Electronic Supplementary Information

Self-standing hollow Ni-doped Mo_2C nano tube arrays induced by the Kirkendall effect for efficient hydrogen evolution reaction in acidic and alkaline solutions

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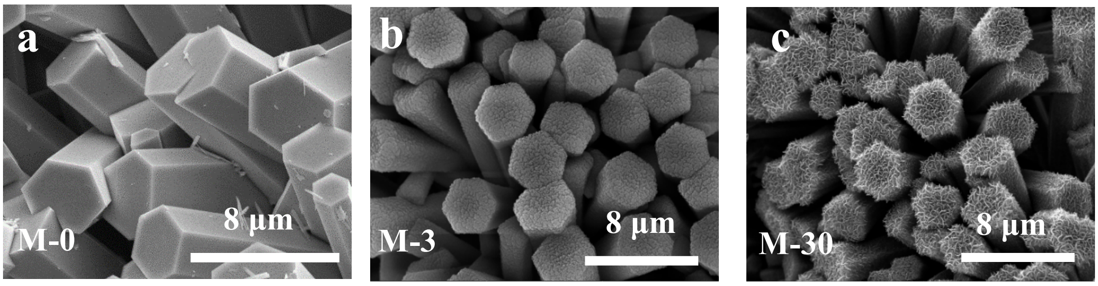

Figure S1. SEM images of M-0, M-3, and M-30

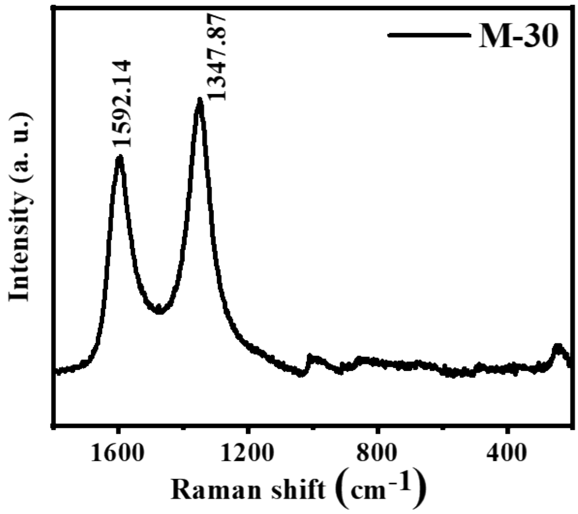

Figure S2. Raman spectra of M-30

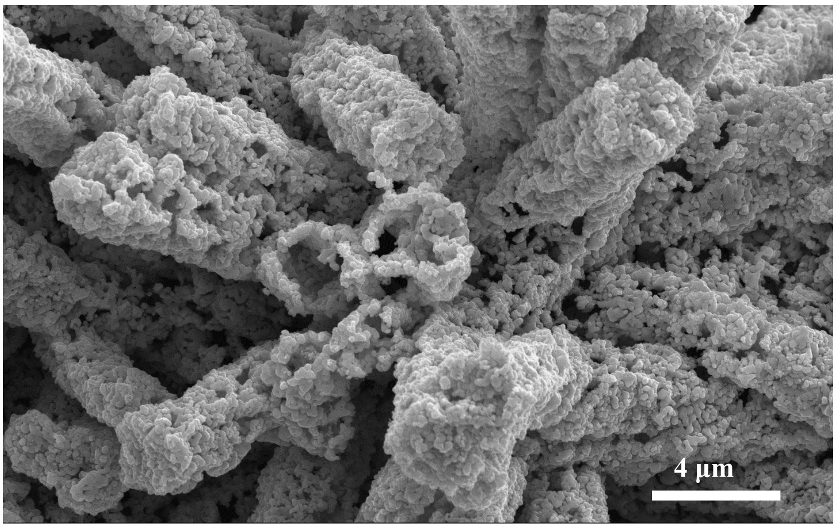

Figure S3. SEM image of M-000

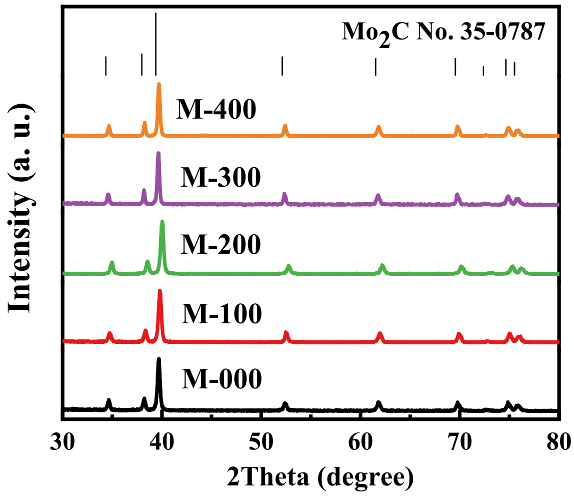

Figure S4. The XRD patterns of M-100, M-200, M-300 and M-400.

