Supporting Information

Ni_3N-Coated Ni Nanorod Arrays for Hydrogen and Oxygen Evolution in Electrochemical Water Splitting

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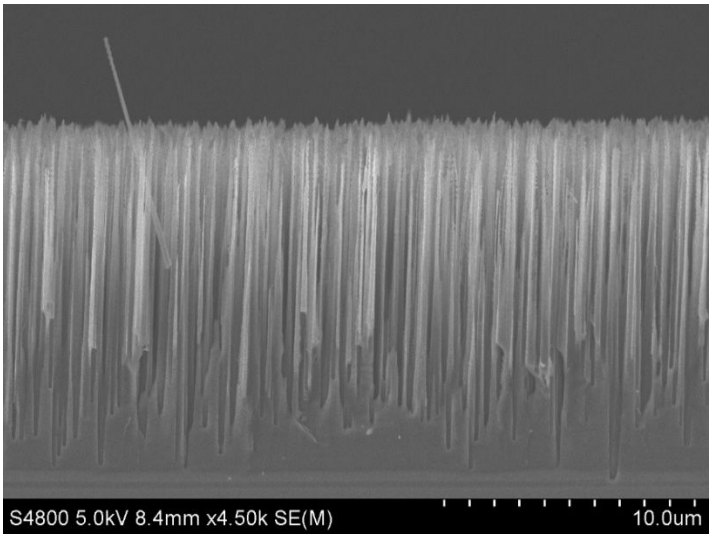

Figure S1. Cross section SEM image of the nanostructured Si template.

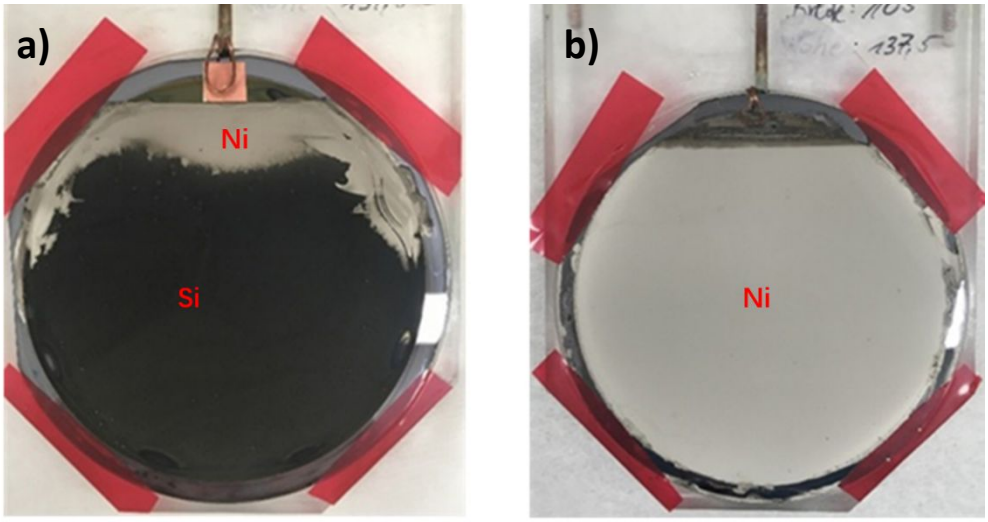

Figure S2. Photographs of (a) Areas with deposited nickel on the Si wafer (4 inches) with nanostructured surface after about half an hour electroplating and (b) the finished Ni-electroplating layer.

