Self-supported hierarchical core-shell Co₉S₈@NiCo₂O₄ hollow nanoneedle arrays for asymmetric supercapacitors

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**Fig. S1** SEM images of pure Co$_9$S$_8$ hollow nononeedles.

**Fig. S2** TEM images of pure Co$_9$S$_8$ hollow nononeedles
**Fig. S3** Elemental mapping images of Co-L(blue), Co-K(green), Ni(purple), O(orange), S(yellow) in Co$_9$S$_8$@NiCo$_2$O$_4$ core-shell nanoneedles.

**Fig. S4** N$_2$ adsorption–desorption isotherms for the hybrid Co$_9$S$_8$@NiCo$_2$O$_4$ core-shell nanoneedles.
**Fig. S5** SEM image of the Co₉S₈@NiCo₂O₄ core-shell nanoneedles after charging and discharging for 6000 cycles.

**Fig. S6** (a) CV curves of pure NiCo₂O₄ electrode at various scan rate; (b) GCD curves of pure NiCo₂O₄ electrode at different current densities.