

Supporting Information for

## **Cobalt Sulfide Confined in N-doped Porous Branched Carbon Nanotube for Lithium-Ion Batteries**

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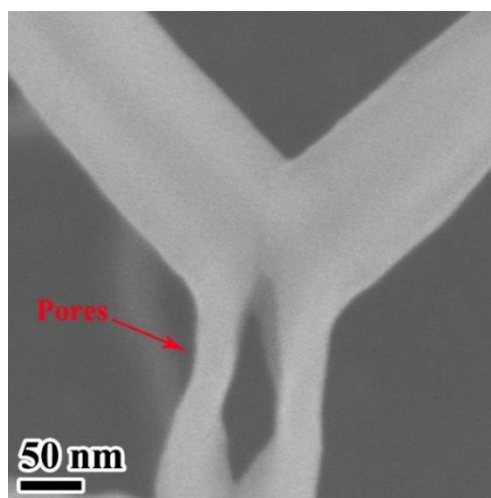
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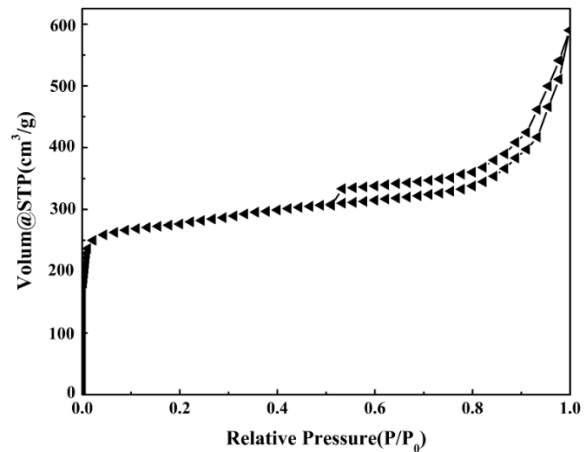
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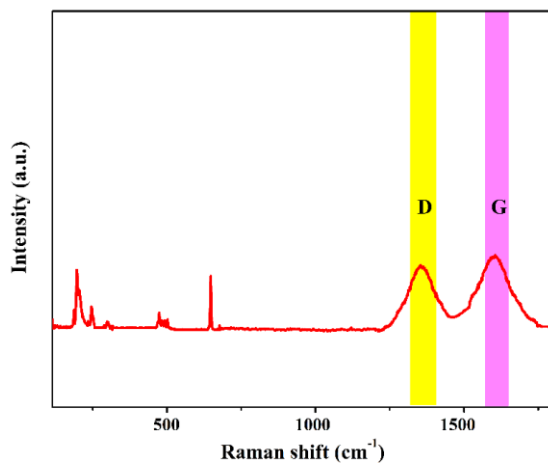
### **Supplementary Figures and Table**



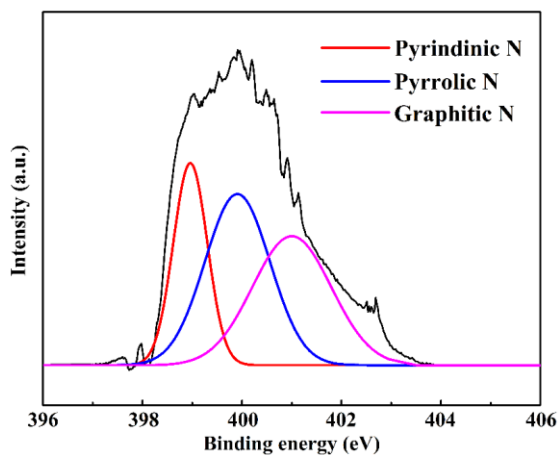
**Fig. S1** High-magnification SEM image of Co<sub>9</sub>S<sub>8</sub>@NBNT