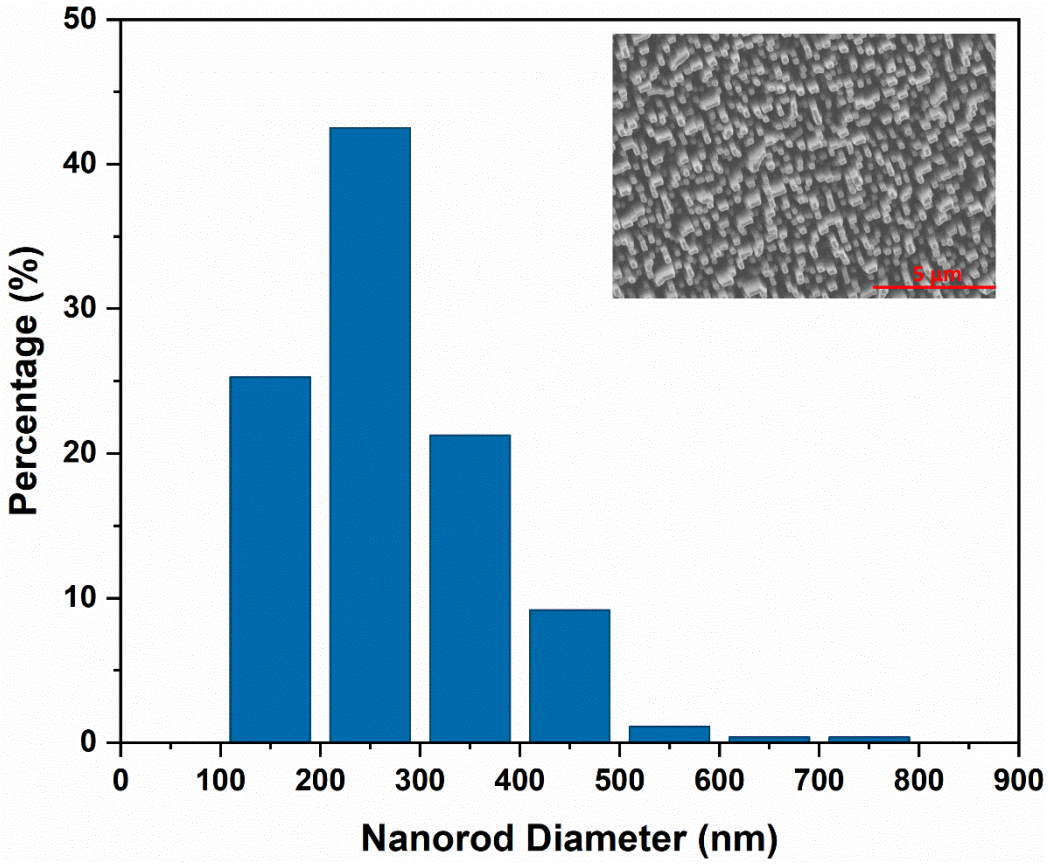

Figure S3. Histogram plot for the diameter of nanorod arrays from the SEM image.

