

Supporting Information

Ni nanoparticles decorated with carbon materials synthesized by solid-state-reaction for efficient electrocatalytic hydrogen evolution reaction

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Typically, 20 mg electrocatalyst and 1.0 mg Ketjenblack were dispersed in ethanol-DMF (1 mL) solution of 7:3 volume ratio with 20 μL Nafion by ultrasonication for 30 min. Then, 10 μL dispersion solution was spread on the GC electrode surface dried at room temperature. The HER performance were measured at the scanning window from -0.9 V to -1.5 V with the scanning speed of 2 mV s^{-1} under 1.0 M KOH electrolyte. Cyclic voltammetry (CV) was recorded with the scanning speeds of 20, 40, 60, 80, and 100 mVs^{-1} in non-Faradaic region from -0.50 V to -0.60 V. Electrochemical impedance spectroscopy (EIS) were tested at the frequency area from 0.01 to 10^5 Hz with the potential of -109 mV. The electrocatalytic stability was measured by i-t test and continuous cyclic voltammograms test.

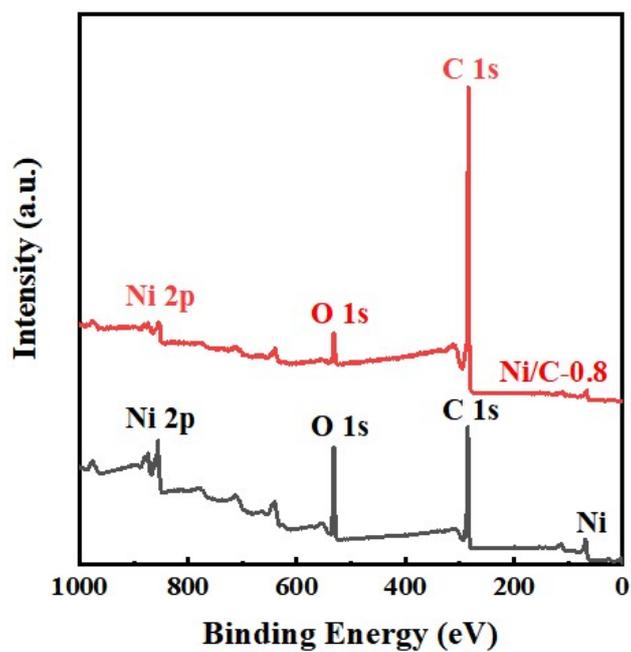


Figure S1. XPS survey spectrum of Ni and Ni/C-0.8.

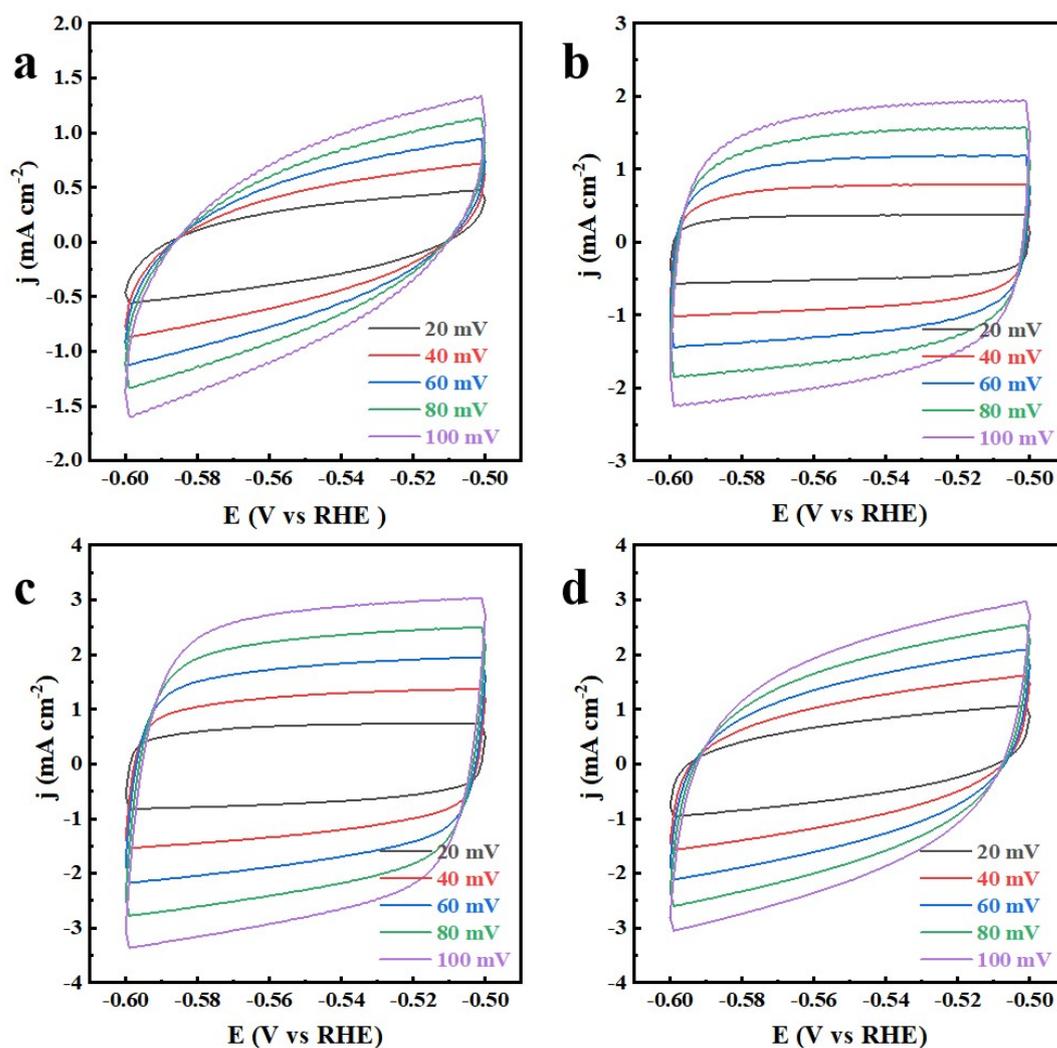


Figure S2. CV curves at different scan rates of (a) Ni. (b) Ni/C-0.6. (c) Ni/C-0.8. (d) Ni/C-1.

Table S1. Compare electrocatalytic HER performance with other Ni-based electrocatalyst.

Catalysts	Substrate	Electrolyte	^a η_{10} (mV)	^b η_{100} (mV)	Reference
Ni@B-C	GC	1 M KOH	176	-	[1]
Ni@NC-800	GC	1 M KOH	205	305	[2]
Ni@CNTs-650	GC	1 M KOH	266	-	[3]
Mo ₂ C-Ni	GC	1 M KOH	131	-	[4]
Ni-MoO ₂ @BC	GC	1 M KOH	204	-	[5]
Ni/C-2	GC	1 M KOH	94	-	[6]
Ni/NC-0.35	GC	1 M KOH	133	270	[7]
Ni/Mo ₂ C/Mo ₂ T iC ₂ T _x @NC	GC	1 M KOH	134	-	[8]
V-NiO@C-450	NF	1 M KOH	17	≈150	[9]
HTA/CNTs@ Ni	GC	1 M KOH	146	-	[10]
Ni/C-0.8	GC	1 M KOH	109	286	This Work

^aOverpotential in electrocatalytic HER at -10 mA cm⁻². ^bOverpotential in electrocatalytic HER at -100 mA cm⁻².

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