Electronic Supplementary Information

Nano-interfacial interactions in 2-D Ni_3S_2-Ni_3N nanosheets for hydrogen evolution reaction in alkaline medium

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ESI S1 PXRD spectrum of Ni_3S_2 and Ni_3N

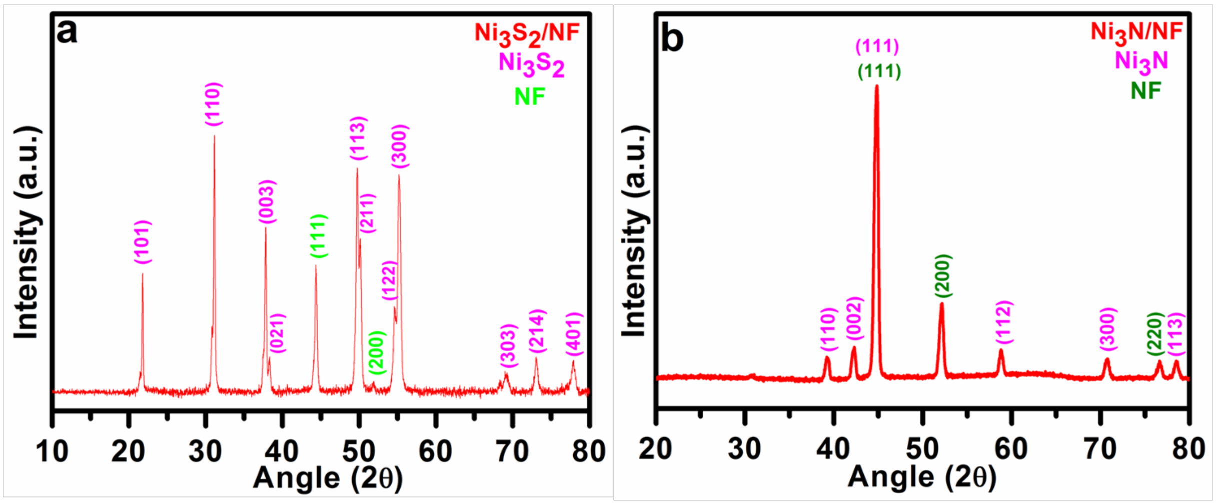

Figure S1. (a) and (b) PXRD pattern of Ni_3S_2 and Ni_3N