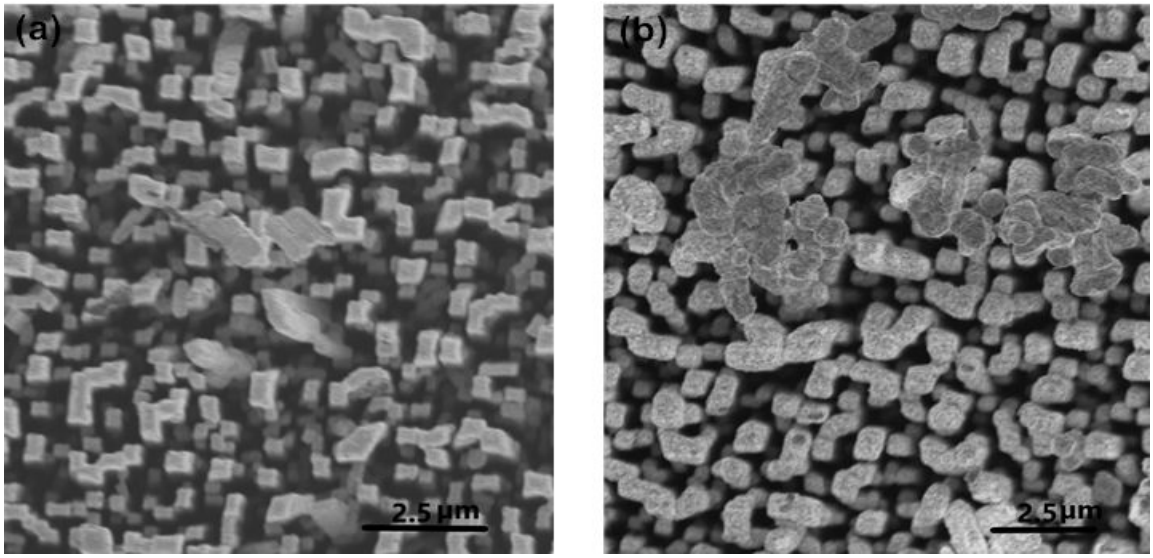

Figure S4. SEM images after electrochemical experiments: (a) B-Ni and (b) B-Ni_N_2_30 min.

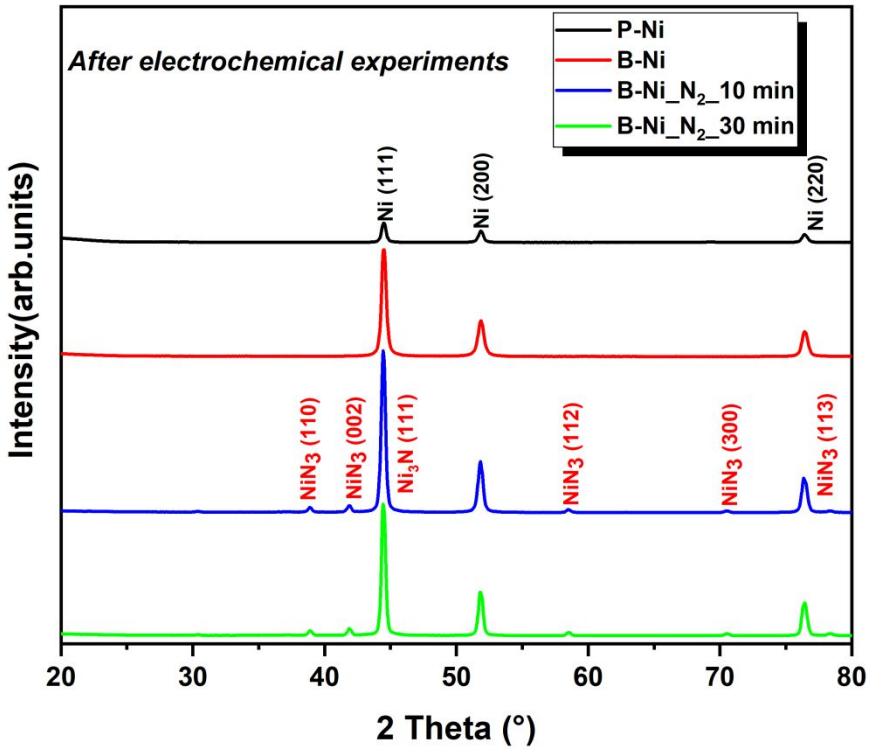

Figure S5. XRD patterns of P-Ni, B-Ni, B-Ni_N_2_10 min and B-Ni_N_2_30 min after electrochemical measurements.

