Electronic Supplementary Information

Pseudocapacitance-tuned High-rate and Long-term Cyclability on Lithium Storage of $NiCo_2S_4$ Hexagonal Nanosheets Prepared by a Vapor Transformation

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Table S1. Structure parameters for NiCo-hydroxide bructite, $NiCo_2O_4$ and $NiCo_2S_4$.

Samples	Crystal system	Lattice parameter	Space group
NiCo-hydroxide	hexagonal brucite	$a = b = 3.153$ Å $c = 4.632$ Å $\alpha = \beta = 90^o$, $\gamma = 120^o$	$P\bar{3}m$
$NiCo_2O_4$	cubic spinel	$a = b = c = 8.114$ Å $\alpha = \beta = \gamma = 90^o$	$Fd\bar{3}m$
$NiCo_2S_4$	cubic spinel	$a = b = c = 9.418$ Å $\alpha = \beta = \gamma = 90^o$	$Fd\bar{3}m$

Table S2. Comparison of the cycling performance of $NiCo_2S_4$-based anode materials

Anode material	Current density	Cycle Number	Reference
$NiCo_2S_4$ nanosheet on carbon paper	0.1 A/g	50	1
$NiCo_2S_4$ nanosheet on Ni foam	0.1 A/g	100	2
$NiCo_2S_4$ nanosheet on Carbon cloth	0.1 A/g	100	3
$NiCo_2S_4$ nanorod	0.1A/g	100	4
$NiCo_2S_4$ nanotube on Ni foam	0.2 A/g	50	5
$NiCo_2S_4$ hollow spheres	0.2 A/g	100	6
$NiCo_2S_4$/N-doped graphene/CNT hybrids	0.2 A/g	100	7
$NiCo_2S_4$ nanotube on N-doped Carbon foam cloth	0.5 A/g	100	8
$NiCo_2S_4$ nanosheets	2 A/g	800	This work

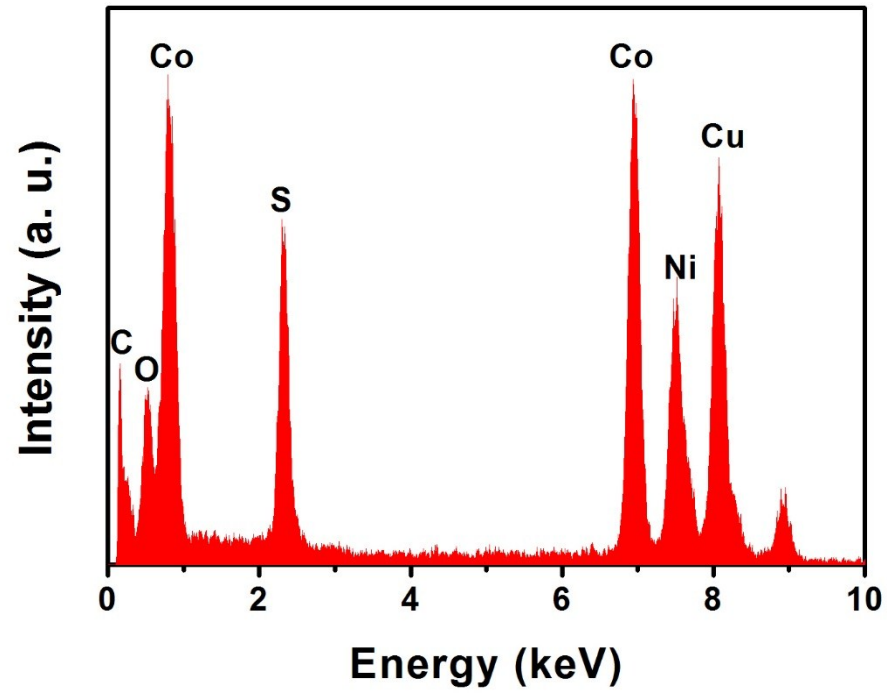

Figure S1. EDX spectrum of incompletely vulcanized $NiCo_2O_4/NiCo_2S_4$ composite after a 1 h sulfidation reaction of the $NiCo_2O_4$ precursor under H_2S/Ar atmosphere.

