Supplementary Information

Hollow cubic double layer structured Cu$_7$S$_4$/NiS nanocomposites for high-performance supercapacitors

Information of materials and reagents used in this paper

Copper sulfate (CuSO$_4$·5H$_2$O, 99.0%), sodium hydroxide (NaOH, 96.0%), polyvinyl pyrrolidone ((C$_6$H$_9$NO)$_n$, PVP, K30), ascorbic acid (C$_6$H$_8$O$_6$, AA, 99.7%), nickel chloride (NiCl$_2$·6H$_2$O, 96.0%), sodium sulfide (Na$_2$S·9H$_2$O, 98.0%), ethanol (C$_2$H$_5$OH, 99.7%), polyvinylidene fluoride (PVDF), carbon black. All chemicals were used as received without any further purification.

Fig. S1. XRD pattern of (a) C-150 (Cu$_2$O synthesized by 1.5 M NaOH); (b) CNOH-150 (Cu$_2$O/Ni(OH)$_2$ synthesized by C-150); (c) CS-150 (Cu$_7$S$_4$ synthesized by 1.5 M NaOH); (d) CNS-150 (Cu$_7$S$_4$/NiS synthesized by C-150).
Fig. S2. SEM image of the sample CNS-300 (Cu$_7$S$_4$/NiS synthesized by C-300)

Fig. S3. FESEM image of (a) C-150 (Cu$_2$O synthesized by 1.5 M NaOH); (b) CNOH-150 (Cu$_2$O/Ni(OH)$_2$ synthesized by C-150); (c) CS-150 (Cu$_7$S$_4$ synthesized by 1.5M NaOH); (d) CNS-150(Cu$_7$S$_4$/NiS synthesized by C-150).
**Fig. S4** Sample CS-150 for (a) Cyclic Voltammograms (CV) curves from 0 to 0.5 V at the scan rate between 5 and 60 mV s$^{-1}$; (b) galvanostatic charge/discharge curves at different current densities ranged from 1 to 20 A g$^{-1}$; (c) average specific capacitance of the sample at various current rates; (d) cycling performance of the sample at a current rate of 4 A g$^{-1}$.

**Fig. S5** (a) CV curves at scan rate 10 mV s$^{-1}$, and (b) Nyquist plots, of a CNS-025 electrode before and after 1000 charge/discharge cycles.