

Nanostructured nickel-cobalt alloy/GMS-SWCNT thin film as an efficient electrocatalyst for hydrogen evolution reaction

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Table S1 Deposition bath composition and mass loading for various electrodeposited catalysts

Film	CoSO ₄ /M	NiSO ₄ /M	Co/mg	Ni/mg	Loading/mg
Co	0.12	-	5.5	-	5.5
Ni	-	0.12	-	5.3	5.3
CoNi12	0.04	0.08	1.48	2.92	4.4
CoNi11	0.06	0.06	2.48	2.52	5.0
CoNi21	0.08	0.04	3.08	1.72	4.8
CoNi31	0.09	0.03	3.07	1.03	4.1

Table S2 Performances of CoNi21/rGO-SWCNT together with other related catalysts for HER process

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Material	Mass loading (mg /cm ²)	Supports	Tafel Slope (mV/dec)	j(mA/cm ²)	η at j (mV)	Electrolyte	Ref.
CoNi21	4.8	rGO/SWCNT	112.55	10/100	83.5/291.8	1.0 M KOH	This work
Cu–Ni foam (50 wt% Ni)	-	Cu–Ni	97	10	229	1.0 M KOH	B. Mater. Sci. 2023, 46 (1), 9
CoSe ₂ /Co ₃ S ₄ @Co ₃ O ₄	-	-	117.7	10	165	1.0 M KOH	Small 2023, 19 (35), 2302056
Ni–Mo/ESS	3.0	ESS	97.14	10	53	1.0 M KOH	Energy Technology 2023, 11 (8), 2300118
FeNiS ₂	-	-	104	10	141	1.0 M KOH	ChemistrySelect 2023, 8 (13), e202204370
CC@MoS ₂ /RuNPs	-	CC	104.8	10	71.3	1.0 M KOH	J. Mater. Eng. 2022, 50 (4), 44-52
1T 0.81MoS ₂ @Ni ₂ P	3.0	CC	42	10	95	1.0 M KOH	Nat. Commun. 2021, 12 (1), 5260 -5272
Ni/MoN@NCNT/CC	2.7	CC	93	10	207	1.0 M KOH	Nat. Commun. 2021, 12 (1), 5260 -5272
Re/ReS ₂ /CC	-	CC	53	10	44	1.0 M KOH	ChemElectroChem 2020, 7 (3), 745-752
CoNi film	1.98	Cu rod	124	10	67	1.0 M KOH	Int. J. Hydrogen Energ. 2022, 47 (75), 32145-32157

