Supplementary Materials

Methane plasma-mediated phase engineering of Ni nanosheets for alkaline hydrogen evolution

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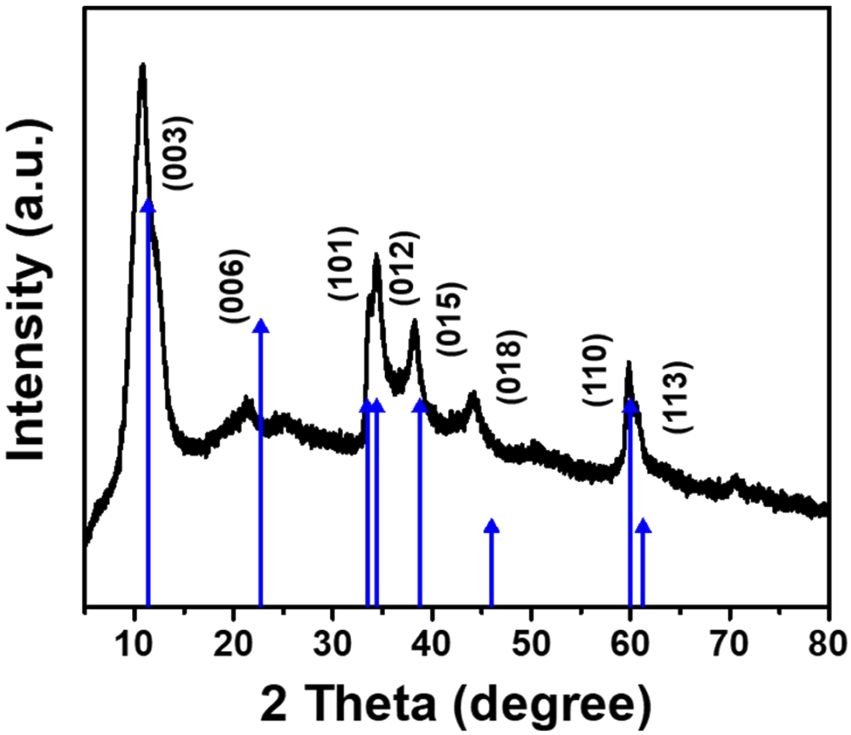

Figure S1. XRD pattern of $Ni(OH)_2$.

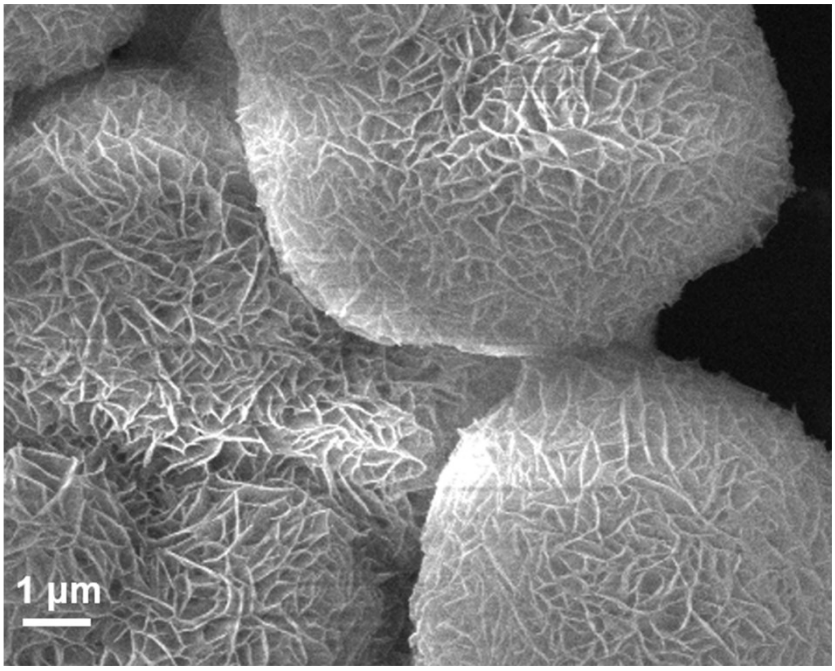

Figure S2. Low and high-magnified SEM image of $Ni(OH)_2$.

