Electronic Supplementary Material (ESI) for New Journal of Chemistry.

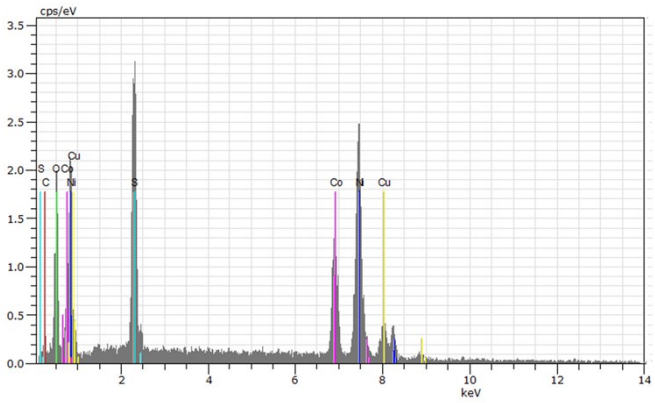
Supporting Information

Wrapping $CuCo_2S_4$ Arrays on Nickel Foam with $Ni_2(CO_3)(OH)_2$ Nanosheets as High-performance Faradaic Electrode

Qingya Zhou, Jinping Huang*, Cuiyu Li, Zhiwei Lv, Huilin Zhu, Gang Hu

Department of Chemistry, Shanghai Key Laboratory of Rare Earth Functional Materials, Shanghai Normal University, Shanghai 200234, China

*Corresponding author. E-mail: hjinping@shnu.edu.cn



Atom	Atom Ratio (%)
O	30.04
C	22.82
Ni	19.07
S	16.07
Co	7.78
Cu	4.23

Figure S1 EDS spectrum and atom ratio of the NF/$CuCo_2S_4$-200@$Ni_2(CO_3)(OH)_2$ electrode with the $CuCo_2S_4$ synthesized at 200 ºC.

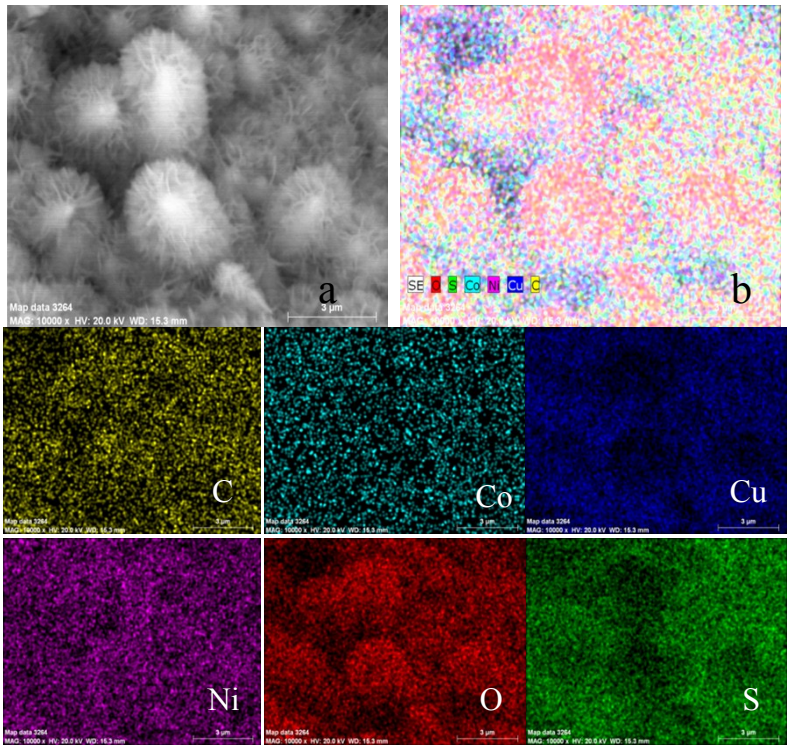


Figure S2 (a) SEM images; (b) area full element mapping of NF/$CuCo_2S_4$-200@$Ni_2(CO_3)(OH)_2$ and Elemental mapping of C, Co, Cu, Ni, O and S.

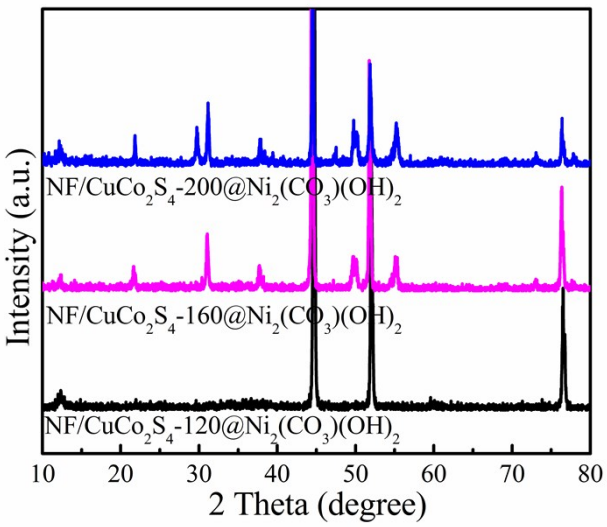


Figure S3 XRD patterns of the NF/$CuCo_2S_4$@$Ni_2(CO_3)(OH)_2$ electrodes with $CuCo_2S_4$ synthesized at hydrothermal temperature of 120, 160, 200 ºC, respectively.

