

3D hierarchical core-shell structural NiCoMoS@ NiCoAl hydrotalcite for high-performance supercapacitors

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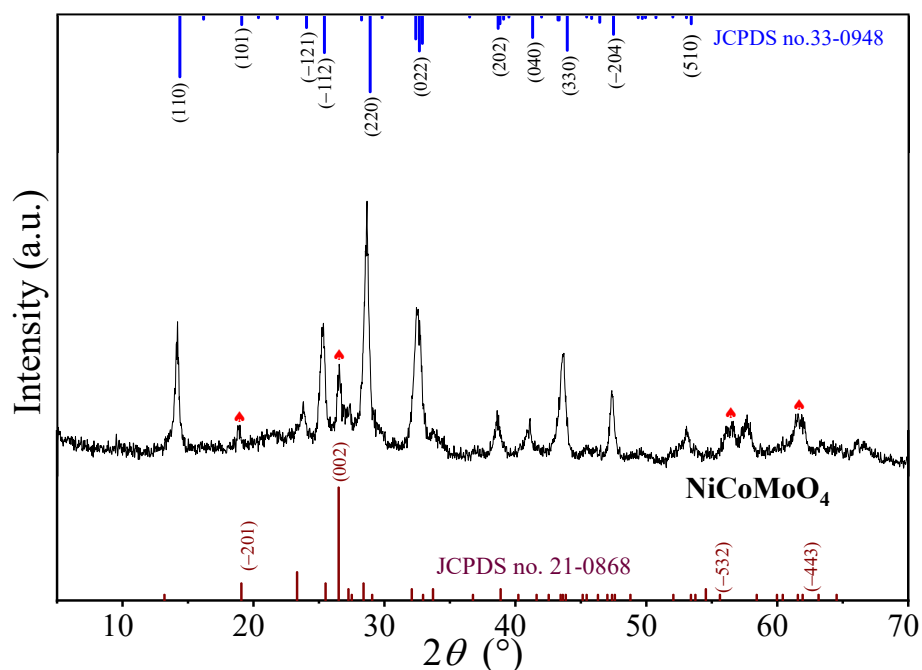
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Fig. S1



For the calcined product (NiCoMoO_4), the diffraction peaks at 14.3, 19.2, 23.6, 25.5, 28.8, 32.6, 38.6, 41.2, 43.9, 47.4 and 53.3 $^\circ$ were separately corresponded to the (110), (101), (-121), (-112), (220), (022), (202), (040), (330), (-204) and (510) crystal planes of α - NiMoO_4 structure (JCPDS no. 33-0948). Meanwhile, the weak diffraction peaks at 19.1, 26.5, 56.0 and 61.9 $^\circ$ could be (-201), (002), (-532) and (-443) crystal planes of CoMoO_4 (JCPDS Card no. 21-0868). The two crystalline phases of in the XRD demonstrated that CoNiMoO_4 was successfully synthesized by transforming the NiCoMo precursor into the mixed metal oxide NiCoMoO_4 using calcination, as described in the literature [1,2].

Reference

1. Li Y, Li J, Qian Q, Jin X, Liu Y, Li Z, Zhang G. Superhydrophilic Ni-based multicomponent nanorod-confined-nanoflake array electrode achieves waste-battery-driven hydrogen evolution and hydrazine oxidation. *Small*. 2021, 17(19): 2008148.
2. Gu M, Deng X, Lin M, Wang H, Gao A, Huang X, Zhang X. Ultrathin NiCo bimetallic molybdate nanosheets coated CuO_x nanotubes: Heterostructure and bimetallic synergistic optimization of the active site for highly efficient overall water splitting. *Adv. Energy Mater.* 2021, 11(41): 2102361.

Fig. S2 CV curves of the NiCoAl-LDH, NiCoMoS_{2/1} and NiCoMoS@LDH at different scan rates.