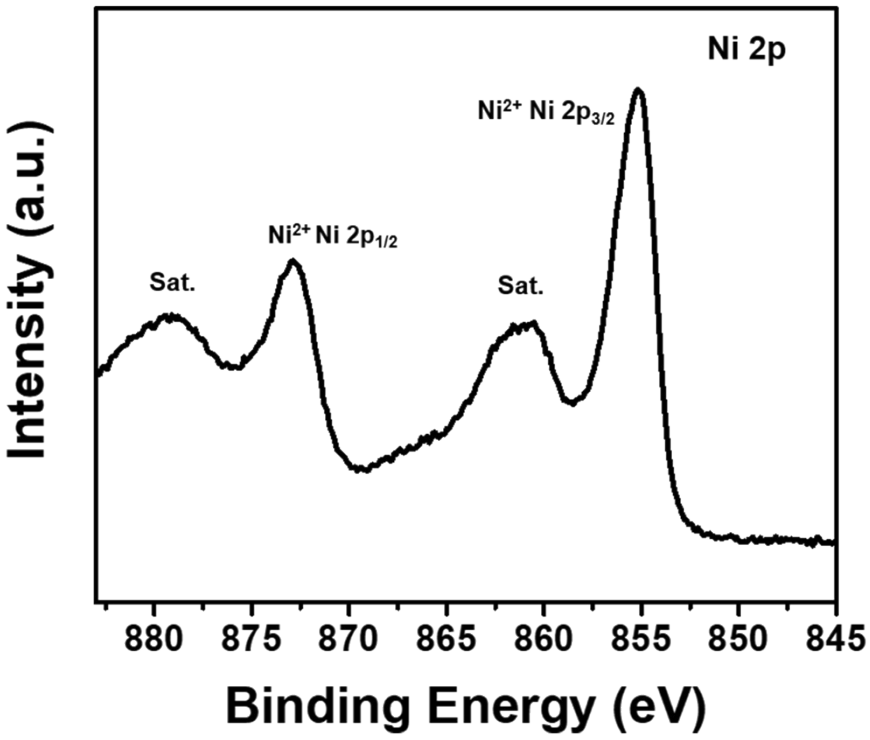

Figure S3. Survey XPS spectrum of $Ni(OH)_2$.

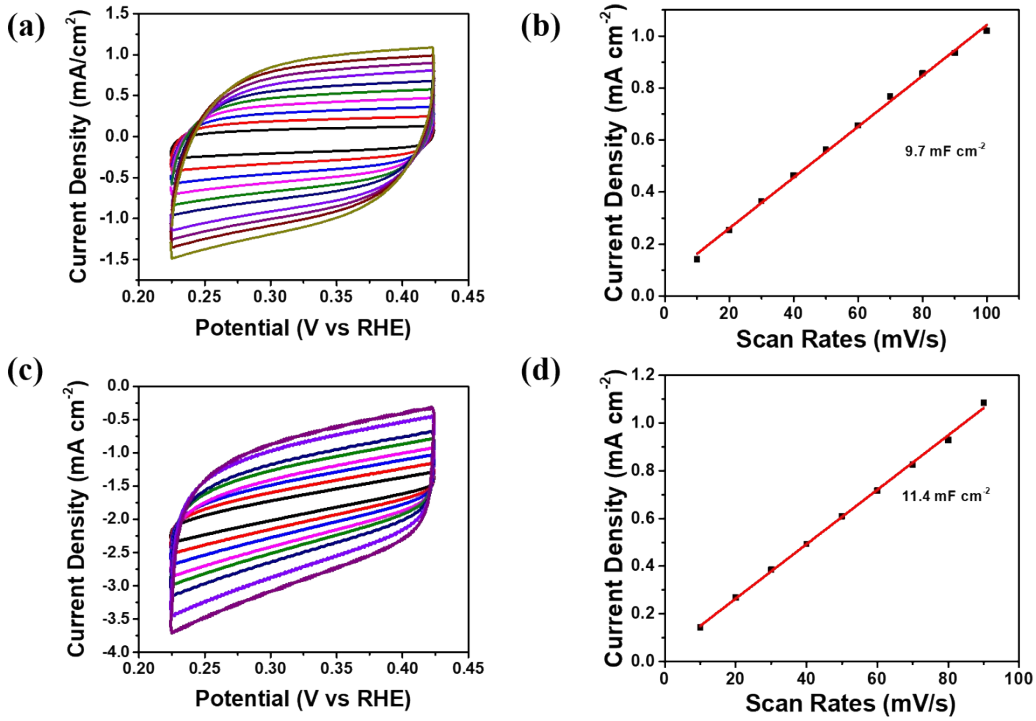

Figure S4. CV curves of fcc Ni (a), and hcp Ni (c) in the non-Faradic region vs various scan rates; and the plot of capacitive currents vs scan rates for fcc Ni (b), hcp Ni (d).

