Supporting Information

Ultra-high energy density supercapacitors based on metal-organic framework derived yolk-shell Cu-Co-P hollow nanospheres and $CuFeS_2$ nanosheet arrays

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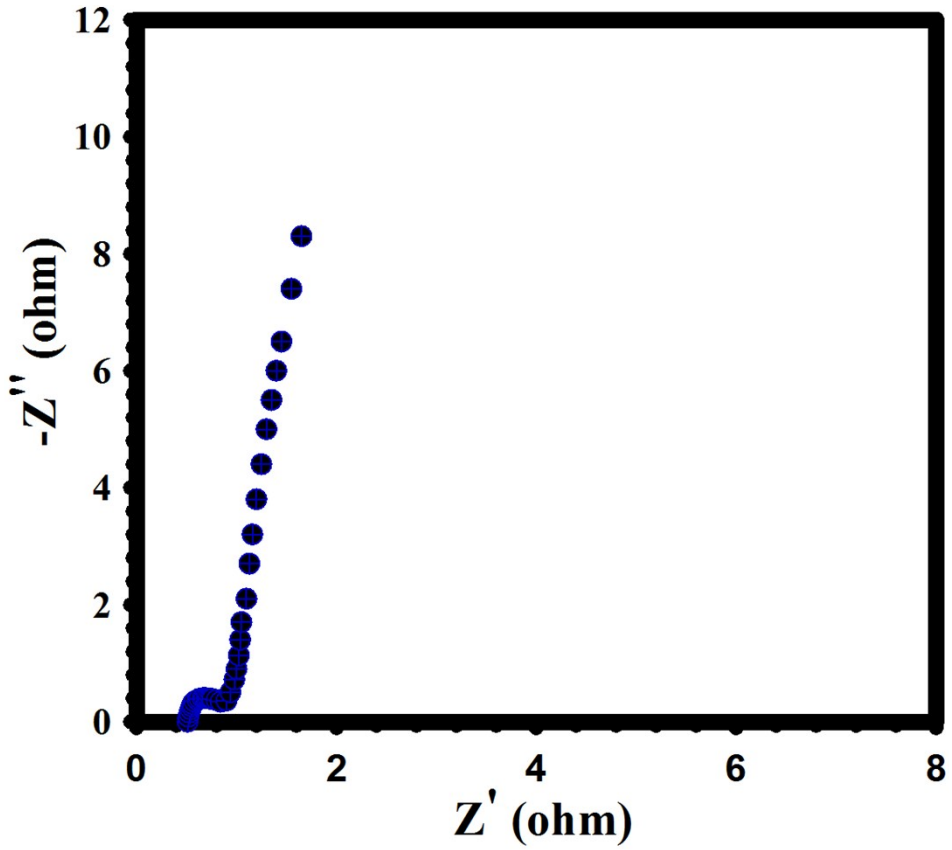

Fig. S1. Nyquist plot of the Y-CCP HN positive electrode.

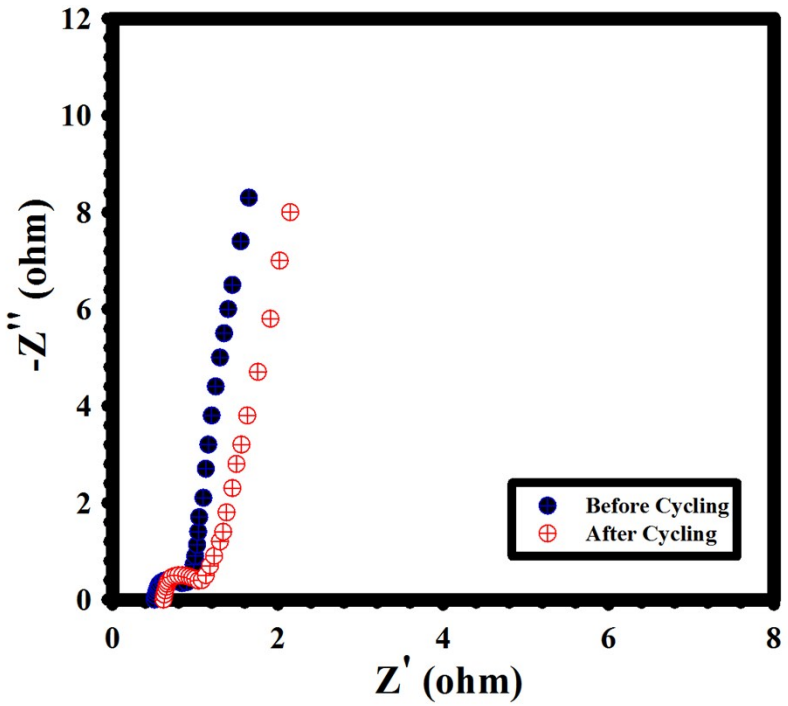

Fig. S2. Nyquist plots of the Y-CCP HN positive electrode before and after cycling test.