S2.1 Wide scan XPS spectra of Ni_3S_2-Ni_3N

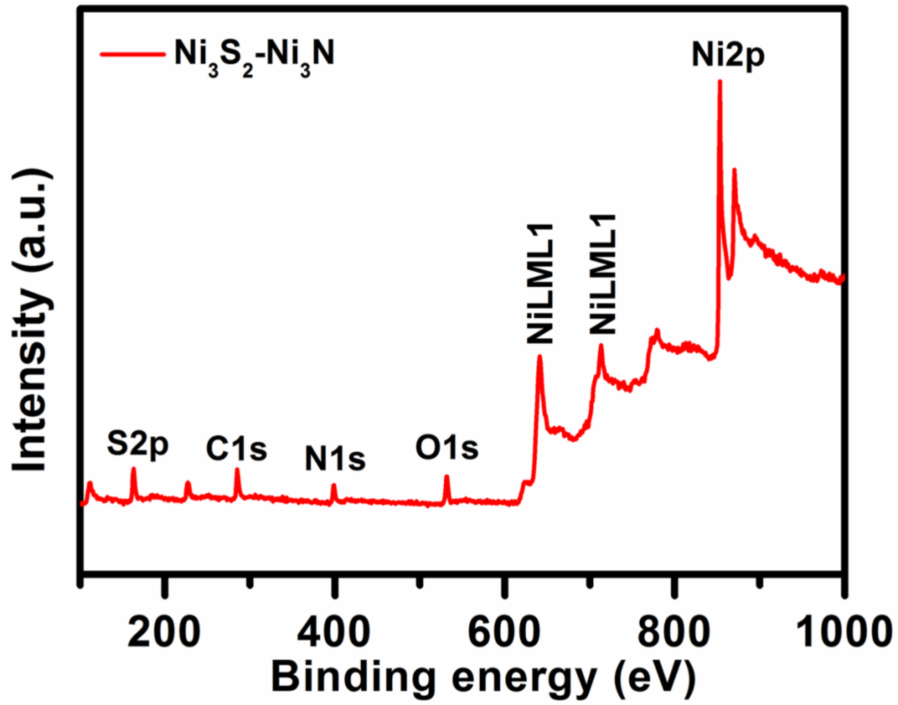

Figure S2.Wide scan XPS spectra of Ni_3S_2-Ni_3N

S2.2 XPS analysis of Ni_3S_2

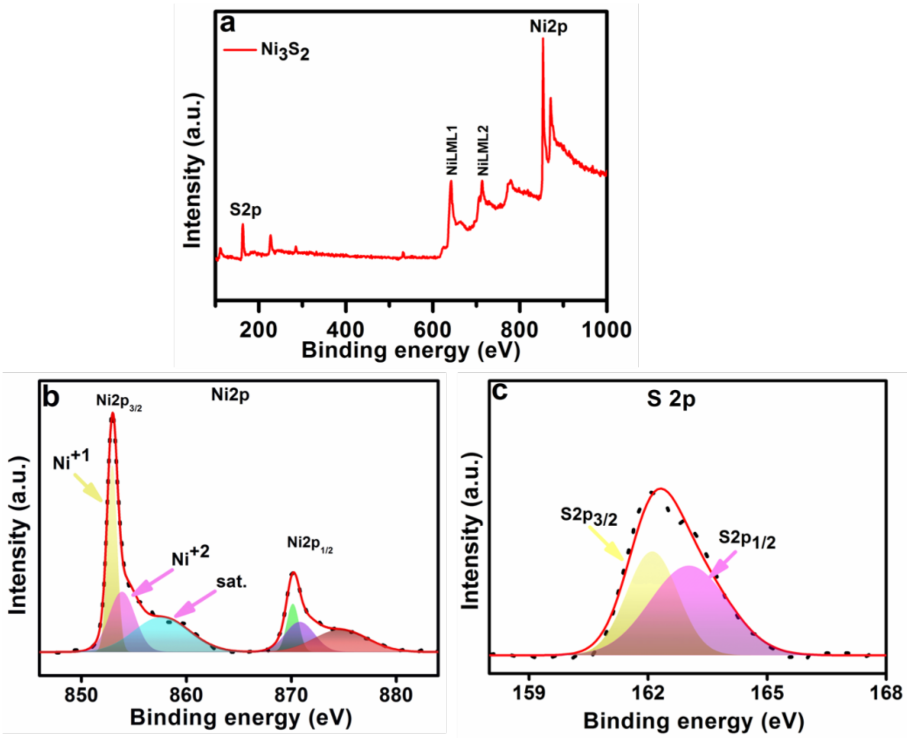

Figure S3. (a) Wide scan XPS spectra of Ni_3S_2 (b) high resolution XPS spectra of Ni_2p present in Ni_3S_2 (c) high resolution XPS spectra of S2p present in Ni_3S_2