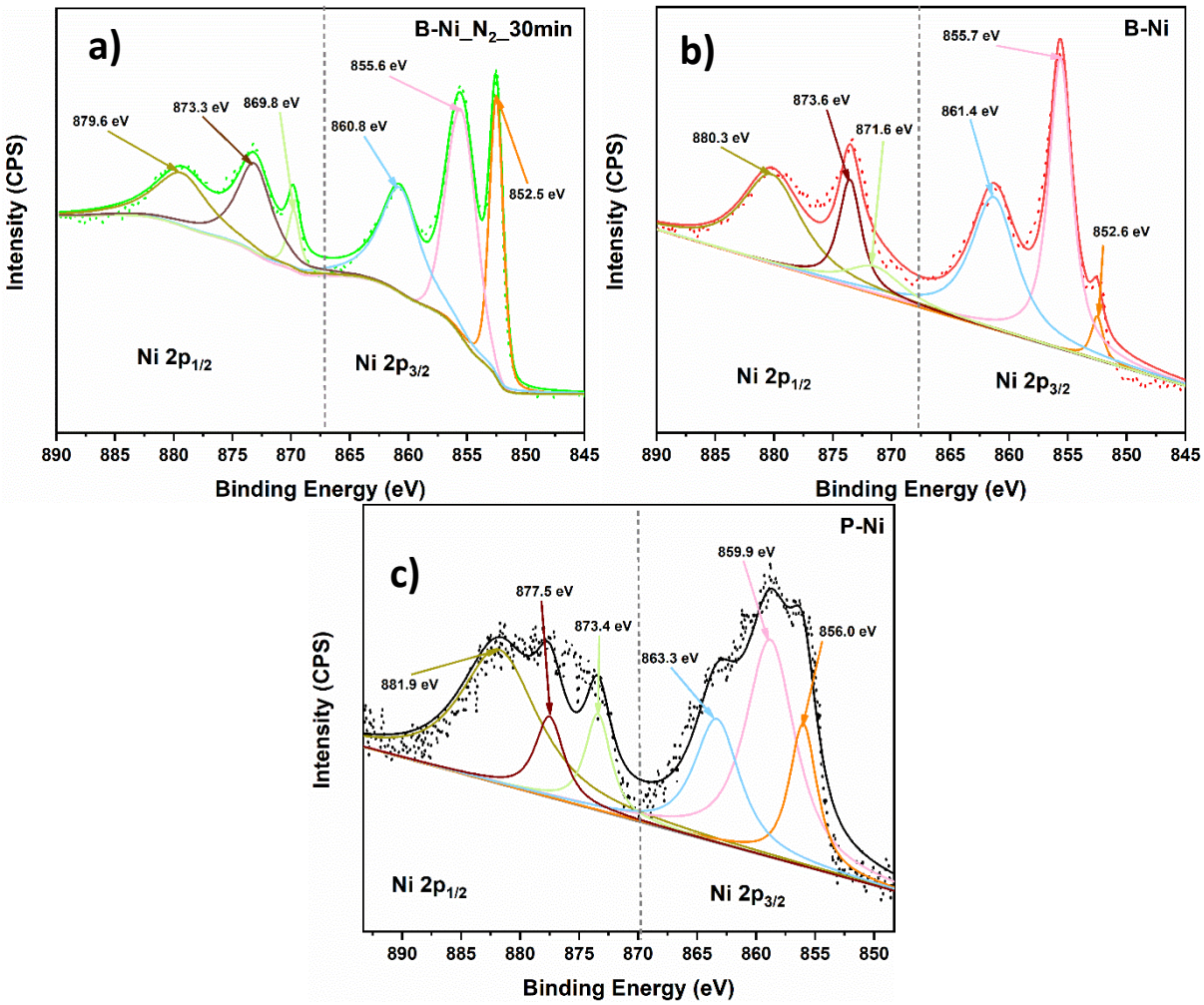

Figure S6. High resolution spectra of Ni 2p for (a) B-Ni_N_2_30 min; (b)B-Ni; (c)P-Ni.