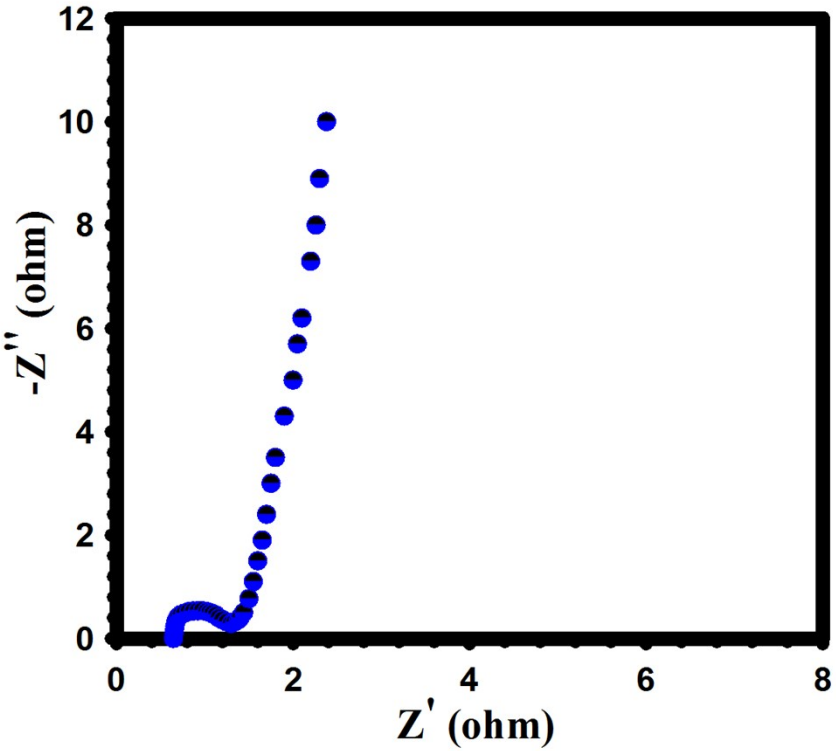

Fig. S3. Nyquist plot of the CFS NS negative electrode.

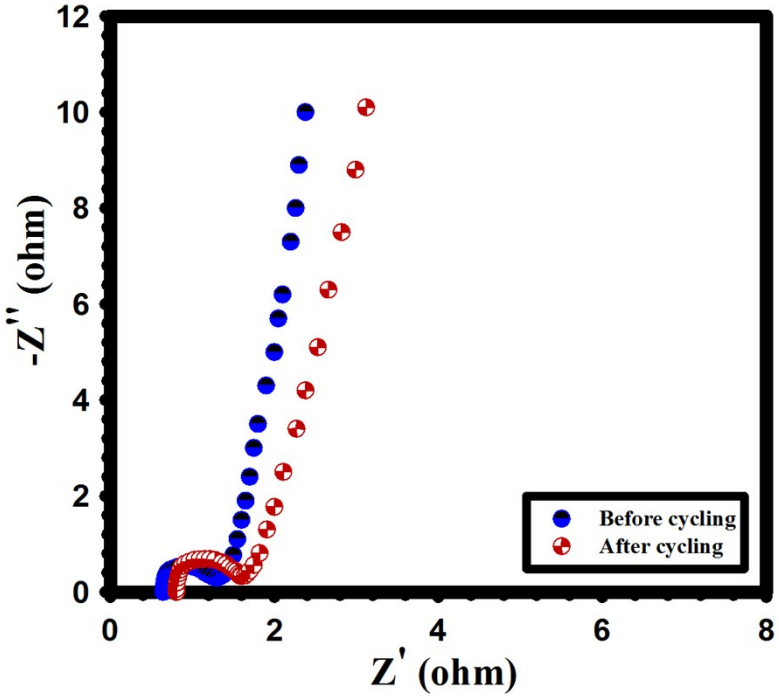

Fig. S4. Nyquist plots of the CFS NS negative electrode before and after cycling test.

