Electronic Supplementary Material (ESI) for RSC Advances.


# Support Information

## Interconnected CuS nanowalls with rough surfaces grown on nickel foam as high-performance electrodes for supercapacitors

Yan Zhang,[a] Jie Xu,[a]* Yayun Zheng,[a] Xiaoyang Hu,[b] Yuanyuan Shang,[a] Yingjiu Zhang[a]*

[a] School of Physical Engineering and Key Laboratory of Material Physics, Ministry of Education，Zhengzhou University, NO. 75, Daxue Road, Zhengzhou 450052, China

[b] Department of Science of College, Henan Institute of Engineering, NO. 1, Longhuxianghe Road, Zhengzhou 451191, China

* *E-mail address*: xujie@zzu.edu.cn; zhangyj2006@zzu.edu.cn

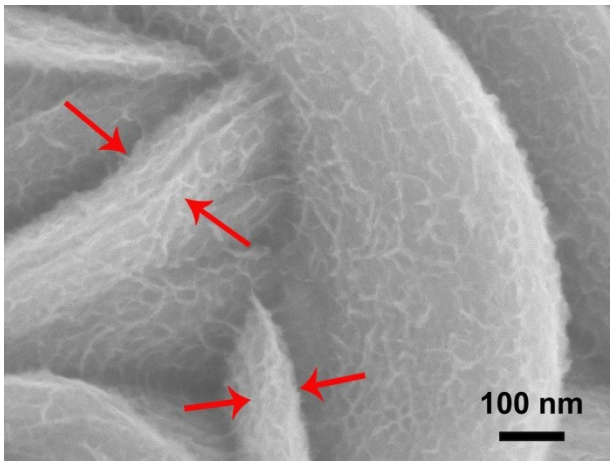


**Fig. S1** High magnification SEM image of RCuS on the Ni foam substrate.

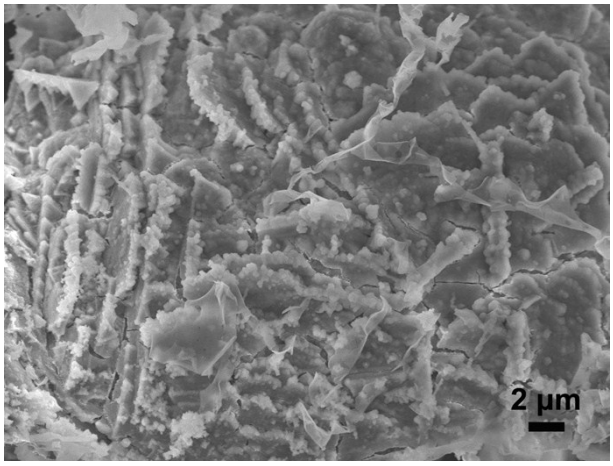


**Fig. S2** High magnification SEM image of HCuS on the Ni foam substrate.

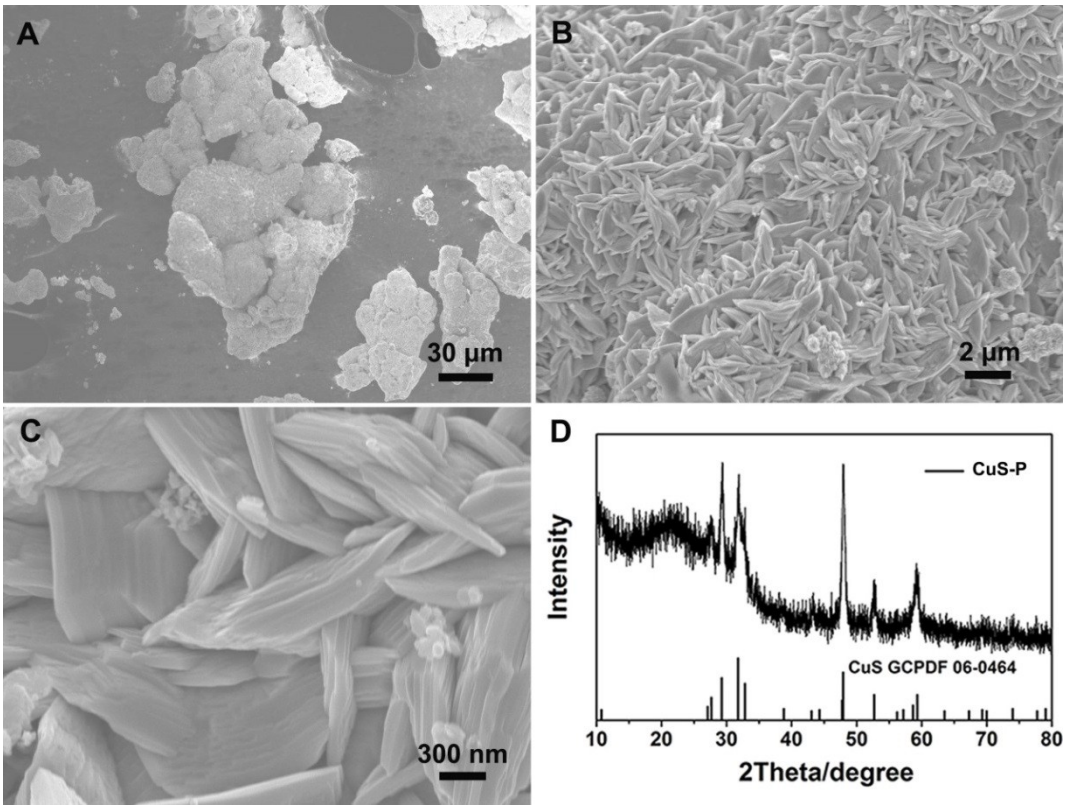


**Fig. S3** (A-C) SEM images of CuS-P in different magnifications. (D) The XRD pattern of the CuS-P.

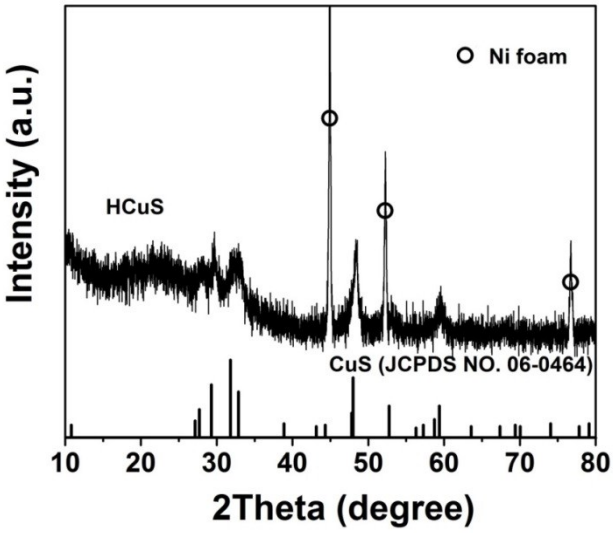


**Fig. S4** The XRD pattern of HCuS.

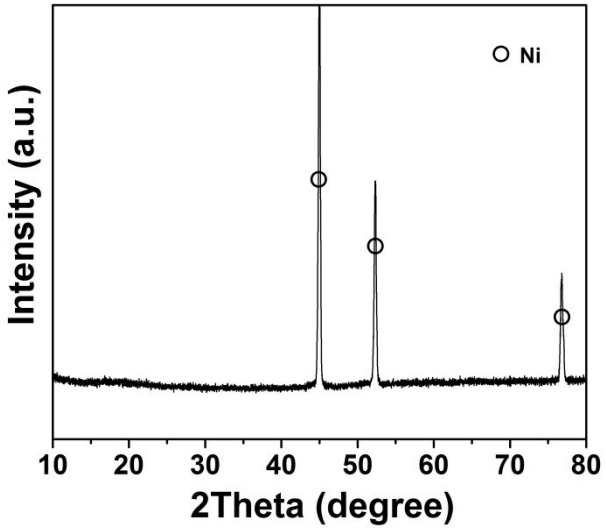


**Fig. S5** The XRD pattern of product obtained from the similar hydrothermal process of RCuS with the addition of the fresh Ni foam and sulfur powder