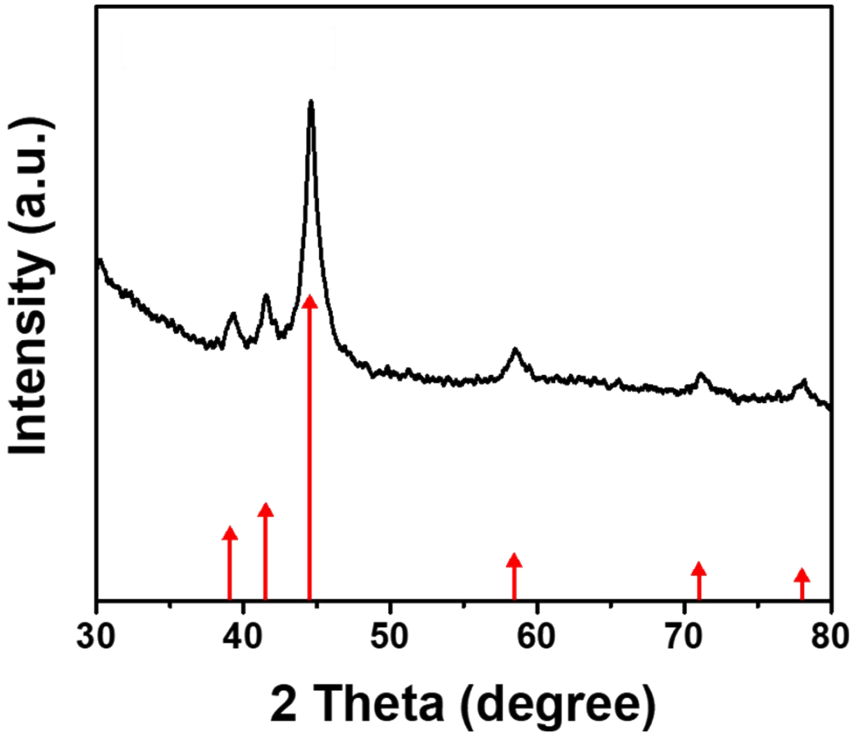

Figure S5. XRD pattern of hcp Ni after testing 15 h.

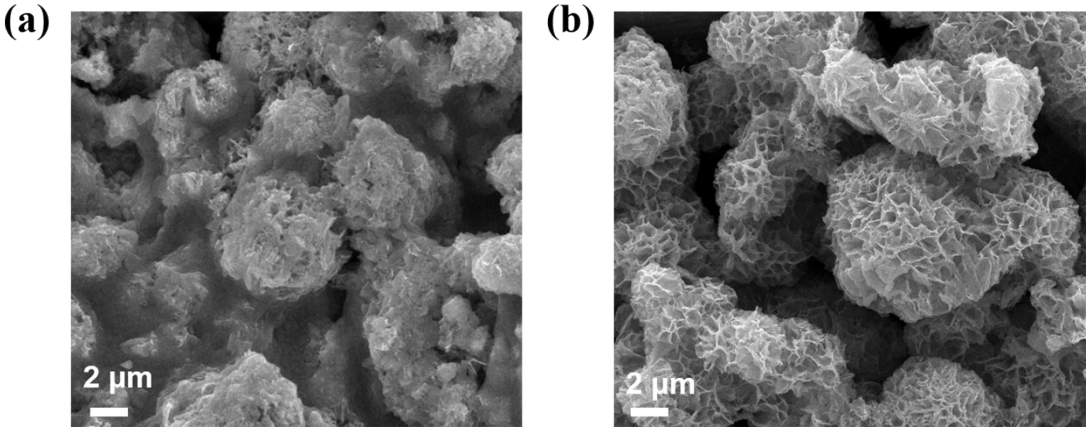

Figure S6. SEM images of (a) fcc Ni, (b) hcp Ni after long-term HER test.