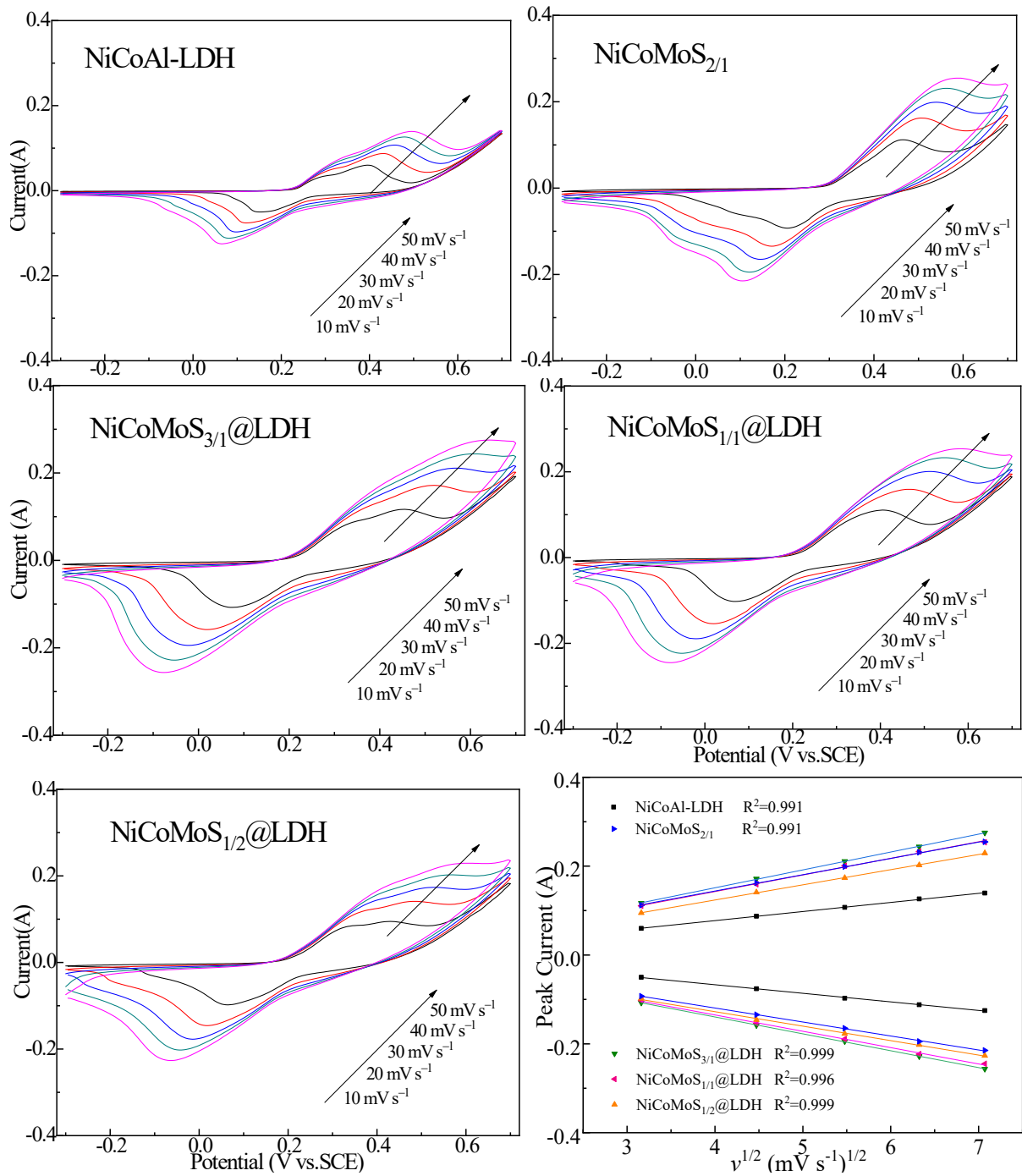


Fig. S3 GCD curves of the NiCoAl-LDH, NiCoMoS_{2/1} and NiCoMoS@LDH at different current densities.

