Supporting Information (SI)

Applied Potential-Dependent Performance for the Nickel Cobalt Oxysulfide Nanotube/Nickel Molybdenum Oxide Nanosheet Core-Shell Structure on Energy Storage and Oxygen Evolution

Kuan-Lin Chiu[a1] and Lu-Yin Lin[ab1*]

[a]Department of Chemical Engineering and Biotechnology, National Taipei University of Technology, 1 Sec. 3, Zhongxiao E. Rd., Taipei 10608, Taiwan

[b]Research Center of Energy Conservation for New Generation of Residential, Commercial, and Industrial Sectors

[*]Corresponding author: Tel: +886–2–2771–2171 ext. 2535; Fax: +886–2–2731–7117; E-mail: lylin@ntut.edu.tw

[1]The authors contributed equally.

Table S1 The C_F values for the $NiCo_2S_4$ NTA/NF and $NiCo_2O_xS_y$@$NiMoO_4$/NF electrodes calculated using the GC/D curves at different current densities.

Current density (mA/cm^2)	$NiCo_2O_xS_y$@$NiMoO_4$		$NiCo_2S_4$	
	C_F (F/cm^2)	C_F (F/g)	C_F (F/cm^2)	C_F (F/g)
10	17.75	1365.47	10.42	868.24
20	15.32	1178.29	7.92	659.63
30	13.41	1031.79	6.33	527.78
40	12.00	922.74	5.26	438.52
50	10.88	836.75	4.48	373.15

Table S2 The resistance of the $NiCo_2S_4$/NF electrode measured using the 4-point probe sheet resistivity measurement device. The unit is in ohm.

	1st	2nd	3rd	4th	Average
Sample 1	0.1278	0.1280	0.1311	0.1176	0.1261
Sample 2	0.1358	0.1228	0.1340	0.1298	0.1306
					0.1284

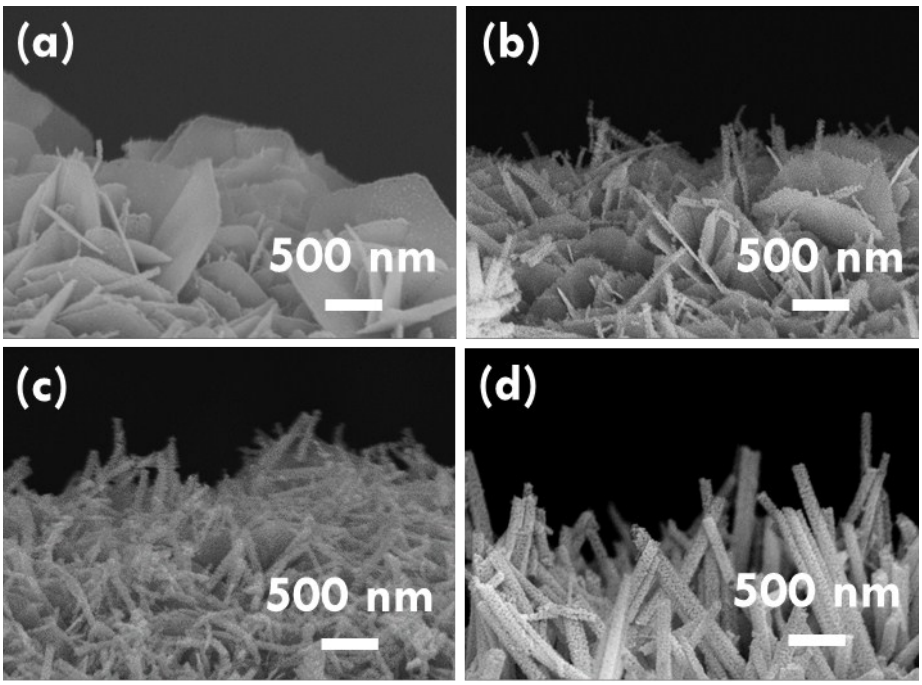

Figure S1 The side-view SEM images for Ni-Co LDH NWA/NF prepared using (a) 2, (b) 3, (c) 4, and (d) 6 h.

