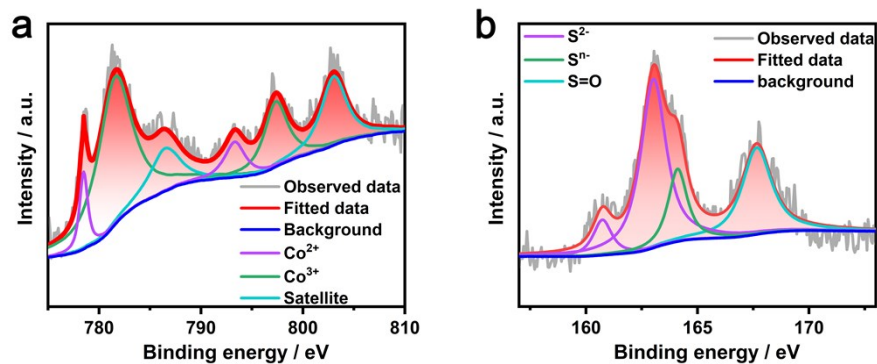


## **Supplementary Information**

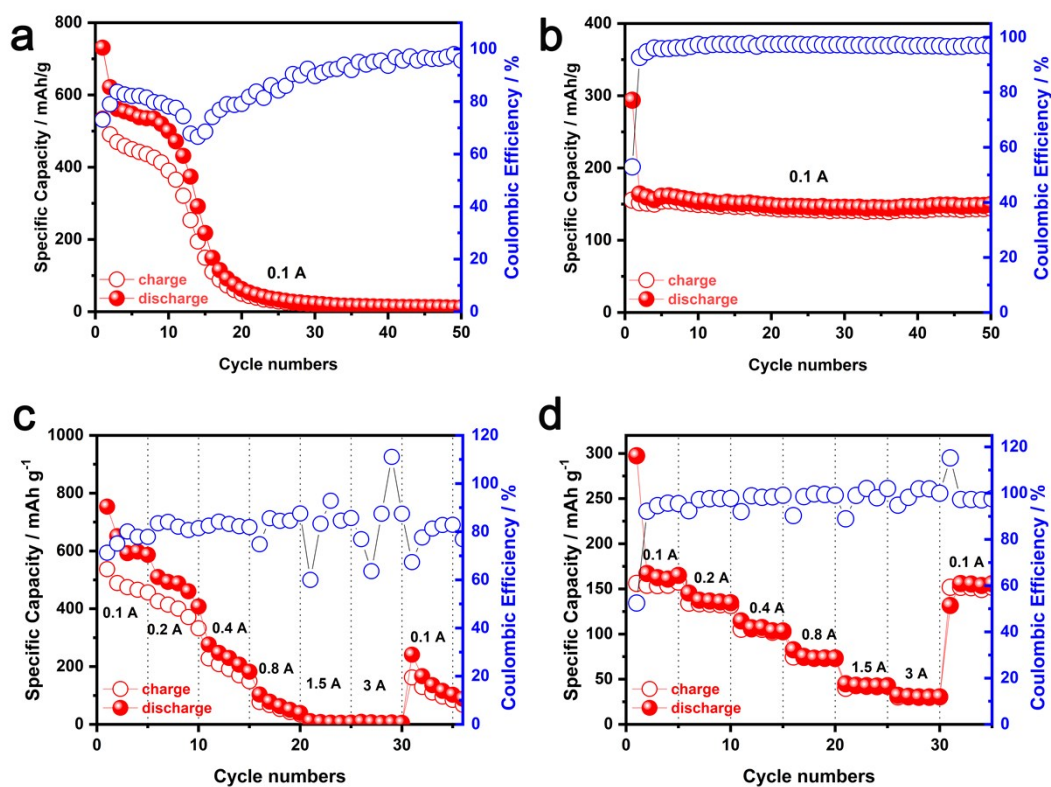
### **Co<sub>9</sub>S<sub>8</sub>@carbon Nanofiber as the High-Performance Anode for Potassium-ion Storage**

