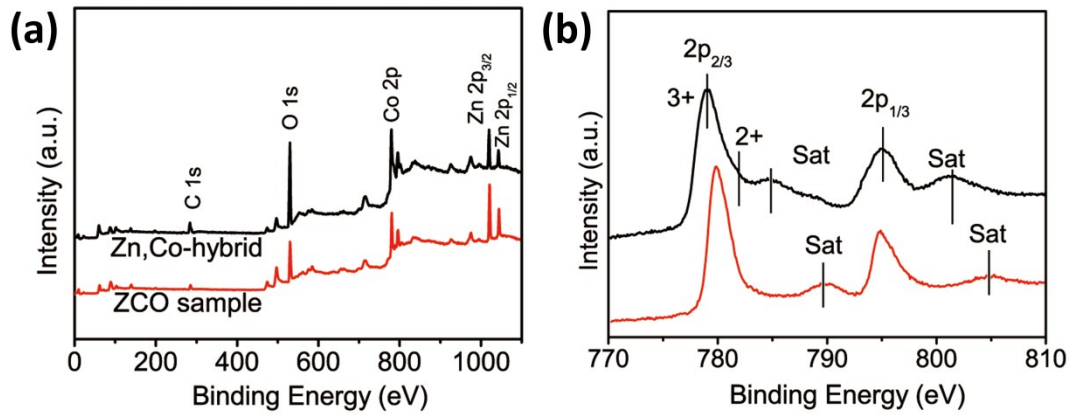

Fig. S1. (a) XPS spectra of the (Zn,Co)-organic hybrid precursor and the ZCO sample; (b) Co 2p XPS spectra of the (Zn,Co)-organic hybrid precursor and the ZCO sample.

As shown in Fig. S1a, XPS spectra indicate the presence of Zn, Co, and O in both (Zn,Co)-organic precursor and ZCO sample. From Fig. S1b, we can see that Co 2p spectrum of the ZCO sample has two major peaks with binding energy at 780.3 (Co $2p_{3/2}$) and 795.3 eV (Co $2p_{1/2}$) with a spin-orbit splitting of 15.0 V, which are accompanied by two weak shake-up satellite peaks at 790.0 and 805.0 eV; the energy gap between the Co 2p main peaks and the satellite peaks is about 9.7 eV. Different from Co 2p spectrum of the ZCO sample, the energy gap between Co 2p main peaks and the satellite peaks in the Co 2p spectrum of the (Zn,Co)-organic hybrid precursor is about 5.0 eV. Generally, if the energy gap is 9-10 eV, the Co cation valence is mainly assigned the value of +3. After refined fitting, the valence of Co ions in the ZCO sample is mainly +3, while some Co^{2+} ions exist in the (Zn,Co)-organic precursor.