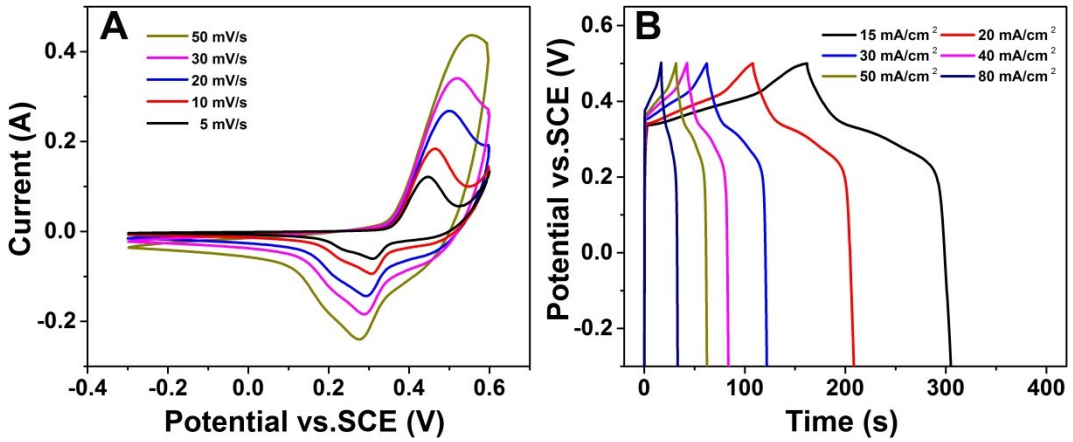


**Fig. S6** (A) CV curves of the RCuS electrode at various scan rate. (B) galvanostatic charge-discharge curves of the RCuS electrode at various current densities.