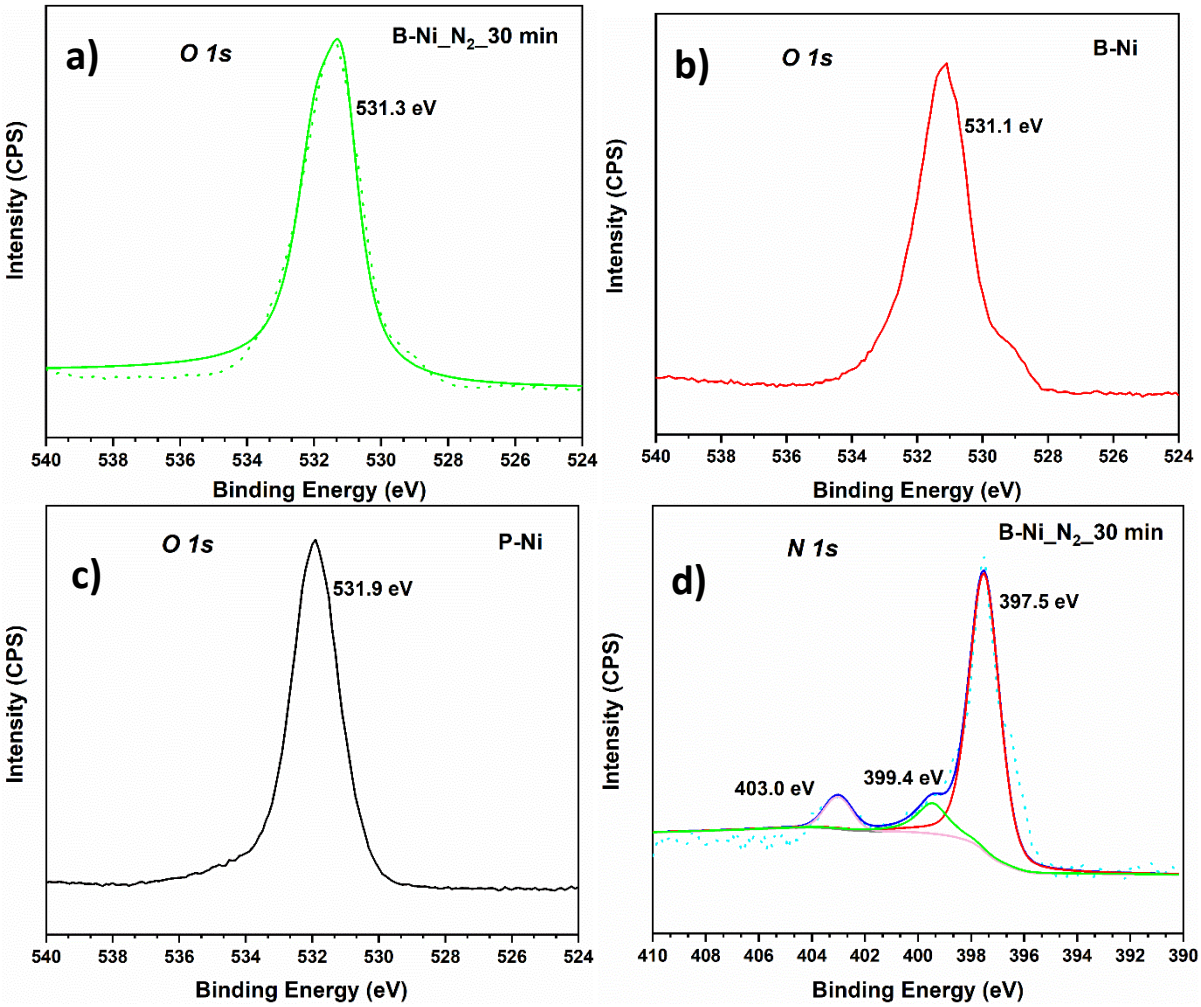

Figure S7. High resolution spectra of O 1s for (a) B-Ni_N_2_30 min; (b) B-Ni; (c) P-Ni. (d) High resolution spectrum of N 1s for B-Ni_N_2_30 min.