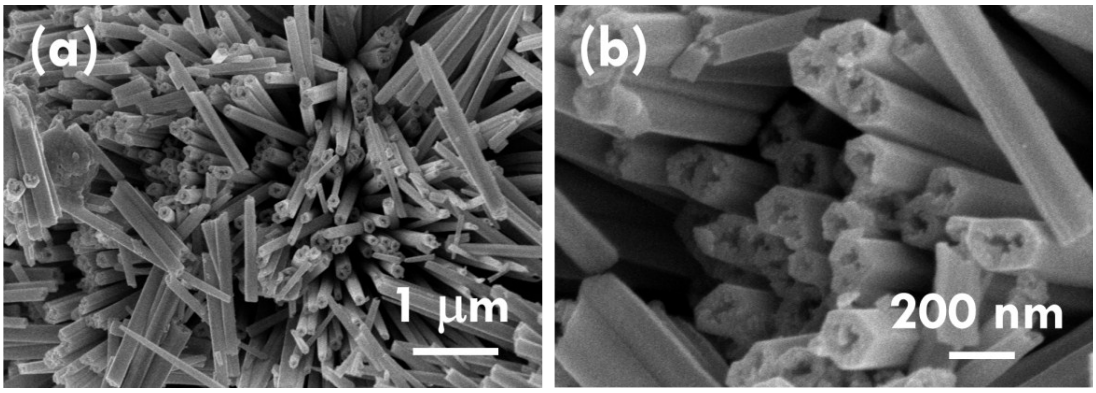

Figure S2 The SEM images for the $NiCo_2S_4$/NF prepared using Ni-Co LDH NWA/NF without calcination (a) in the low magnification and (b) in the high magnification.

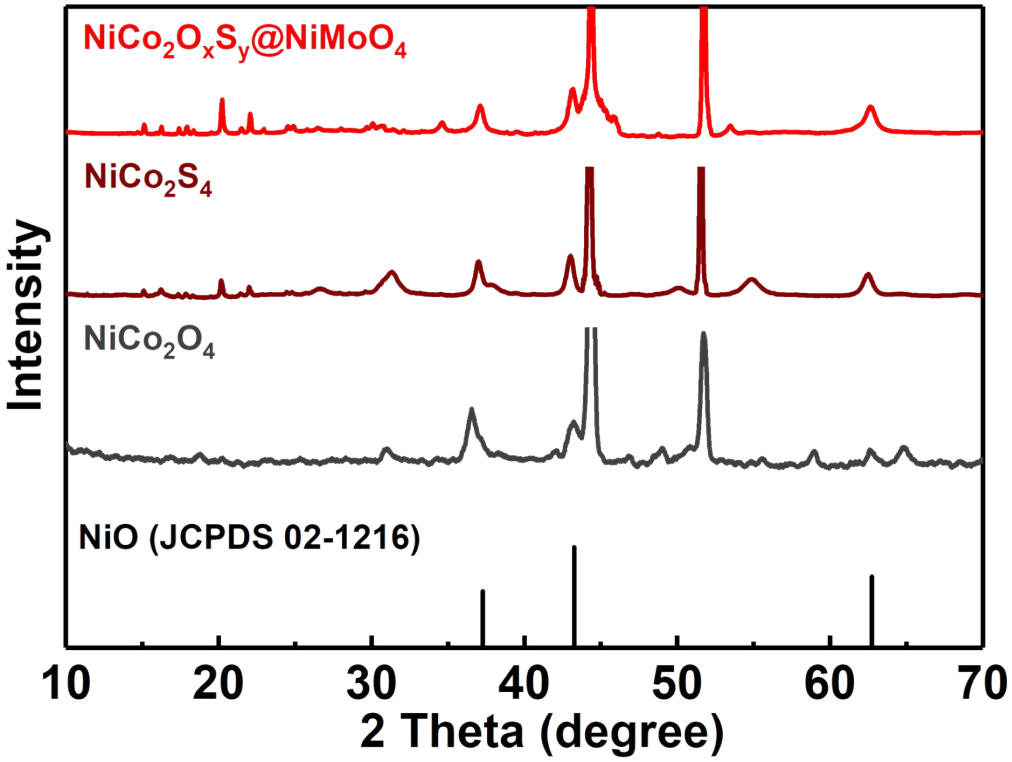

Figure S3 The XRD patterns for $NiCo_2O_xS_y$@$NiMoO_4$, $NiCo_2S_4$, $NiCo_2O_4$ electrodes. The standard pattern for NiO (JCPDS 02-1216) was also shown in this figure.