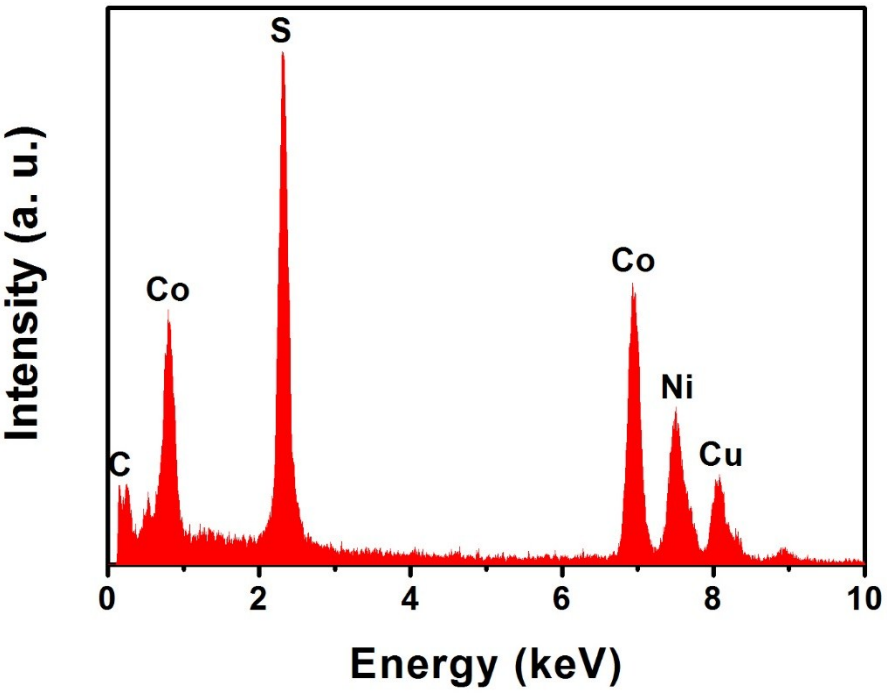

Figure S2. EDX spectrum of pure $NiCo_2S_4$ nanosheets after a 3 h sulfidation reaction.

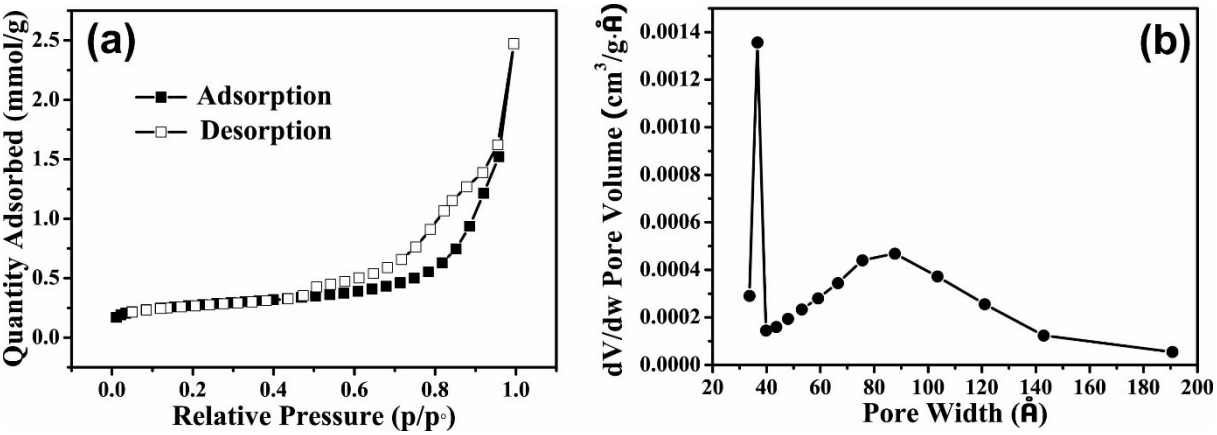

Figure S3. (a) Nitrogen adsorption–desorption isotherms and (b) pore size distribution of the mesoporous $NiCo_2S_4$ nanosheets.