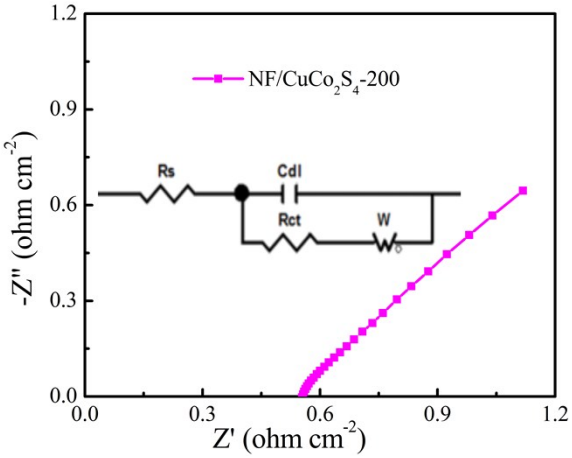


Figure S4 EIS plots of NF/$CuCo_2S_4$-200 electrode (inset, equivalent circuit diagram of the NF/$CuCo_2S_4$-200@$Ni_2(CO_3)(OH)_2$ electrode fitting the electrochemical impedance spectra).

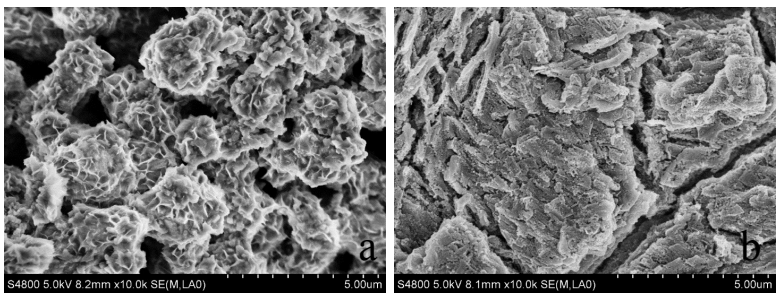


Figure S5 SEM images after charge/discharge 10000 cycles for the $Ni_2(CO_3)(OH)_2$-wrapped electrode of NF/$CuCo_2S_4$-200@$Ni_2(CO_3)(OH)_2$ (a) and the bare electrode of NF/$CuCo_2S_4$-200 (b).

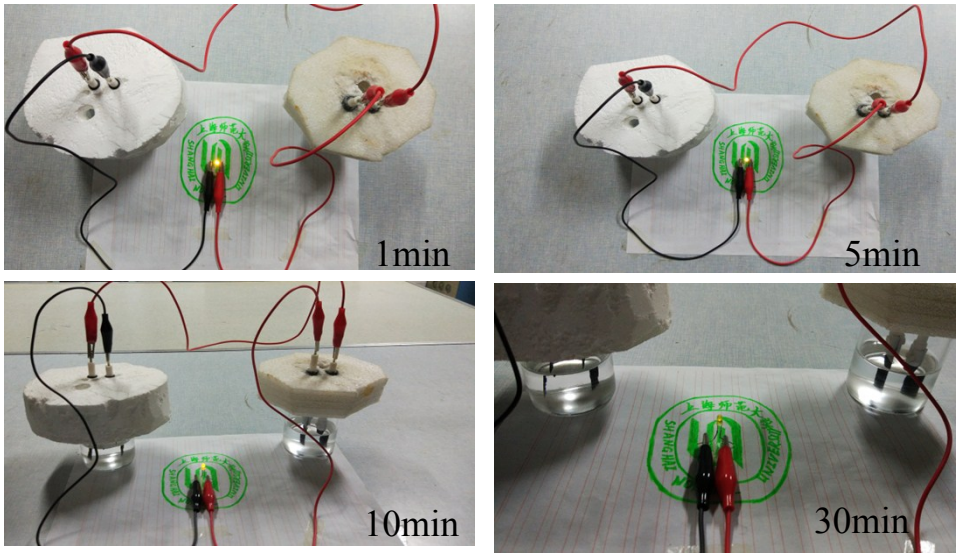


Figure S6 The brightness of light-emitting diode (LED) bulb at different time

Table S1. Comparison the electrochemical performance of NF/$CuCo_2S_4$-200@$Ni_2(CO_3)(OH)_2$ with the electrode material in literature.

electrode material	electrolyte	specific capacity (C g^{-1})	cycling stability	ref.
flower-like $CuCo_2S_4$	2 M KOH	363.6 (908.9 F g^{-1}) at 5 mA cm^{-2}	91.1% (2000 cycles)	36
$CuCo_2S_4$ nanospheres	3 M KOH	53.5 mF cm^{-2} at 0.17 mA cm^{-2}	86% (5500 cycles)	41
$CuCo_2S_4$/rGO composite	3 M KOH	262.5 (525 F g^{-1}) at 1 A g^{-1}	83% (1000 cycles)	46
NiO nanowall arrays	1 M KOH	148.5 (270 F g^{-1}) at 0.67 A g^{-1}	93% (4000 cycles)	47
$CuCo_2S_4$ hollow spheres	6 M KOH	546 (1137.5 F g^{-1}) at 2 A g^{-1}	94.9% (6000 cycles)	48
NF/$CuCo_2S_4$-200@$Ni_2(CO_3)(OH)_2$ arrays	2 M KOH	343.9 at 0.3 A g^{-1}	96.7% (10000 cycles)	This work