S2.3 XPS analysis of Ni_3N

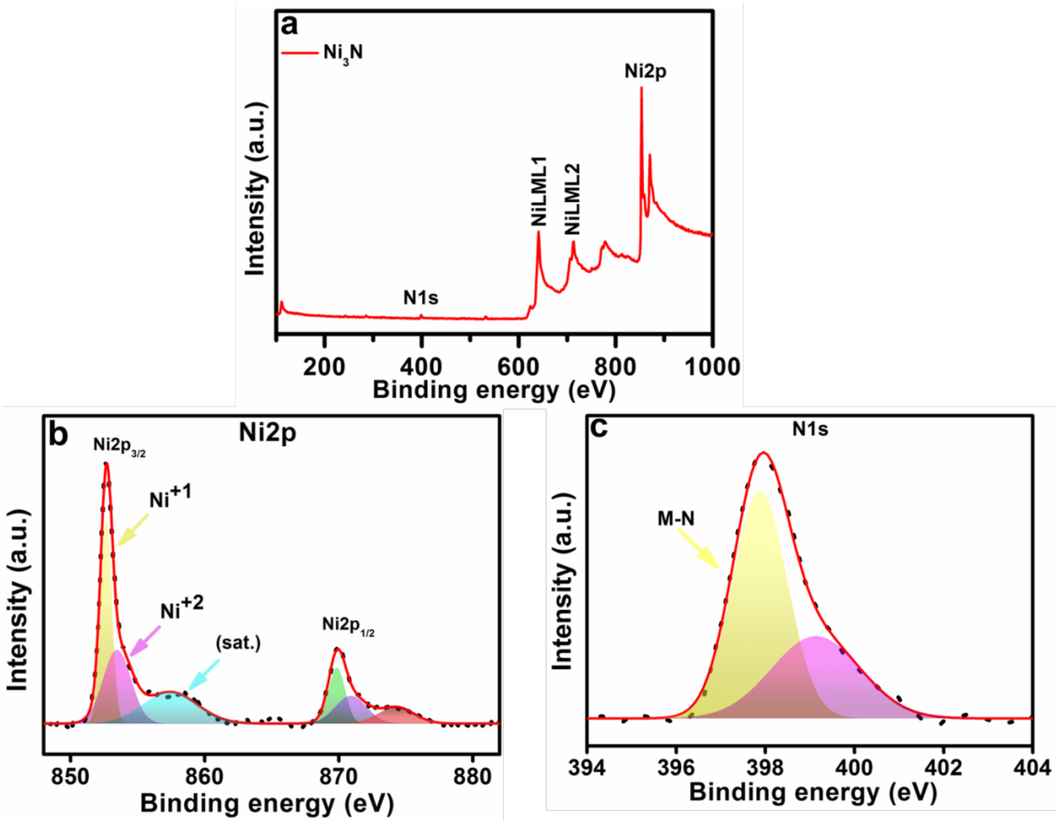

Figure S4. (a) Wide scan XPS spectra of Ni_3N (b) high resolution XPS spectra of Ni2p present in Ni_3N (c) high resolution XPS spectra of N1s present in Ni_3N

S2.4 Shifting in the XPS spectra of Ni_2p

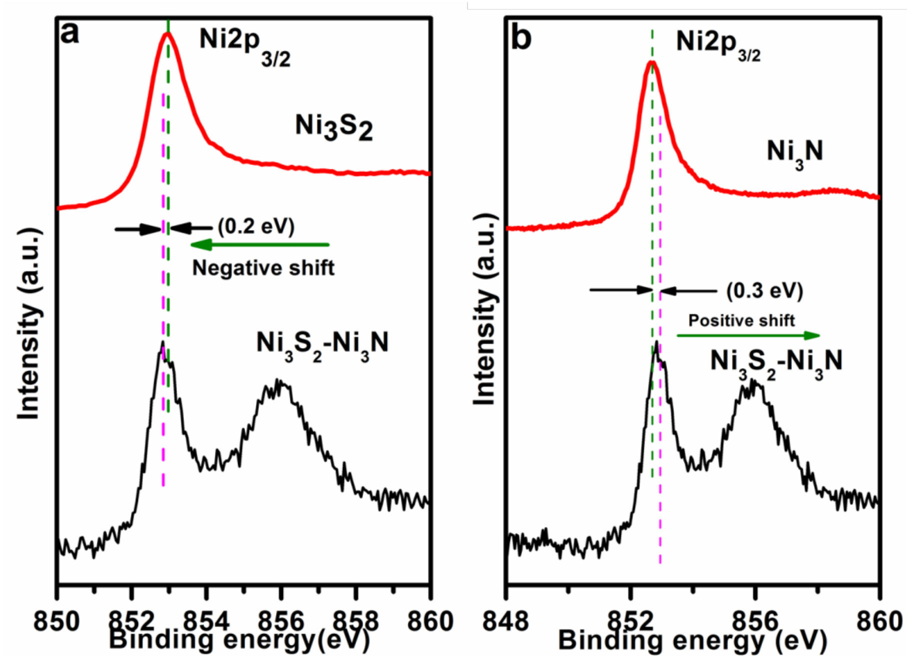

Figure S5. (a) negative shift in the binding energy of Ni2p XPS spectra after the formation of heterointerface with Ni_3S_2 (b) positive shift in the XPS spectra of Ni2p after the formation of heterointerface with Ni_3N