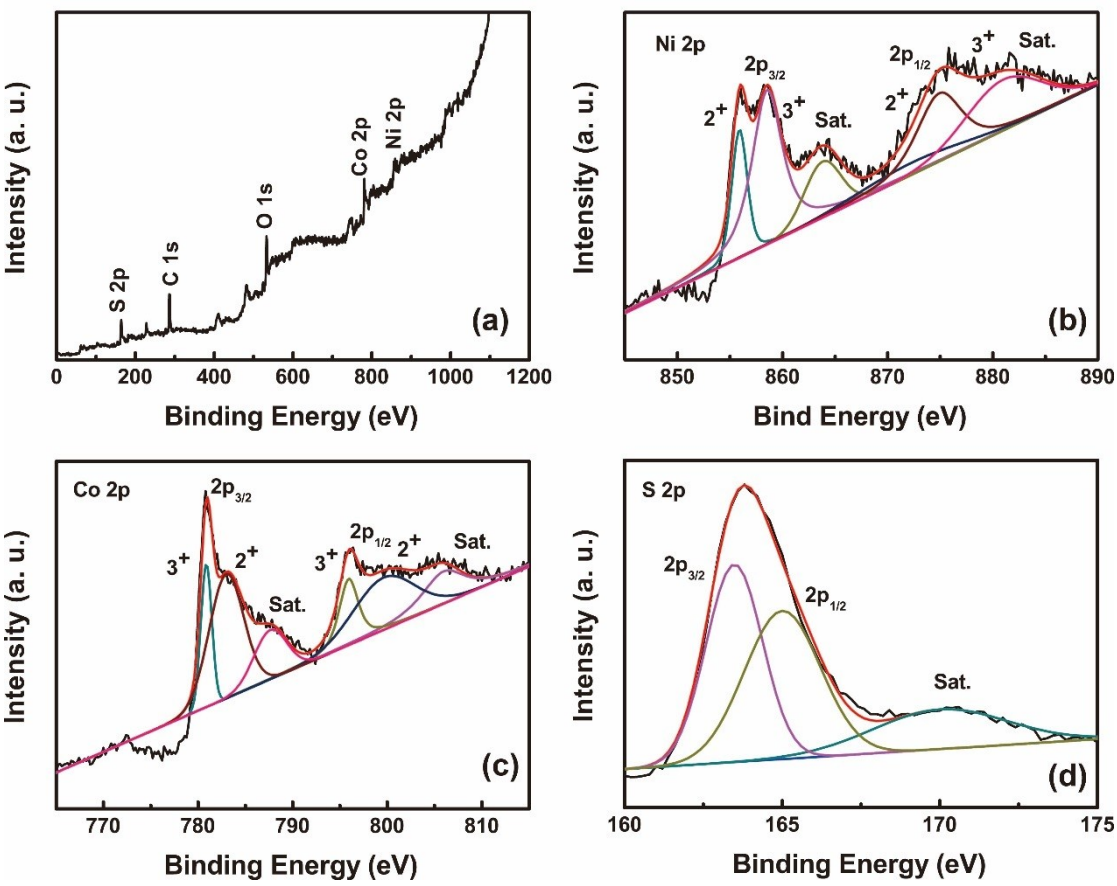

Figure S4. (a) XPS full survey spectra and high-resolution XPS spectra of (b) Ni 2p, (c) Co 2p, and (d) S 2p of as-obtained $NiCo_2S_4$ nanosheet sample.