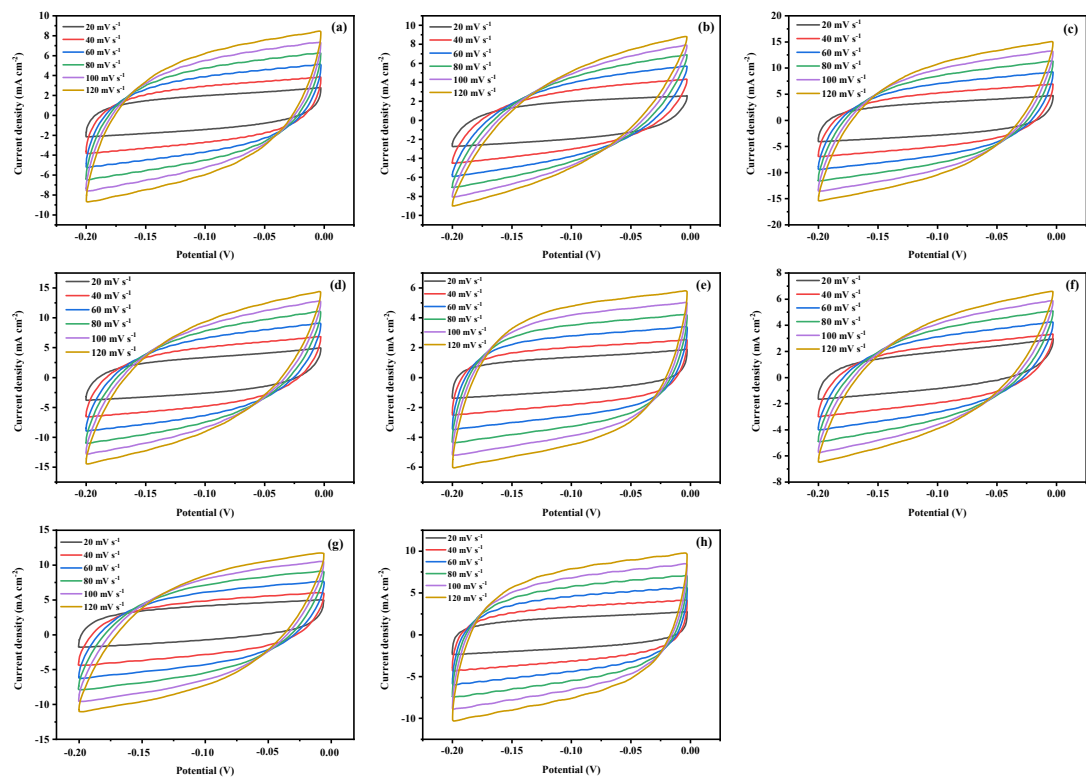


Fig. S1. Cyclic voltammogram curves of (a) CoNi12, (b) CoNi11, (c) CoNi21, (d) CoNi31, (e) Co, (f) Ni, (g)Pt/C, (h) Blank in the potential window of -0.2 V - 0 V vs. RHE at different scan rates.

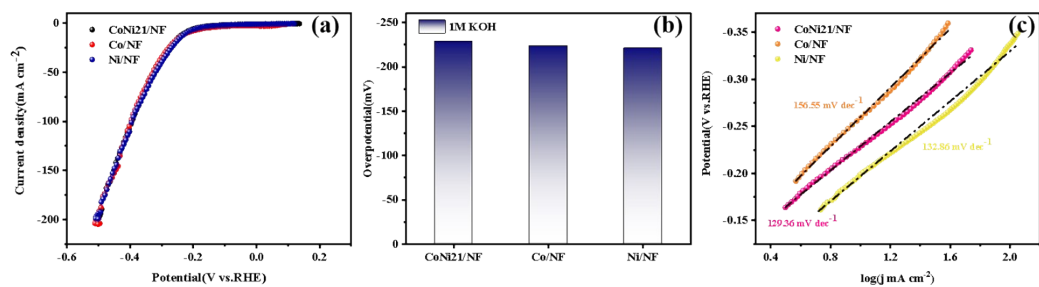


Fig. S2. HER activity over the electrodeposited CoNi21 as well as pure Co and Ni onto Nickel foam (NF).

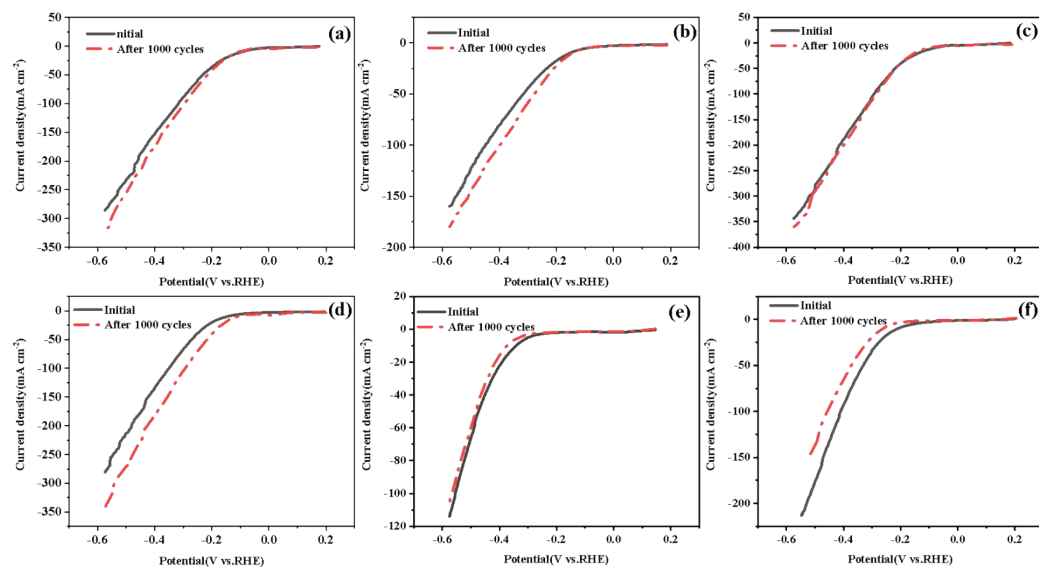


Fig. S3. LSV curves of catalyst at first and after 1000 voltammetry cycles: a) CoNi12; b) CoNi11; c) CoNi21; d) CoNi31; e) Co; f) Ni.