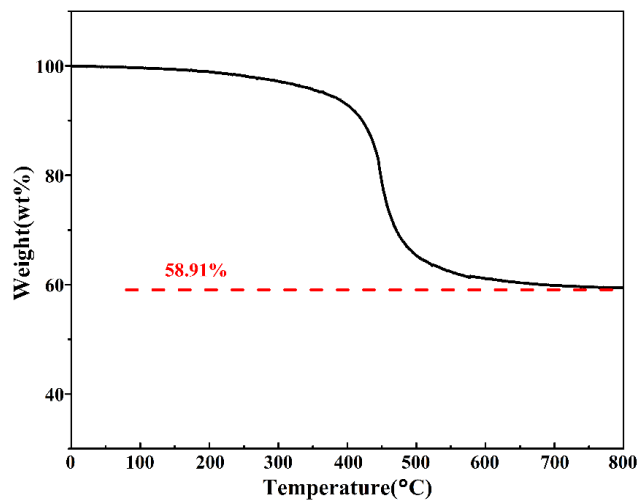
**Fig. S2** N<sub>2</sub> sorption isotherms of Co<sub>9</sub>S<sub>8</sub>@NBNT



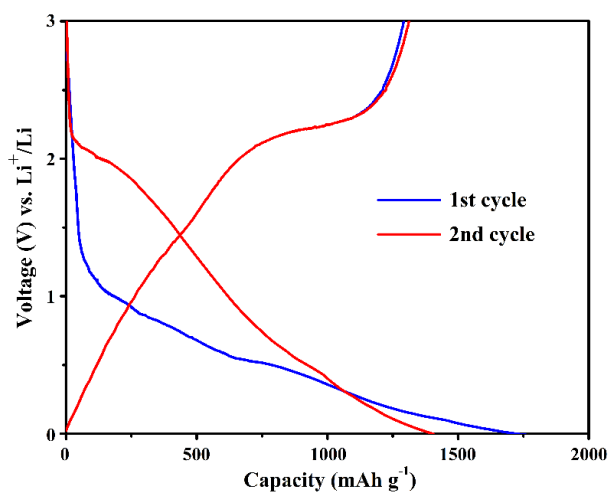
**Fig. S3** Raman spectra of the Co<sub>9</sub>S<sub>8</sub>@NBNT. Besides the D, and G bands, corresponding to the NBNT, there are new peaks corresponding to the Co<sub>9</sub>S<sub>8</sub>



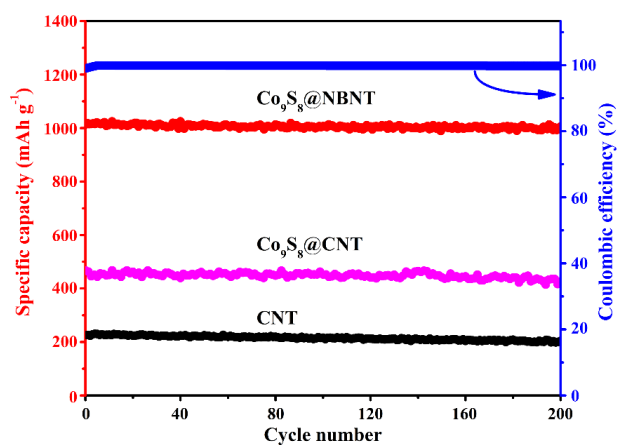
**Fig. S4** High-resolution XPS N 1s spectrum of Co<sub>9</sub>S<sub>8</sub>@NBNT