S3.1 Table containing the HER activity of recently reported catalyst

Material	Electrolyte	Substrate	Overpotential (mV cm^{-2})	Tafel slope (mV/dec)	Reference
PdSe2	1M KOH	GC	138	100	1
Ni-SA/NC	1M KOH	NC	102	120	2
Ni foam/CMP-350	1M KOH	NF	94	94	3
Cu-Ni3S2	1M KOH	NF	121	86.2	4
Ni3S2/NF	1M KOH	NF	161	82	5
NiWO4/Ni3S2-16	1M KOH	NF	136	112.6	6
Ni-MOF/Ni2P@EG	1M KOH	EG foil	132	59	7
Cu3N	1M KOH	GC	149.18	63.28	8
Ni3In0.6Cu0.4N1	1M KOH	GC	143	73.4	9
P-MoP/Mo2N	1M KOH	NF	89	78	10
Shig-NS-rod/NF	1M KOH	NF	137	55	11
CoP/Ni2P@HPNCP	1M KOH	GC	121	61.8	12
f Fe(OH)x@Cu-MOF	1M KOH	Carbon paper	112	76	13
Co2Ni1N	1M KOH	CC	102.6	60.17	14
Ni3Cu1@NG-NC-700	1M KOH	NC	95	84.2	15
Ni–Fe NPs	1M KOH	CFP	100	58	16
MoC-Mo2C/PNCDs	1M KOH	CFP	121	60	17
3% Bi/CoP	1M KOH	GC	122	60.2	18
Ni-SA/NC	1M KOH	NC	102	120	19
CoNiP-41	1M KOH	GC	138	65	20
Ni_3S_2-Ni_3N	**1M KOH**	**NF**	**96**	**135**	**This work**

Table S1. Table containing the HER activity of recently reported catalyst

S3.2 Table containing the value of R_s and R_{ct} for all the catalysts obtained from EIS analysis

Catalyst	$R_s(\Omega)$	$R_{ct}(\Omega)$
Ni_3S_2-Ni_3N	0.4	0.9
Ni_3N	0.38	1.16
Ni_3S_2	0.4	3.2

Table S2. Table containing the value of R_s and R_{ct} for all the catalysts obtained from EIS analysis

S3.3 XPS analysis of Ni_3S_2-Ni_3N after stability

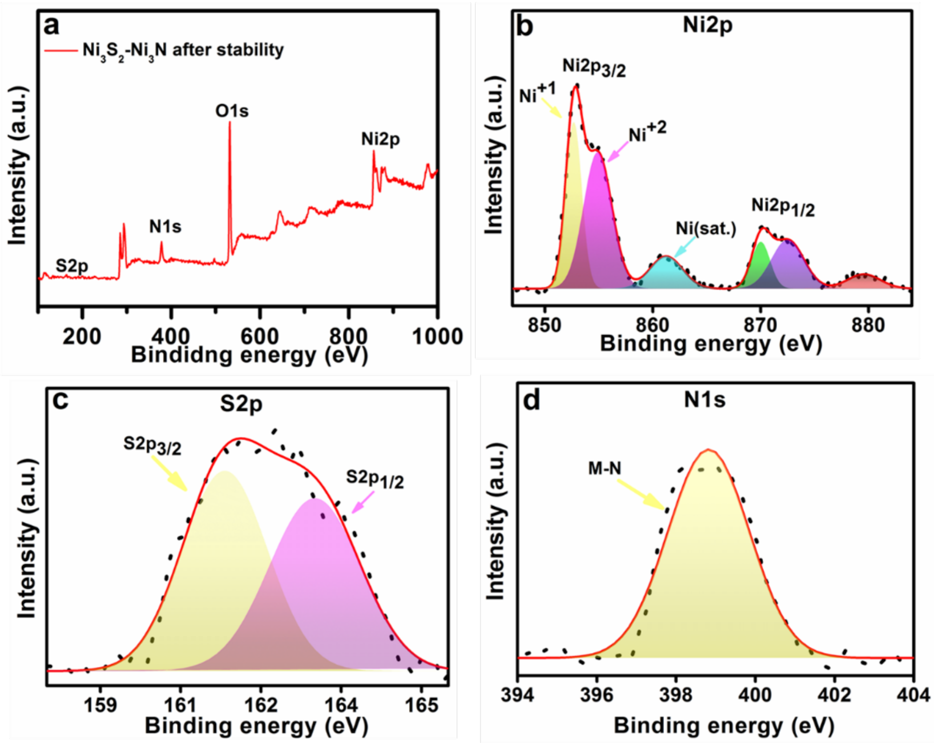

Figure S6. XPS analysis of the catalyst after stability

S3.4 PXRD pattern of Ni_3S_2-Ni_3N after stability test.

