Electronic Supplementary Material

Facile Synthesis of Ultrathin NiCo₂S₄ Nano-petals Inspired by Blooming Buds for High-Performance Supercapacitors

Yuxiang Wen,^a Shanglong Peng,^{*a} Zilei Wang,^a Jiaxin Hao,^a Tianfeng Qin,^a Shuqi Lu,^a Jiachi Zhang,^a Deyan He,^a Xiaoyan Fan,^c Guozhong Cao^{*b}

^aKey Laboratory for Magnetism and Magnetic Materials of the Ministry of Education, School of Physical Science and Technology, Lanzhou University, Lanzhou 730000, P.R. China. E-mail: pengshl@lzu.edu.cn; Tel: +86 931 891 2753.

^bDepartment of Materials Science and Engineering, University of Washington, Seattle, Washington 98195-2120, United States. E-mail: gzcao@u.washington.edu; Tel: +1 206 616 9084 ^cCollege of Mathematics and Physics, Qingdao University of Science and technology, Qingdao, 266061, P.R. China



Fig. S1 A SEM image of the H-NiCo₂S₄ Nano-petals on the surface of the Ni foam.



Fig. S2 (a) SEM image and (b) magnified SEM image of $E\text{-NiCo}_2S_4$ samples.



Fig. S3 A SEM image of $E-NiCo_2S_4$ for the element-mapping image, and corresponding Ni, Co, and S element-mapping images.



Fig. S4 (a) A magnified TEM image and (b) corresponding SAED pattern of the $H-NiCo_2S_4$ Nano-petals. (c) TEM image and (d) HRTEM image of the $E-NiCo_2S_4$ nanosheets.



Fig. S5 XPS spectra of (a) survey, (b) Co 2p, (c) Ni 2p, and (d) S 2p for the E-NiCo₂S₄ sample (Sat. means shake-up satellites).



Fig. S6 SEM images of (a, b) H-NiCo₂S₄-10 and (c, d) H-NiCo₂S₄-12 samples after extending the reaction time from 12 to 24 hours.



Fig. S7 SEM images of E-NiCo₂S₄ samples with different cycle number: (a) 10 cycles, (b) 30 cycles, (c) 45 cycles.



Fig. S8 (a) Effects of solution concentration on the mass loading and specific capacitance at a constant current density of 1 A g^{-1} for the H-NiCo₂S₄ electrodes. (b) Capacitance as a function of current density for the H-NiCo₂S₄ electrodes with various solution concentration. (c) Influences of cycle number on the mass loading and specific capacitance at a constant current density of 1 A g^{-1} for the E-NiCo₂S₄ electrodes. (d) Capacitance as a function of current density for the E-NiCo₂S₄ electrodes with different cycle number.



Fig. S9 Nyquist plots of the H-NiCo $_2S_4$ and E-NiCo $_2S_4$ electrodes.



Fig. S10 (a) CV curves and (b) GCD curves of AC. (c) Specific capacitance of AC at various current densities.



Fig. S11 CV curves of the (a) H-NiCo₂S₄//AC and (b) E-NiCo₂S₄//AC ASCs within different voltage windows at a scan rate of 10 mV s⁻¹. (c) The specific capacitance as a function of current density for the H-NiCo₂S₄//AC and E-NiCo₂S₄//AC ASCs. (d) Nyquist plots of the H-NiCo₂S₄//AC and E-NiCo₂S₄//AC ASCs.



Fig. S12 A GCD curve of our H-NiCo₂S₄//AC and E-NiCo₂S₄//AC ASCs connected in series at a scan rate of 1 A g⁻¹.