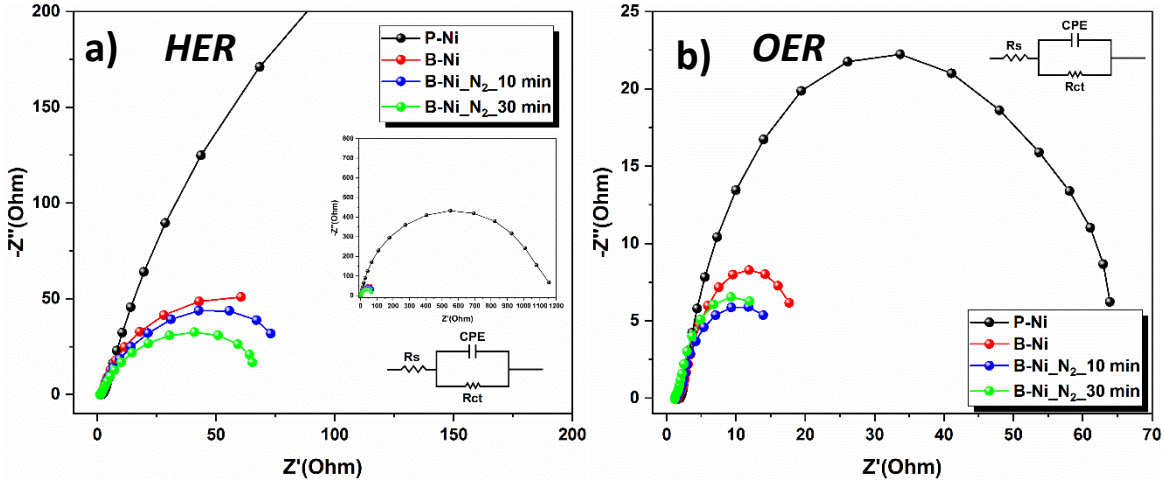

Figure S8. (a) Nyquist plots of as-prepared catalysts at -0.05 V versus RHE for HER, the inset is the equivalent circuit diagram and whole range plots. (b) Nyquist plots of as-prepared catalysts at 1.55 V versus RHE for OER, the inset is the equivalent circuit diagram.