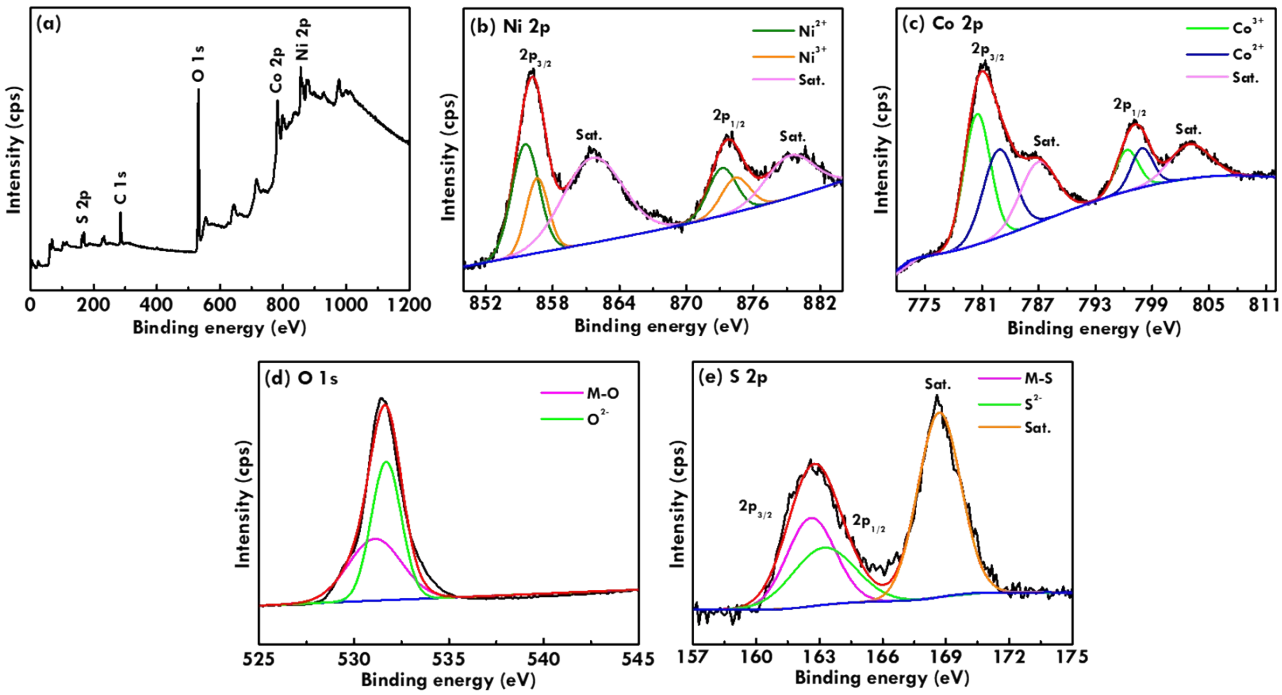

Figure S4 The XPS spectra for (a) the survey region, (b) Ni 2p, (c) Co 2p, (d) O 1s, and (e) S 2p for $NiCo_2S_4$.

