Electronic Supplementary Material (ESI) for RSC Advances.

Synthesis Flowers-like Co-doped $Ni(OH)_2$ Composite for High-performance Supercapacitors

Qi Wang, Suwen Liu,* Haiyan Sun and Qifang Lu

School of Material Science and Engineering, Qilu University of Technology, Jinan, 250353, P. R. China

*E-mail: liusw@qlu.edu.cn

Figure S1 The N_2 adsorption-desorption isotherm of the pure $Ni(OH)_2$.

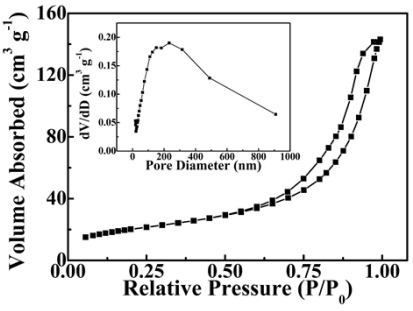


Figure S2 CV curves of the Co-doped $Ni(OH)_2$ composite electrodes using two-electrode at a scan rate of 50 mV s^{-1}.

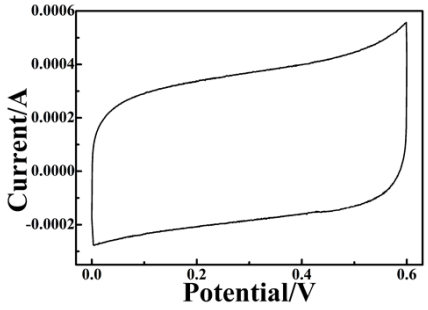


Table S1 Values of specific capacitance (F g^{-1}) of the Co-doped $Ni(OH)_2$ composite electrodes depending on cell type at a scan rate of 50 mV s^{-1}.

type	Values of specific capacitance (F g^{-1})
Three-electrode	677.3
Two-eletrode	149.7

Figure S3 Galvanostatic discharge curves of the Co-doped $Ni(OH)_2$ composite using two-electrode.

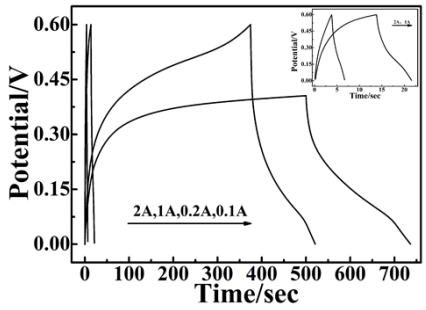
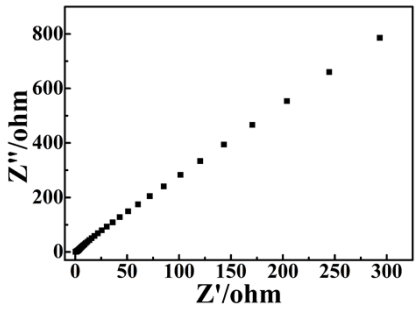


Figure S4 Nyquist plot of Co-doped $Ni(OH)_2$ composite using the 2-electrode.



It should be noted that a three-electrode cell is valuable for quickly determining material electrochemical characteristics whereas a two-electrode cell shows the physical configuration, internal voltages and charge transfer that occurs in a packaged supercapacitor and thus provides the best indication of an electrode performance for industrial applications.[1] Therefore we fabricate the two-electrode supercapacitor device of the Co-doped $Ni(OH)_2$ composite, measure the CV, galvanostatic charge-discharge curves and Nyquist plot (Figure S2, S3 and S4). CV curves of the Co-doped $Ni(OH)_2$ composite electrodes using two-electrode in Figure S2. From the figure we can see that the CV curve tends to be rectangular. Table S1 lists the specific capacitance calculated according to the CV curve, as measured with each cell type. As seen from the table, the specific capacitance calculated by the three-electrode cell yields values is approximately four times those of the two-electrode cell. From the Galvanostatic discharge curves (Figure S3), we can see that the curves of discharge is very steep compare with the curves using the three-electrode. There was not appear the arc in high frequency area, and the angle of the straight line and the z axis is small in low frequency area (Figure S4).

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■ REFERENCES

(1) Stoller, M. D.; Ruoff, R. S. Best practice methods for determining an electrode material's performance for ultracapacitors, *Energy Environ. Sci.* **2010**, 3, 1294.