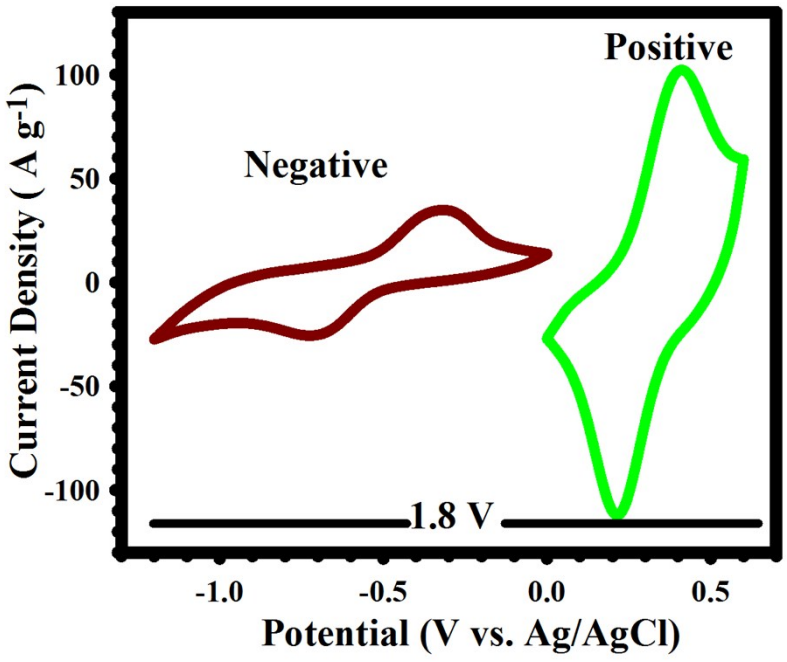

Fig. S5. CV plots of the CFS NS negative electrode and Y-CCP HN positive electrode at scan rate 50 mV s^{-1}.

Table S1. *Comparison of the electrochemical performance of positive electrode in three and two electrode systems with other previously reported electrodes.*

Composition	Capacity 3 and 2 electrodes (mAh g^{-1})	Cycles, retention 2 and 3 electrode	ED (W h kg^{-1}) 2 Electrode	Reference
NiCoP/Co $(OH)_2$	304 (3 E) 118.4 (2 E)	6000, 87% (2 E)	37	1
SDBS-$Ni_2Co_1PO_4$	191.6 (3 E) 48.3 (2 E)	2000, 77% (3 E) 2000, 76% (2 E)	36.5	2
Ni_2P-CNFs	145 (3 E)	6000, 88% (2 E)	42	3
NiCoP@NiCoP	312 (3 E)	2000, 71.8% (3 E)	34.8	4
(Co, Mn)-$NiSe_2$-dien/NF	288.6 (3 E) 57 (2 E)	10000, 84% (3 E)	50.9	5
α-NiS	235.88 (3 E) 136.88 (2 E)	2000, 87.1% (3 E)	46.8	6
$NiCoO_2$	190.4 (3 E) 11.3 (2 E)	3000, 98% (3 E) 1500, 70% (2 E)	36.1	7
Cu-Co-P Hollow Nanospheres	340.55 (3 E) 176.05 (2 E)	8000, 96.7 (3 E) 8000, 96.1 (2 E)	158.4	This work

References:

1 H. Wang, Y. Zhu, Q. Zong, Q. Wang, H. Yang and Q. Zhang, *Electrochim. Acta* 2019, **321**, 134746-134754.

2 X. Zhang, N. Shang, S. Gao, C. Wang, Y. Gao and Z. Wang, *Appl. Surf. Sci*. 2019, **483**, 529-535.

3 H. Peng, J. Zhou, Z. Chen, R. Zhao, J. Liang, F. Wang, G. Ma and Z. Lei, *J. Alloys Compd*. 2019, **797**, 1095-1105.

4 Y. Zhu, Q. Zong, Q. Zhang, H. Yang, Q. Wang and H. Wang, *Electrochim. Acta* 2019, **299**, 441-450.

5 H. Dan, K. Tao, Y. Hai, L. Liu and Y. Gong, *Nanoscale* 2019, **11**, 16810-16827.

6 Y. Tan, W.-D. Xue, Y. Zhang, D.-X. He, W.-J. Wang and R. Zhao *J. Alloys Compd*. 2019, **806**, 1068-1076.

7 J. H. Lin, H. Chen, M. M. Shuai, W. Z. Wu, Y. Wang, W. G. Zhang and Q. D. Ling, *Mater. Today Nano* 2019, **7**, 100046-100066.