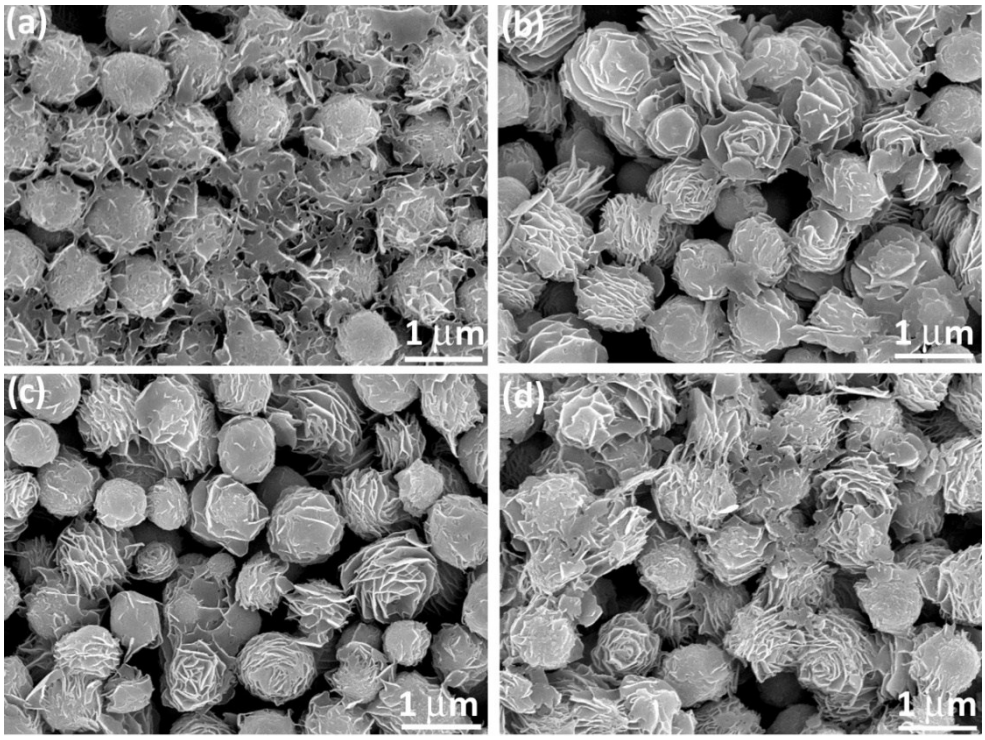

Fig. S2. SEM images of (Zn,Co)-organic precursor prepared under different reaction time: (a) 1 min, (b) 5 min, (c) 10 min, and (d) 20 min.

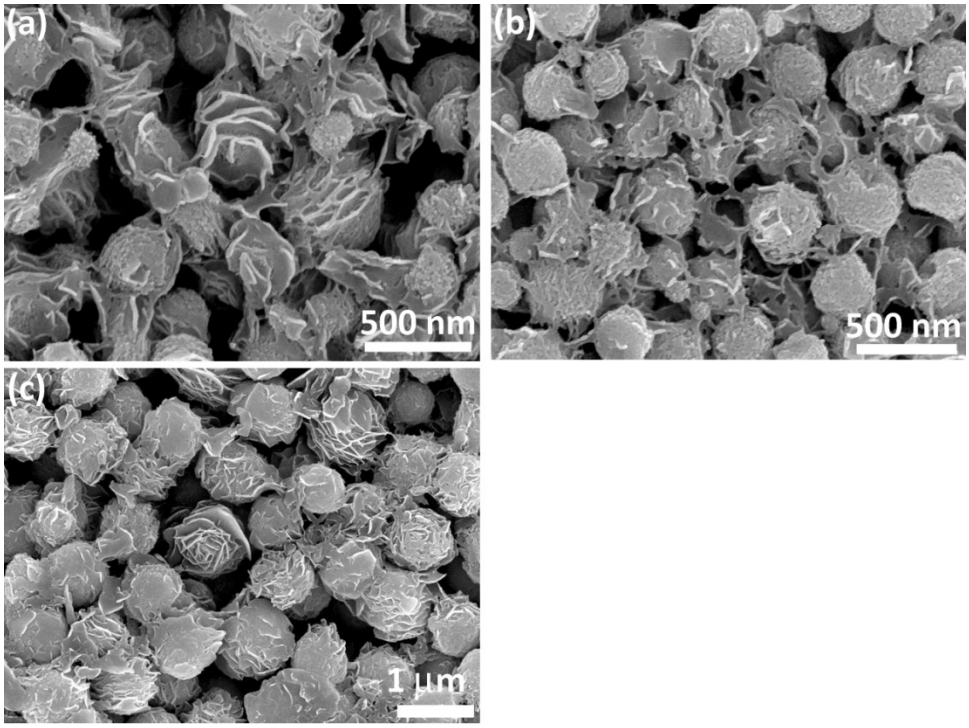

Fig. S3. SEM images of the (Zn,Co)-organic precursor prepared with different usage of H_2O (volume): (a) 200 μL, (b) 400 μL, and (c) 800 μL.