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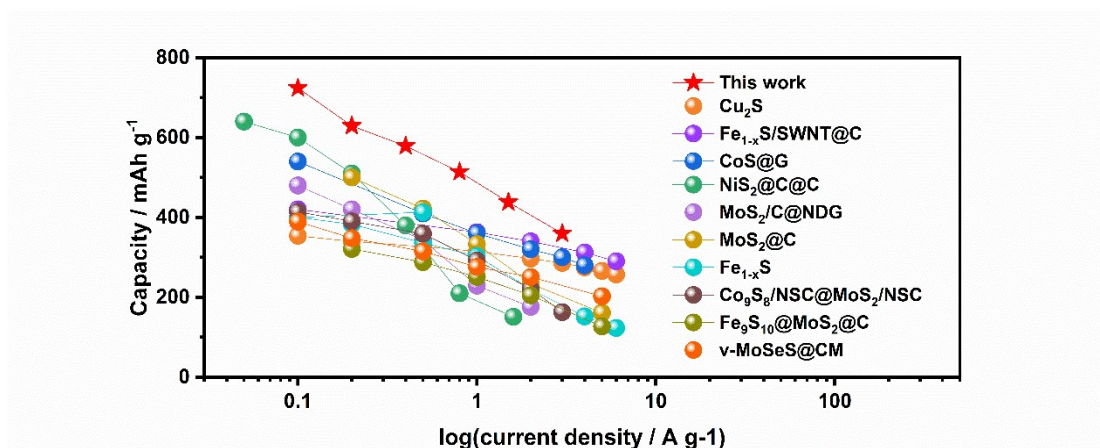
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**Figure S1.** XPS spectrum of the as-prepared Co<sub>9</sub>S<sub>8</sub>@carbon nanofiber: (a) survey; (b)Co 2p; (c)S 2p.



**Figure S2.** (c) cycling performance at 0.1 A g<sup>-1</sup> of (a) Co<sub>9</sub>S<sub>8</sub>; (b) carbon nanofiber; rate performance at different current densities from 0.1 to 3 A g<sup>-1</sup> of (c) Co<sub>9</sub>S<sub>8</sub>; (d) carbon nanofiber.



**Figure S3. Comparison of rate capacities between  $\text{Co}_9\text{S}_8$ @carbon nanofiber and as-reported transition metal sulfide anodes for PIBs<sup>[1-10]</sup>.**

### References

1. Peng Q, Zhang S, Yang H, et al. Boosting potassium storage performance of the  $\text{Cu}_2\text{S}$  anode via morphology engineering and electrolyte chemistry. *ACS nano*, 2020, 14(5): 6024-6033.
2. Zhao Y, Shi X, Ong S J H, et al. Enhancing the Charge Transportation Ability of Yolk–Shell Structure for High-Rate Sodium and Potassium Storage. *ACS nano*, 2020, 14(4): 4463-4474.
3. Gao H, Zhou T, Zheng Y, et al. CoS quantum dot nanoclusters for high-energy potassium-ion batteries. *Advanced Functional Materials*, 2017, 27(43): 1702634.
4. Yang L, Hong W, Zhang Y, et al. Hierarchical  $\text{NiS}_2$  modified with bifunctional carbon for enhanced potassium-ion storage. *Advanced Functional Materials*, 2019, 29(50): 1903454.
5. Zhang J, Cui P, Gu Y, et al. Encapsulating Carbon-Coated  $\text{MoS}_2$  Nanosheets within a Nitrogen-Doped Graphene Network for High-Performance Potassium-Ion Storage. *Advanced Materials Interfaces*, 2019, 6(22): 1901066.
6. Zhang C, Wang F, Han F, et al. Improved Electrochemical Performance of Sodium/Potassium-Ion Batteries in Ether-Based Electrolyte: Cases Study of  $\text{MoS}_2$ @C and  $\text{Fe}_7\text{S}_8$ @C Anodes. *Advanced Materials Interfaces*, 2020, 7(13): 2000486.
7. Xu Y, Bahmani F, Wei R. Pyrrhotite  $\text{Fe}_{1-x}\text{S}$  microcubes as a new anode material in potassium-ion batteries. *Microsystems & Nanoengineering*, 2020, 6(1): 1-10.

8. Yang C, Feng J, Zhang Y, et al. Multidimensional Integrated Chalcogenides Nanoarchitecture Achieves Highly Stable and Ultrafast Potassium-Ion Storage. *Small*, 2019, 15(44): 1903720.
9. Zhang C, Han F, Wang F, et al. Improving compactness and reaction kinetics of  $\text{MoS}_2@ \text{C}$  anodes by introducing  $\text{Fe}_9\text{S}_{10}$  core for superior volumetric sodium/potassium storage. *Energy Storage Materials*, 2020, 24: 208-219.
10. Tian Z, Chui N, Lian R, et al. Dual anionic vacancies on carbon nanofiber threaded  $\text{MoSSe}$  arrays: A free-standing anode for high-performance potassium-ion storage. *Energy Storage Materials*, 2020, 27: 591-598.