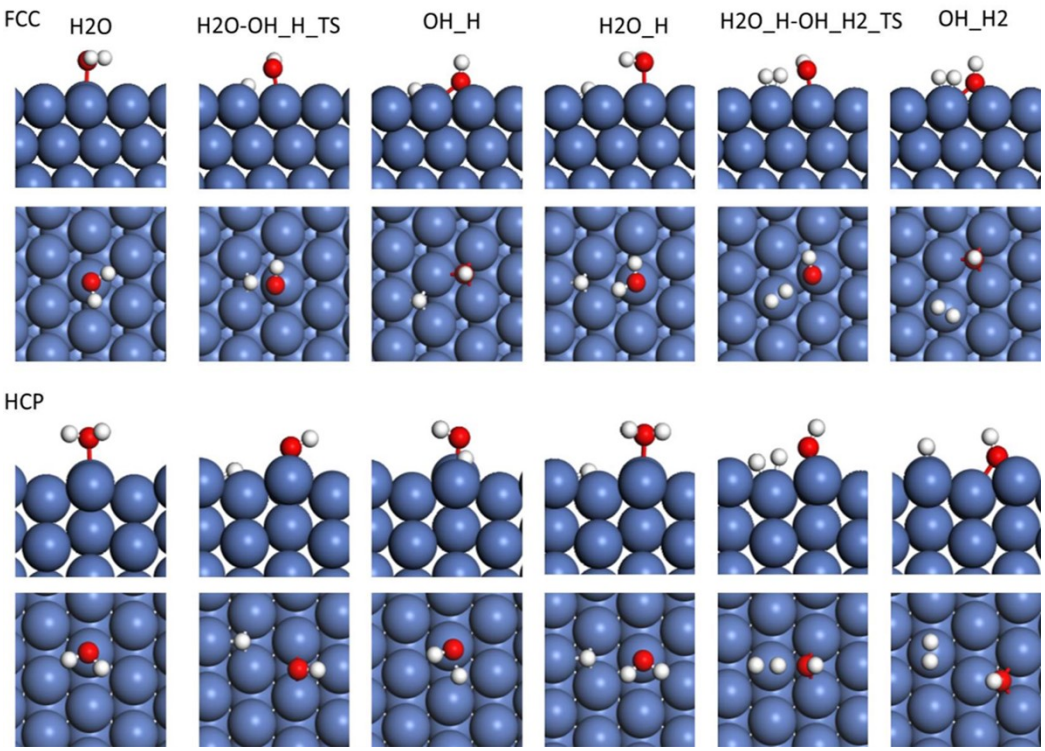

Figure S7. Stable structures for the reactants, products and transition states of the H_2 formation on fcc Ni and hcp Ni.

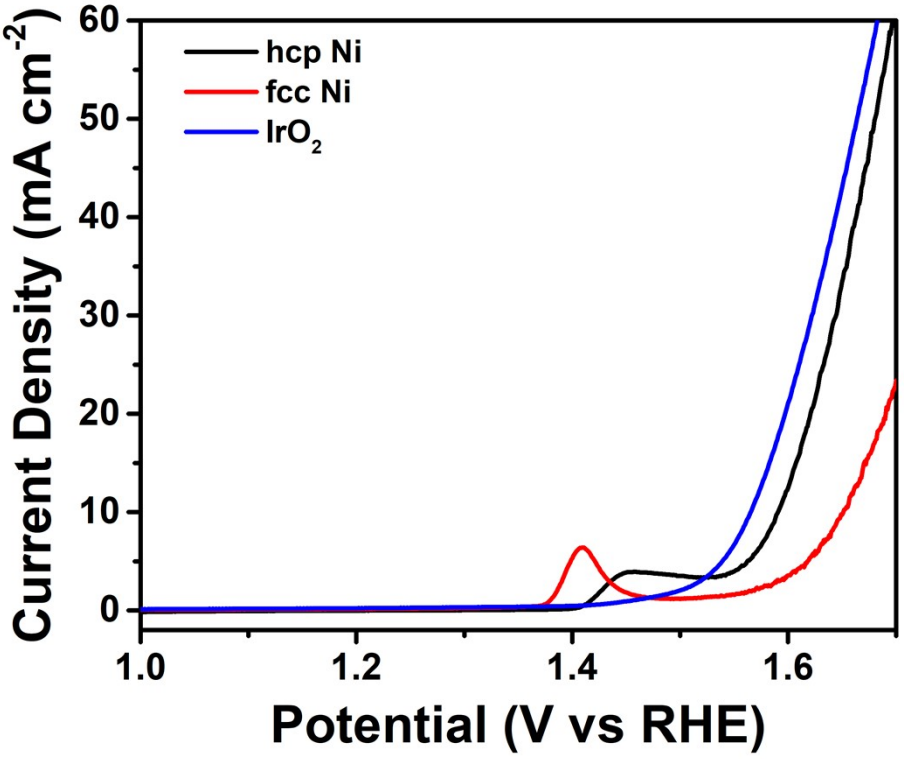

Figure S8. LSV polarization curves of electrocatalytic OER evaluation on hcp Ni and fcc Ni.

Table S1. Comparison of HER performance with similar reported catalysts.

Catalyst	Electrolyte	Overpotential (mV)	J/mA cm^{-2}	Ref.
Ni@SNG	1.0 M KOH	99.8	10	1
Ni_3S_4/g-C_3N_4/N-doped graphene	1.0 M KOH	95	10	2
Vs-Ni_3S_2/NF	1.0 M KOH	88	10	3
Ni/NC-0.35	1.0 M KOH	133	10	4
Ni/TM	1.0 M KOH	190	10	5
Ni-Nx	1.0 M KOH	147	10	6
Ag-Ni_3S_2	1.0 M KOH	89	10	7
Ni/M-MoS_2	1.0 M KOH	145	10	8
N-Ni_3S_2	1.0 M KOH	155	10	9
MoS_2/$Fe_5Ni_4S_8$	1.0 M KOH	120	10	10
hcp Ni	**1.0 M KOH**	**85**	**10**	**This work**

References.

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