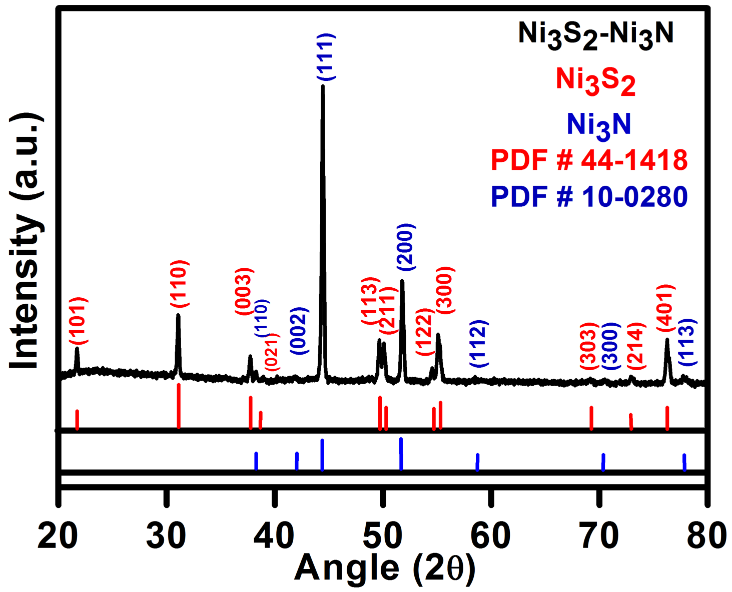

Figure S7 PXRD pattern of the catalyst after stability test

S3.5 CV curve used for the calculation of double layer capacitance

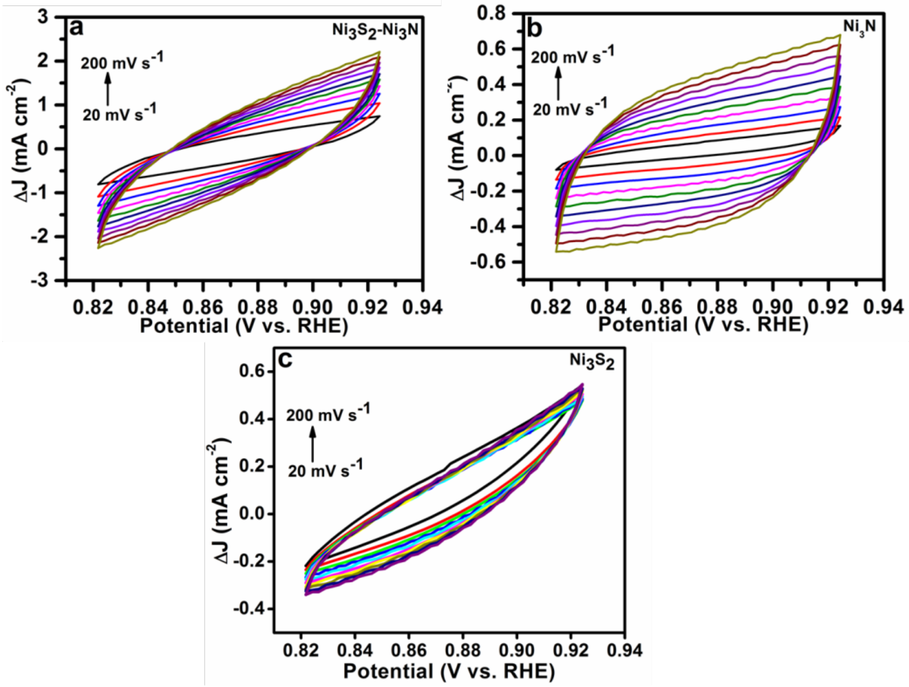

Figure S8. Cyclic voltammetry curve of (a) Ni_3S_2-Ni_3N, (b) Ni_3N and (c) Ni_3S_2 used for the calculation of double layer capacitance

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