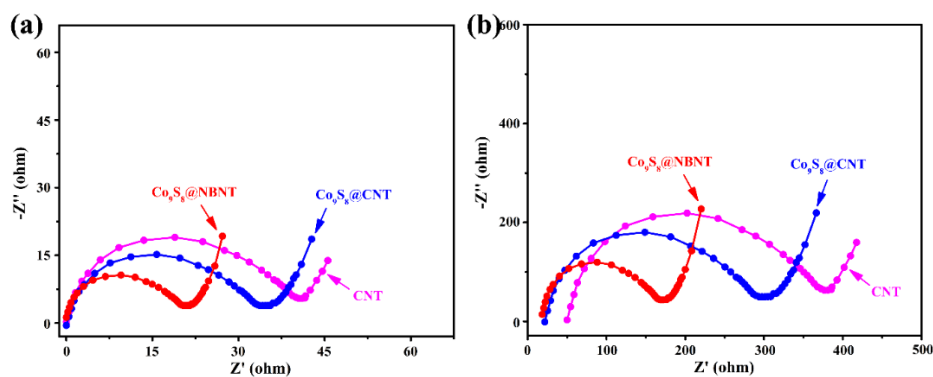
**Fig. S5** TGA curve of Co<sub>9</sub>S<sub>8</sub>@NBNT



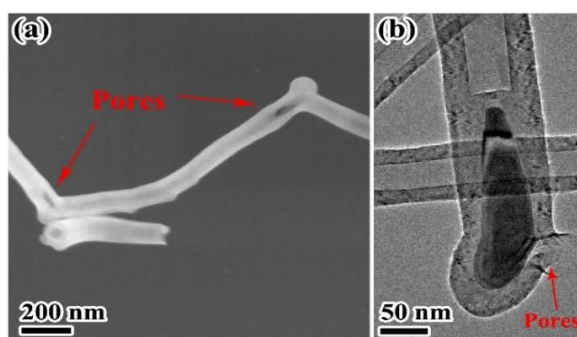
**Fig. S6** Charge-discharge voltage profiles at 0.1 A g<sup>-1</sup> of Co<sub>9</sub>S<sub>8</sub>@NBNT



**Fig. S7** Comparison of cycle stability at 500 mA g<sup>-1</sup> of the obtained samples



**Fig. S8** Nyquist plots of  $\text{Co}_9\text{S}_8@\text{NBNT}$ ,  $\text{Co}_9\text{S}_8@\text{CNT}$ , and CNT samples **a** before and **b** after cycling test



**Fig. S9** **a** High-magnification SEM and **b** HRTEM images of  $\text{Co}_9\text{S}_8@\text{NBNT}$  after 200th cycles

**Table S1** | Different carbon materials employed in cathodes for LIBs

Materials	Initial capacity (mAh g <sup>-1</sup> )	Reversible specific capacity	References
N-C-800	3487	2132 mAh g <sup>-1</sup> at 100 mA g <sup>-1</sup> after 500 cycles	[S1]
CNT-on-OCNT-Fe	985	784 mAh g <sup>-1</sup> at 100 mA g <sup>-1</sup> after 200 cycles	[S2]
HN-CNT	730	397 mAh g <sup>-1</sup> at 100 mA g <sup>-1</sup> after 100 cycles	[S3]
Sn/Sn <sub>4</sub> P <sub>3</sub> @C	1332	589 mAh g <sup>-1</sup> at 1000 mA g <sup>-1</sup> after 700 cycles	[S4]
CuO/Cu <sub>2</sub> O/C	381	260 mAh g <sup>-1</sup> at 200 mA g <sup>-1</sup> after 600 cycles	[S5]
Si@C@MoS <sub>2</sub>	2079.3	1365.7 mAh g <sup>-1</sup> at 500 mA g <sup>-1</sup> after 500 cycles	[S6]
CoSe/NC-L	530	424 mAh g <sup>-1</sup> at 500 mA g <sup>-1</sup> after 150 cycles	[S7]
WS <sub>2</sub> @C	730	638 mAh g <sup>-1</sup> at 500 mA g <sup>-1</sup> after 45 cycles	[S8]
pSiMS@C	1665	1027.8 mAh g <sup>-1</sup> at 1000 mA g <sup>-1</sup> after 500 cycles	[S9]
Our work	1310	1109 mAh g <sup>-1</sup> at 500 mA g <sup>-1</sup> after 200 cycles	

## Supplementary References

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