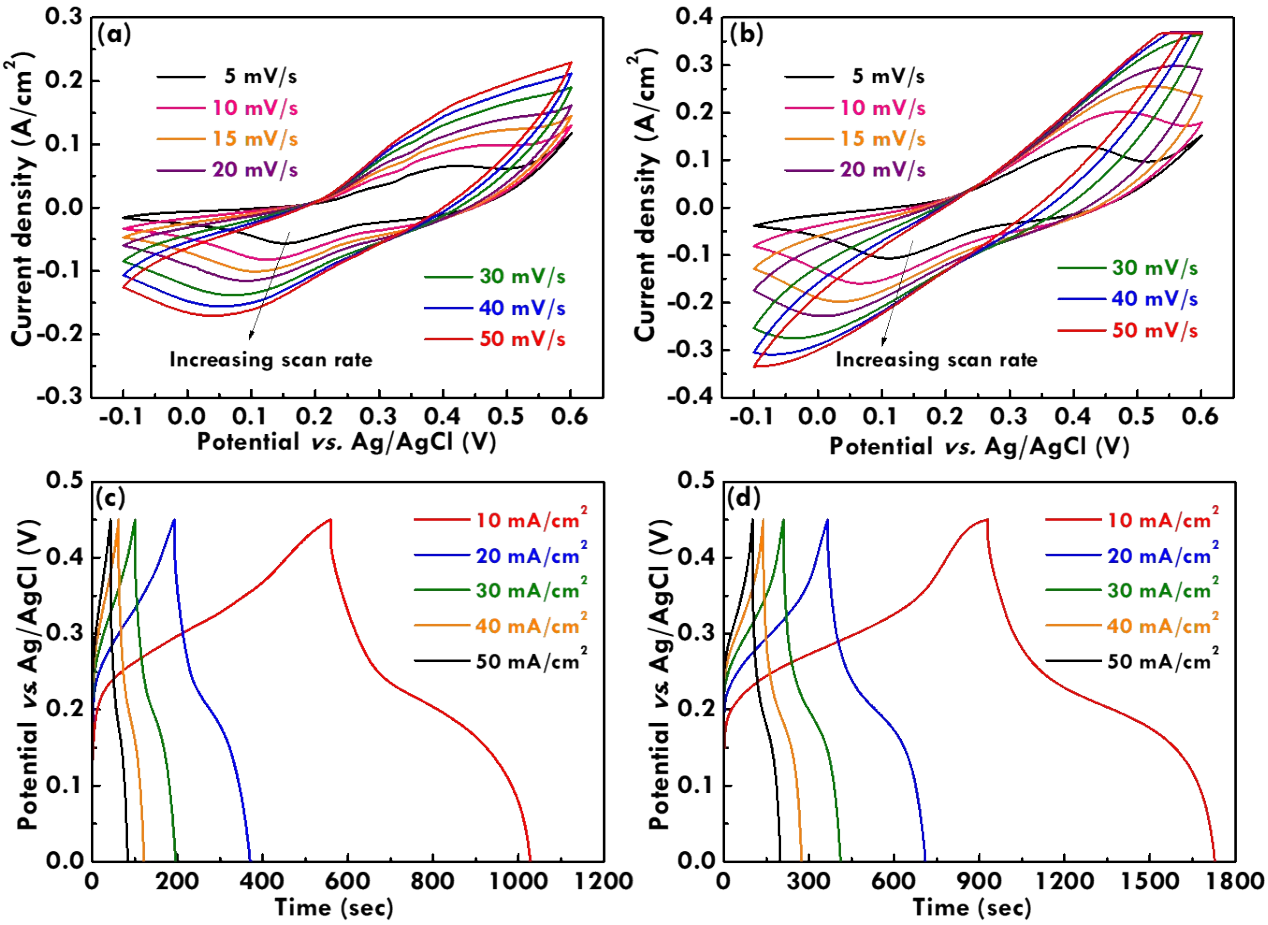

Figure S5 The CV curves at different scan rates for (a) $NiCo_2S_4$ NTA/NF and (b) $NiCo_2O_xS_y$@$NiMoO_4$/NF; the GC/D curves at different current densities for (c) $NiCo_2S_4$ NTA/NF and (d) $NiCo_2O_xS_y$@$NiMoO_4$/NF.