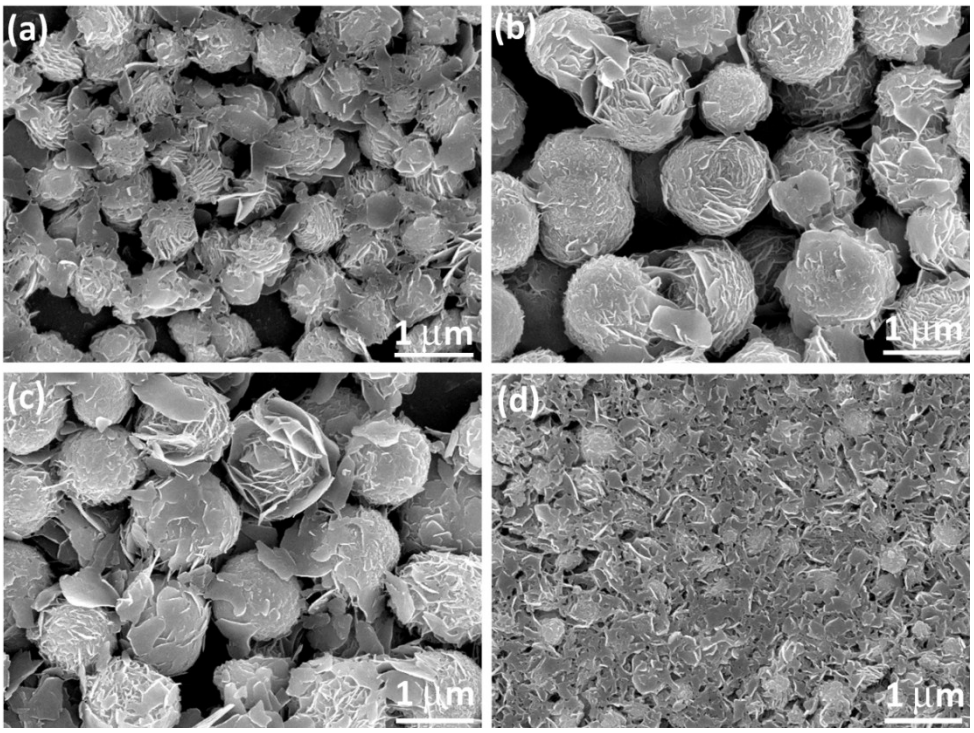

Fig. S4. SEM images of (Zn,Co)-organic precursor prepared with different usage of butylamine (volume): (a) 0 μL, (b) 25 μL, (c) 50 μL, and (d) 100 μL.

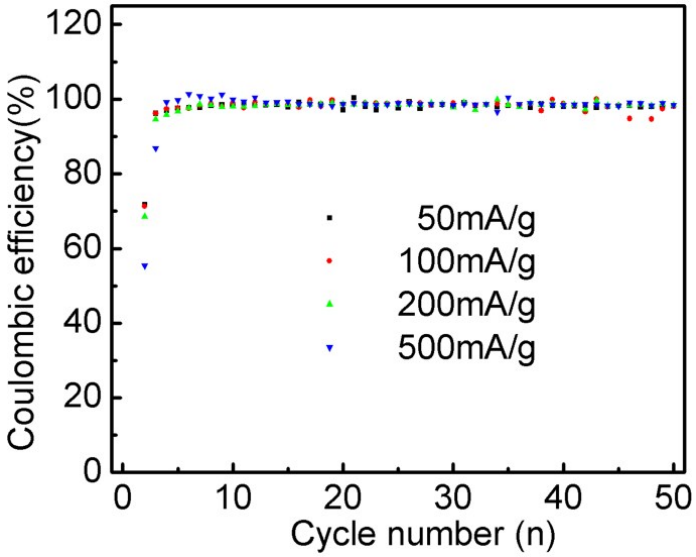

Fig. S5. Coulombic efficiency of the as-prepared ZCO electrode in the voltage range of 0.01–3.0 V at current densities from 50 to 500 mA g^{-1}.

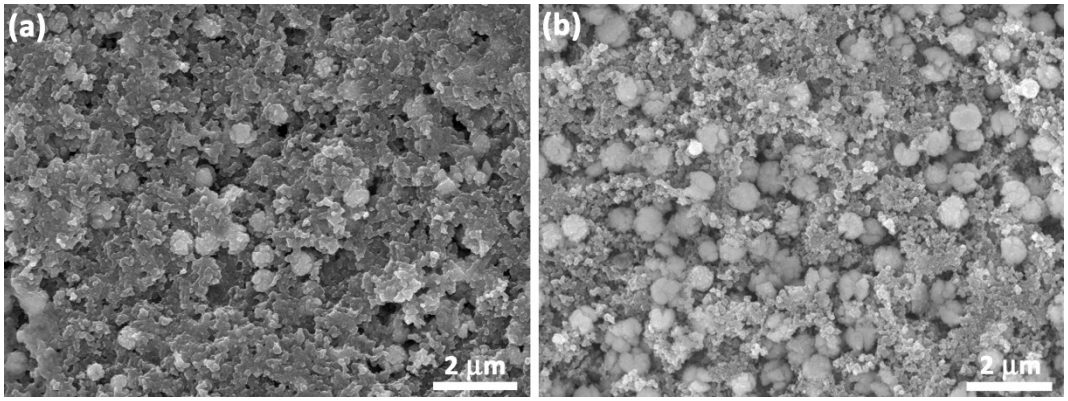

Fig. S6. SEM images of the ZCO electrode: (a) before and (b) after 50 charge/discharge cycles at a current density of 50 mA g^{-1}.