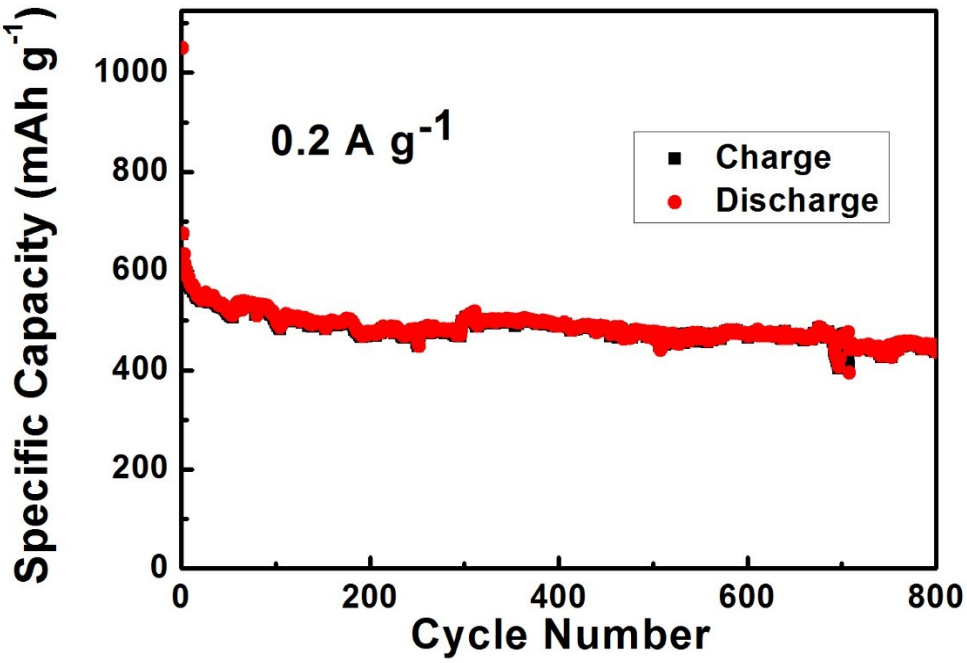

Figure S5. Cycling performance of $NiCo_2O_4$-G electrode at a current density of 0.2 A g^{-1}

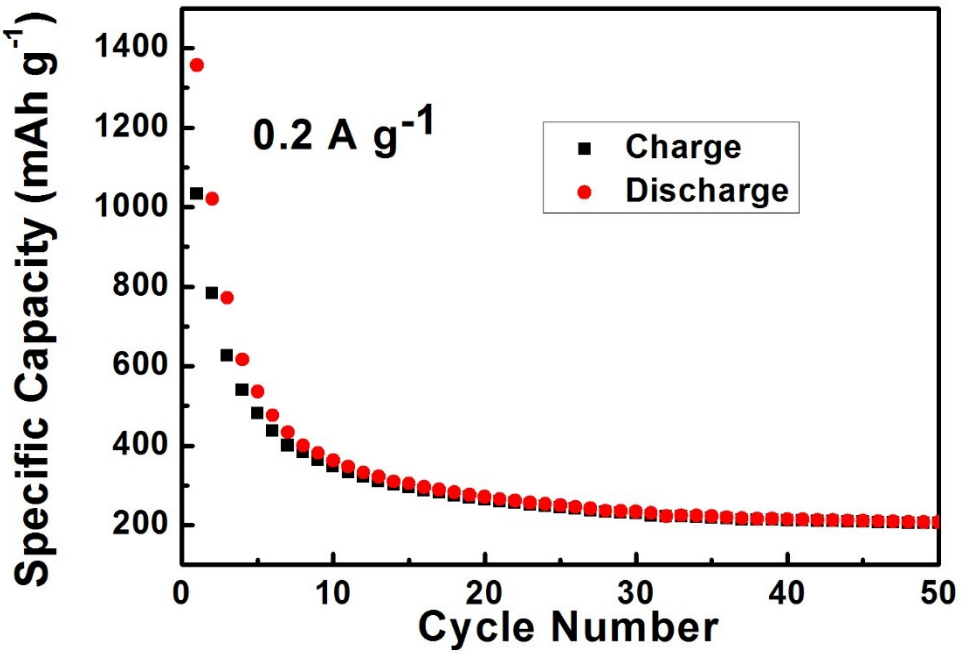

Figure S6. Cycling performance of $NiCo_2S_4$-P electrode at a current density of 0.2 A g^{-1}

Reference

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