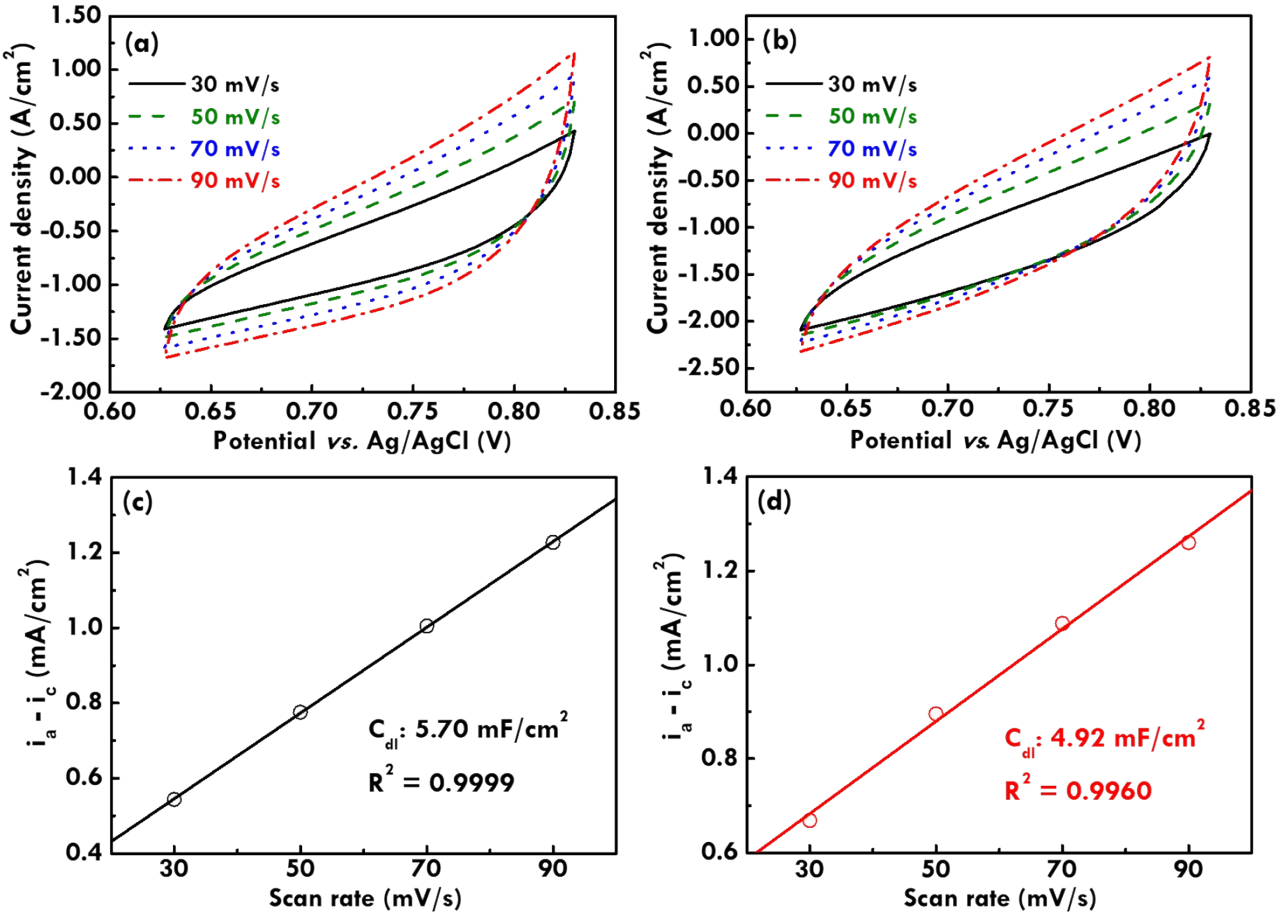

Figure S6 The CV curves at different scan rates for (a) $NiCo_2S_4$ NTA/NF and (b) $NiCo_2O_xS_y$@$NiMoO_4$/NF electrodes recorded in an electrolyte containing 1 M KOH; the peak current difference (i_a – i_c) at a potential of 0.725 V *vs.* Ag/AgCl against the scan rate for (c) $NiCo_2S_4$ NTA/NF and (d) $NiCo_2O_xS_y$@$NiMoO_4$/NF electrodes.