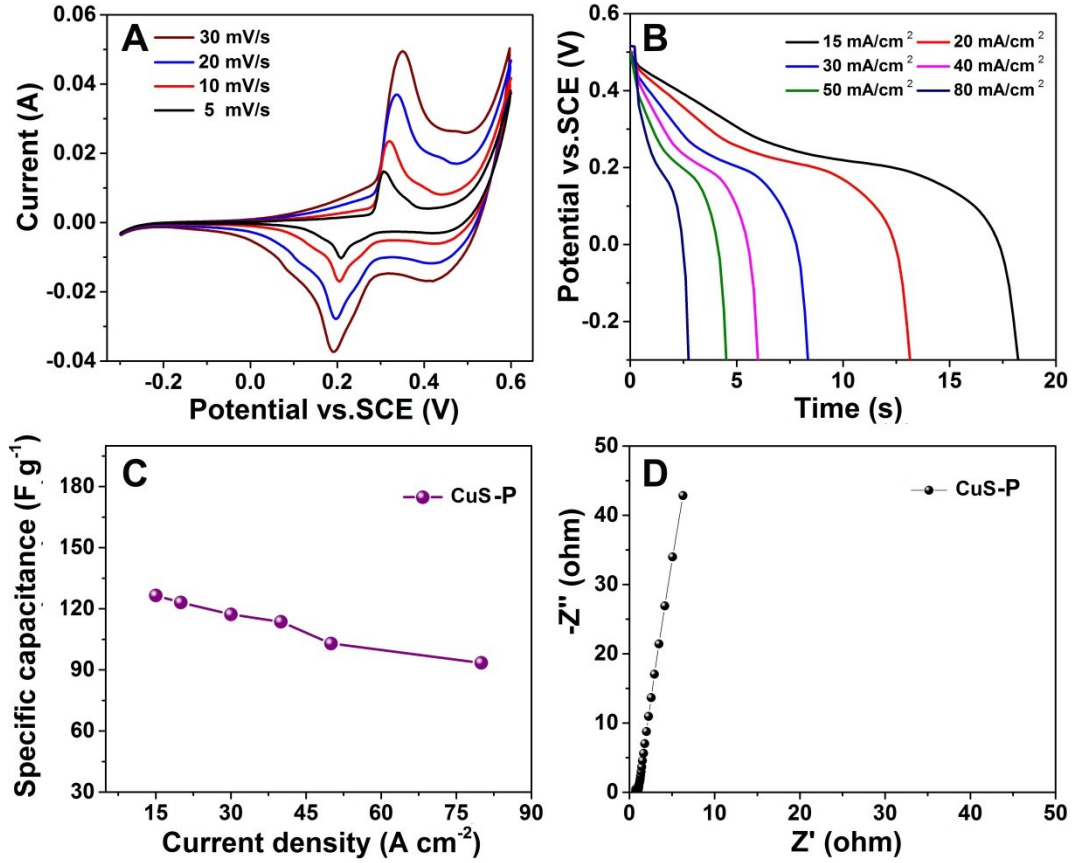


**Fig. S7** Electrochemical characterizations of the CuS-P electrode: (A) CV curves at various scan rates ranging from 5 to 30 mV $s^{-1}$. (B) Charge and discharge voltage profiles at various current densities ranging from 15 to 80 mA $cm^{-2}$. (C) The specific capacitance as a function of current density. (D) Nyquist plots of CuS-P nanoplatelets.

**Table S1** Comparison of the electrochemical performance of the RCuS and other CuS electrode materials reported in previous literatures.

| Sample | Voltage window | Specific capacitance | Electrolyte | Preparation method | Reference |
|---|---|---|---|---|---|
| CuS nanowire arrays on Cu foil | 0.5 V | 305 F $g^{-1}$ at 0.6 mA $cm^{-2}$ | 1 M NaOH | Wet-chemical process | [1] |
| CuS nanoplatelets | 0.7 V | 30 F $g^{-1}$ at 3 A $g^{-1}$ | 1 M $LiClO_4$ | Chemical bath deposition | [2] |
| CuS nanoparticles | 0.9 V | 101 F $g^{-1}$ at 1.5 mA $cm^{-2}$ | 1 M NaOH | One-pot hydrothermal method | [3] |
| CuS nanosheets | 0.6 V | 833.3 F $g^{-1}$ at 1 A $g^{-1}$ | 6 M KOH | One-step solvothermal method | [4] |
| CuS nanocrystals | 1.2 V | 346.57 F $g^{-1}$ at 5 A $g^{-1}$ | 2 M KOH | Liquid phase synthesis | [5] |
| CuS nanosheet | 0.6 V | 920 F $g^{-1}$ at 1 A $g^{-1}$ | 2 M KOH | Solvothermal method | [6] |
| CuS microspheres | 1 V | 212 F $g^{-1}$ at 1 A $g^{-1}$ | 1 M KCl | Solvothermal method | [7] |
| CuS nanosheets | 0.6 V | 925.1 F $g^{-1}$ at 1 A $g^{-1}$ | 6 M KOH | One-step hydrothermal method | [8] |
| CuS hollow spheres | 0.6 V | 917.6 F $g^{-1}$ at 1 A $g^{-1}$ | 6 M KOH | Solvothermal method | [9] |
| CuS nanosheets on Ni foam | 0.8 V | 1124 F $g^{-1}$ at 15 mA $cm^{-2}$ | 2 M KOH | Hydrothermal method | Present work |

## References


[1] Y. K. Hsu, Y. C. Chen and Y. G. Lin, *Electrochim. Acta*, 2014, **139**, 401-407.

[2] C. J. Raj, B. C. Kim, W. J. Cho, W. G. Lee, Y. S. Seo and K. H. Yu, *J. Alloy. Compd.*, 2014, **586**, 191-196.

[3] K. Krishnamoorthy, A. N. Rao and A. N. Rao, *Mater. Res. Express*, 2014, **1**, 035006.

[4] K. J. Huang, J. Z. Zhang and Y. Fan, *J. Alloy. Compd.* 2015, **625**, 158-163.

[5] Y. Wang, F. Y. Liu, Y. Ji and X. D. Zhao, *Dalton Trans.*, 2015, **44**, 10431-10437.

[6] K. J. Huang, J. Z. Zhang and Y. M. Liu, *J. Alloy. Compd.*, 2015, **641** 119-126.

[7] H. Peng, G. F. Ma and Z. Q. Lei, *J. Mater. Chem. A*, 2014, **2**, 3303-3307.

[8] K. J. Huang, J. Z. Zhang and K. Xing, *Electrochim. Acta*, 2014, **149**, 28-33.

[9] K. J, Huang, J. Z. Zhang, Y. Liu and Y. M. Liu, *Int. J. Hydrogen Energy*, 2015, **40** 10158-10167.