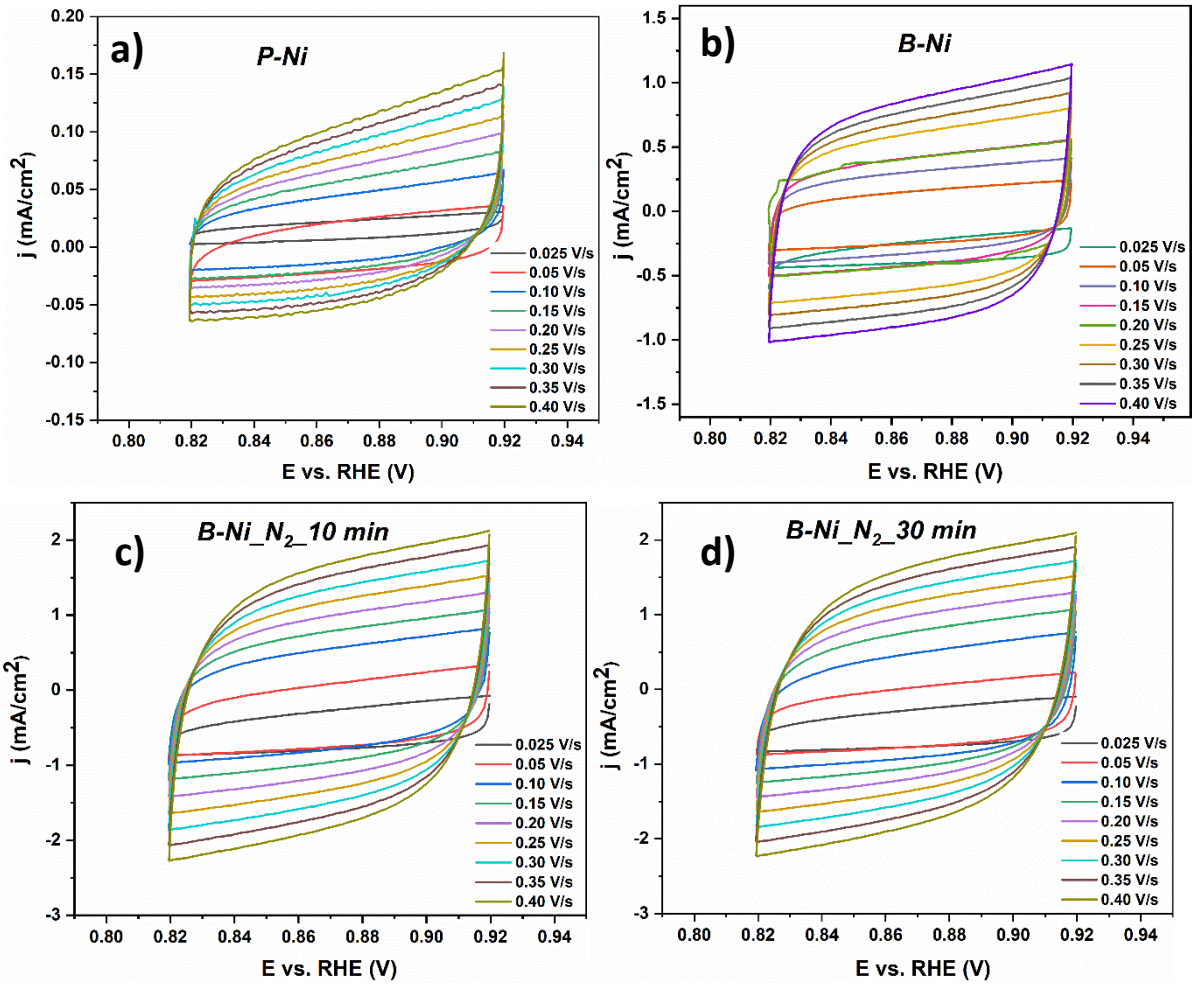

Figure S9. Cyclic voltammetry measurements of (a) P-Ni, (b) B-Ni, (c) B-Ni_N_2_10 min and (d) B-Ni_N_2_30 min at different scan rates.

Table S1 Fitted impedance parameters for the electrodes of HER and OER.

Electrode	HER		OER	
	R_S (Ω)	Rct (Ω)	R_S (Ω)	Rct (Ω)
P-Ni	2.34	1152	2.06	63.75
B-Ni	1.75	139.6	1.64	28.17
B-Ni_N_2_10 min	1.56	119.3	1.45	22.13
B-Ni_N_2_10 min	1.34	86.43	1.23	21.05

Table S2 Comparison of the electrocatalytic performance of Nickel-based electrocatalysts under alkaline conditions.

Catalyst	Electrolysis test	Electrolyte	Current density (*j*) (mA cm-^{2})	Overpotential at *j* (mV)	Tafel slope (mV dec^{-1})	Ref.
B-Ni_N_2_10min	HER	1 M KOH	10	161	189	This
	OER		10	350	67	work
NiNS	HER	1 M KOH	100	197	58.8	(7)
	OER		100	404	112	
Cu_1Ni_2-N	HER	1 M KOH	10	71.4	106.5	(15)
	OER		20	312	N.A.	
Fe_2Ni_2N	HER	1 M KOH	10	110	101	(46)
nanoarrays	OER		10	200	34	
$FeNi_3N$	HER	1 M KOH	10	75	98	(47)
	OER		10	202	40	
Co-Ni_3N	HER	1 M KOH	10	194	156	(48)
	OER		10	307	57	
NF@Ni/C-600	HER	1 M KOH	10	37	57	(49)
	OER		10	265	54	