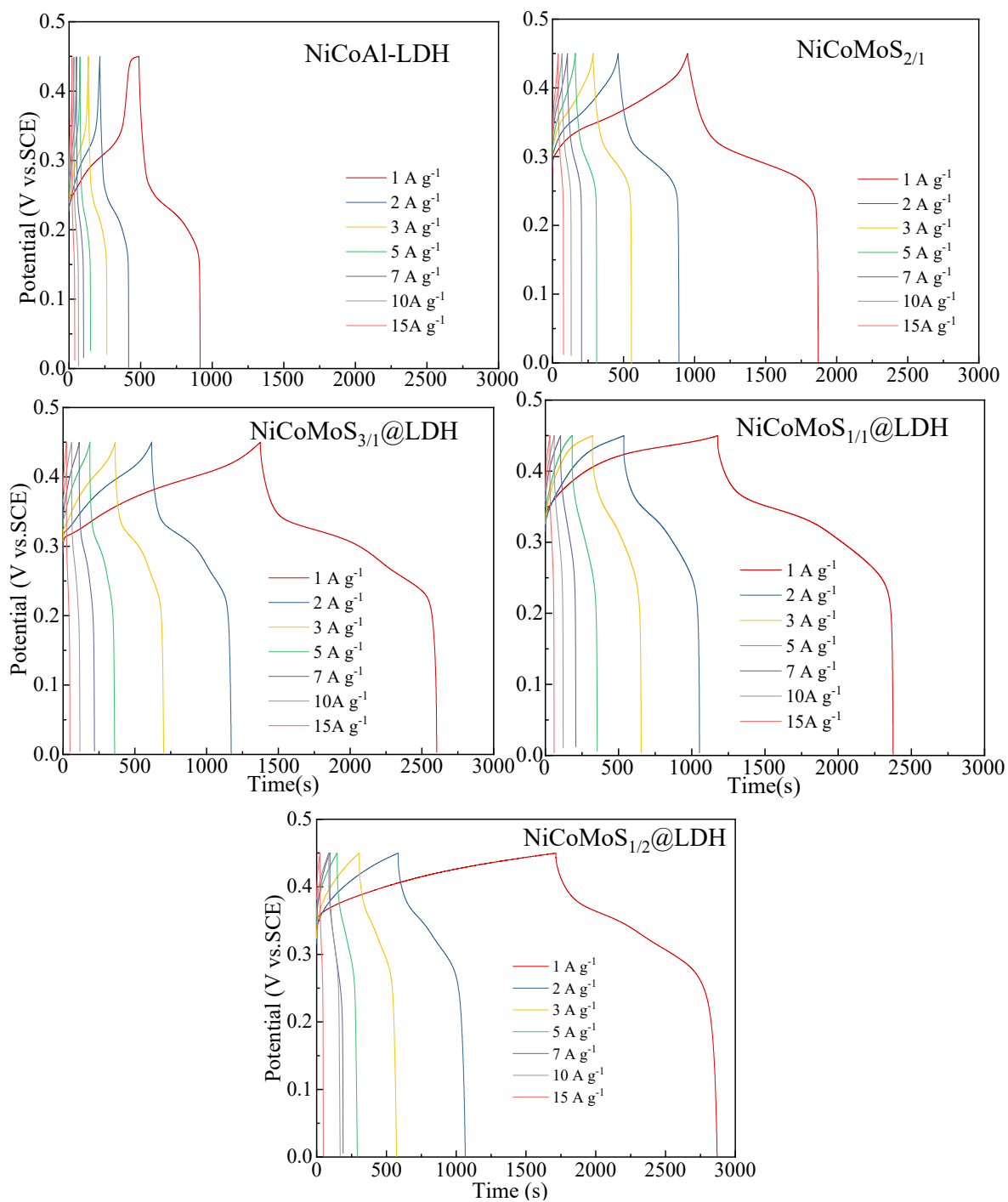


Table S1 Peak positions of the XPS spectra for the NiCoMoS_{2/1} and NiCoMoS_{2/1}@LDH.

		NiCoMoS _{2/1}	NiCoMoS _{2/1} @LDH
Ni 2p	2p _{1/2}	873.9 eV	873.5 eV
	2p _{3/2}	856.3 eV	856.0 eV
Co 2p	2p _{1/2}	793.3 eV	797.1 eV
	2p _{3/2}	778.5 eV	781.4 eV
O 1s	-	-	531.5 eV
Mo 3d	3d _{3/2}	234.3 eV	235.0 eV
	3d _{5/2}	232.7 eV	232.5 eV
S 2p	2p _{1/2}	162.6 eV	163.1 eV
	2p _{3/2}	161.4 eV	161.9 eV
Al 2p	-	-	74.2 eV

Table S2 Electrochemistry performances of the NiCoAl-LDH, NiCoMoS_{2/1} and NiCoMoS@LDH.

	A^* ($\times 10^{-2}$)	b	r^2_{pa}	CV				EIS		C_s (C g ⁻¹ , at 1 A g ⁻¹)
				k_{pa}^* (s ⁻¹)	R^2_{pa}	k_{pc}^* (s ⁻¹)	R^2_{pc}	R_{ct} (Ω)	R_s (Ω)	
NiCoAl-LDH	4.60	0.527	0.999	0.020	0.991	-0.019	0.998	4.496	0.975	427.0
NiCoMoS _{2/1}	9.18	0.513	0.998	0.037	0.999	-0.031	0.999	2.848	1.564	919.8
NiCoMoS _{3/1} @LDH	10.84	0.530	0.999	0.040	0.999	-0.038	0.999	0.811	0.706	1231.0
NiCoMoS _{2/1} @LDH	14.69	0.490	0.999	0.048	0.999	-0.039	0.995	0.144	0.641	1336.0
NiCoMoS _{1/1} @LDH	10.52	0.525	0.999	0.037	0.996	-0.037	0.998	1.274	0.873	1197.4
NiCoMoS _{1/2} @LDH	9.91	0.546	0.999	0.034	0.999	-0.033	0.998	1.764	0.875	1151.1