

Supporting Information

Ni_{1-x}Zn_xS/Ni Foam Composite Electrode with Multi-layers: One-step Synthesis and High Supercapacitor Performance

*Xiaobing Wang, Jin Hao, Yichang Su, Fanggang Liu, Jian An, Jianshe Lian**

In order to confirm the key role of Zn element in fabricating NZS-2h multi-layers structure, pure Ni₃S₂ growth on Ni foam were synthesized using the same method (hydrothermal synthesis at 453 K with heating for 2h) without adding Zn(NO₃)₂, and the structure characteristics were shown in Figure S1. It is clearly to see that numerous uniform nanoparticles grown on the outer-surface of Ni₃S₂, the size of these particles distributed in the region of 50-100nm. The morphology shows big difference with NZS-2h, thus demonstrates that Zn element is an essential factor in constructing multi-layers structure.

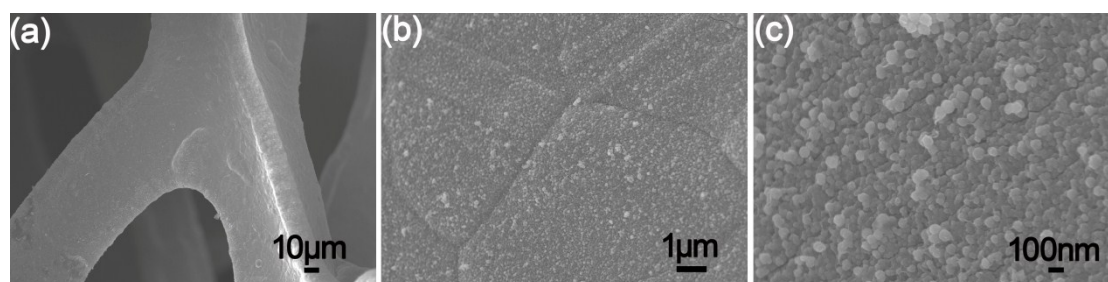


Figure S1. FESEM images of Ni₃S₂.

To identify the capacitive performance of bare Ni foam for comparison purpose, CV curves of bare Ni foam compared with other Ni_{1-x}Zn_xS/Ni foam samples have been provided in Fig. S2a. Compared with Ni₃S₂/Ni foam, NZS-0.5h, NZS-2h and NZS-4h electrodes, a much lower hysteresis loop area for bare Ni foam indicates its negligible capacitance. For comparing the effect of hydrothermal time and clarifying the roles of Zn element, rate capability tests of Ni₃S₂/Ni foam, NZS-0.5h and NZS-4h electrodes were also measured, the corresponding results can be seen in Figure S2b, c and d. There are similar galvanostatic charge–discharge curves measured from 0 to 0.6 V over a wide range of current densities (1, 2, 5, 10, 20, 50, 100 and 200 A g⁻¹). A non-linear profile with obvious potential plateaus appeared in the charge–

discharge curves which endorse the redox behavior, implying all the $\text{Ni}_3\text{S}_2/\text{Ni}$ foam, NZS-0.5h and NZS-4h electrodes possess strong pseudocapacitive characteristics.

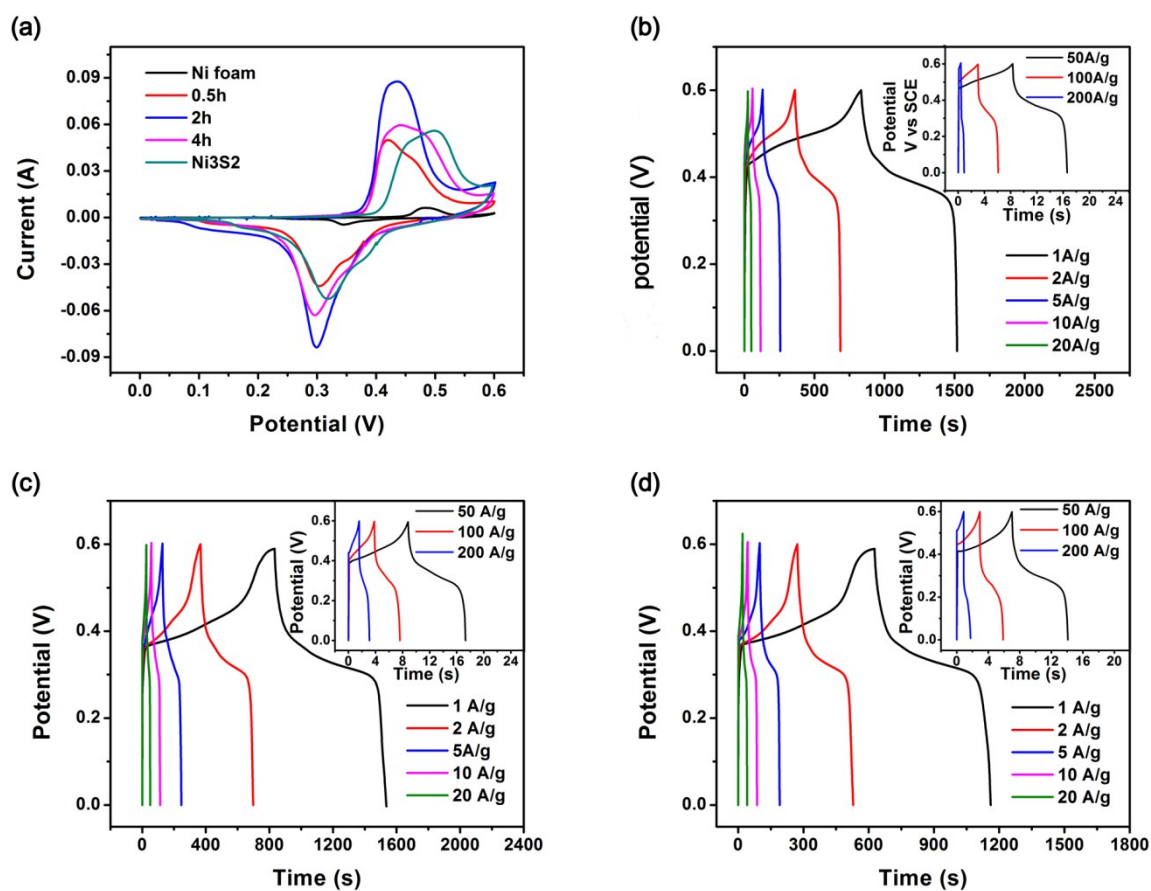


Figure S2. (a) Cyclic voltammetry (CV) (scan rate: 10 mV s^{-1}) of $\text{Ni}_3\text{S}_2/\text{Ni}$ foam, bare Ni foam and various hydrothermal-time based NZS supercapacitor electrodes. Rate performance curves of (b) $\text{Ni}_3\text{S}_2/\text{Ni}$ foam, (c) NZS-0.5h and (d) NZS-4h electrodes.