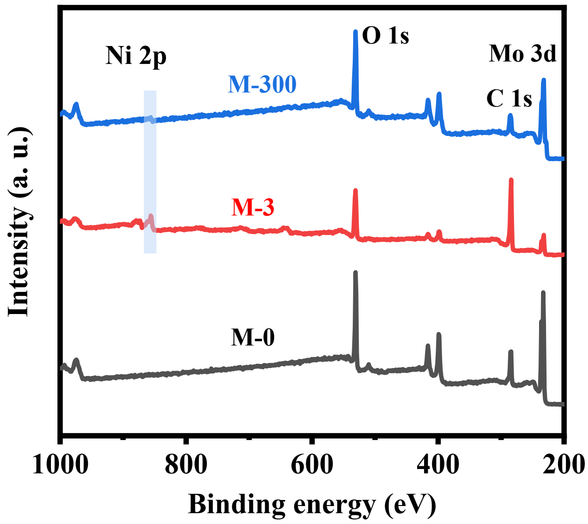

Figure S5. The XPS survey spectra of M-0, M-3, and M-300

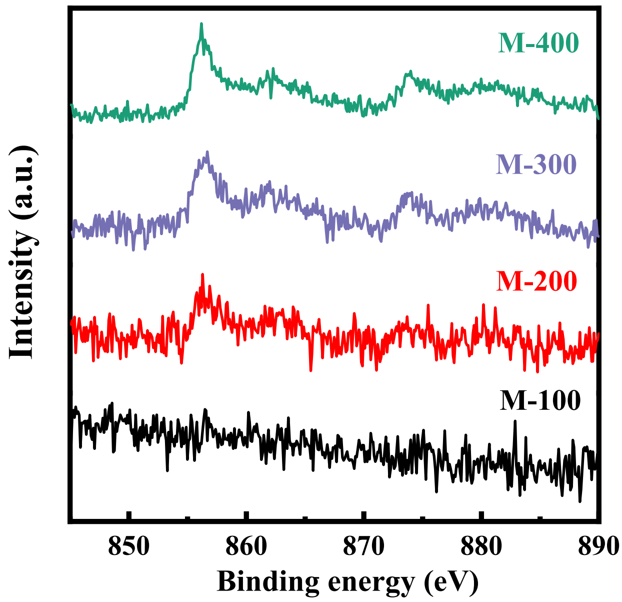

Figure S6. Ni fine spectra of M-100, M-200, M-300 and M-400

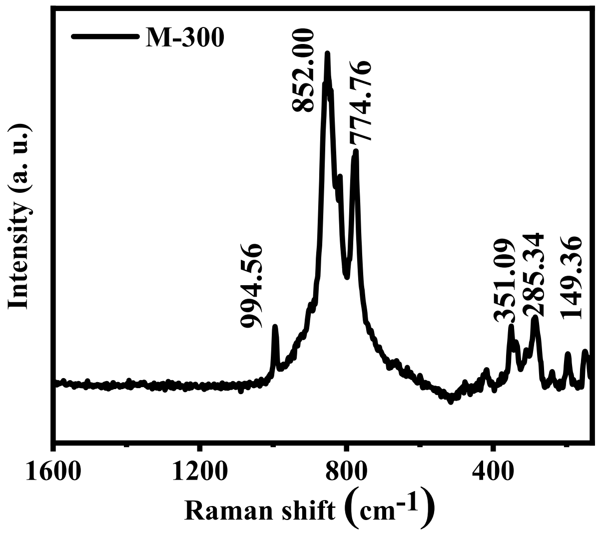

Figure S7. Raman spectrum of M-300

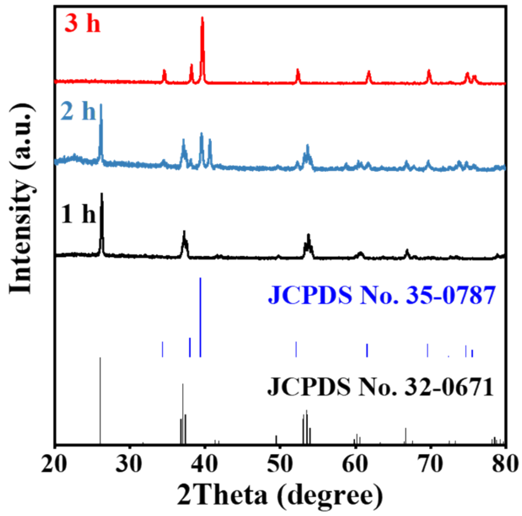

Figure S8. XRD patterns of M-30 calcined at 800°C for different time period.

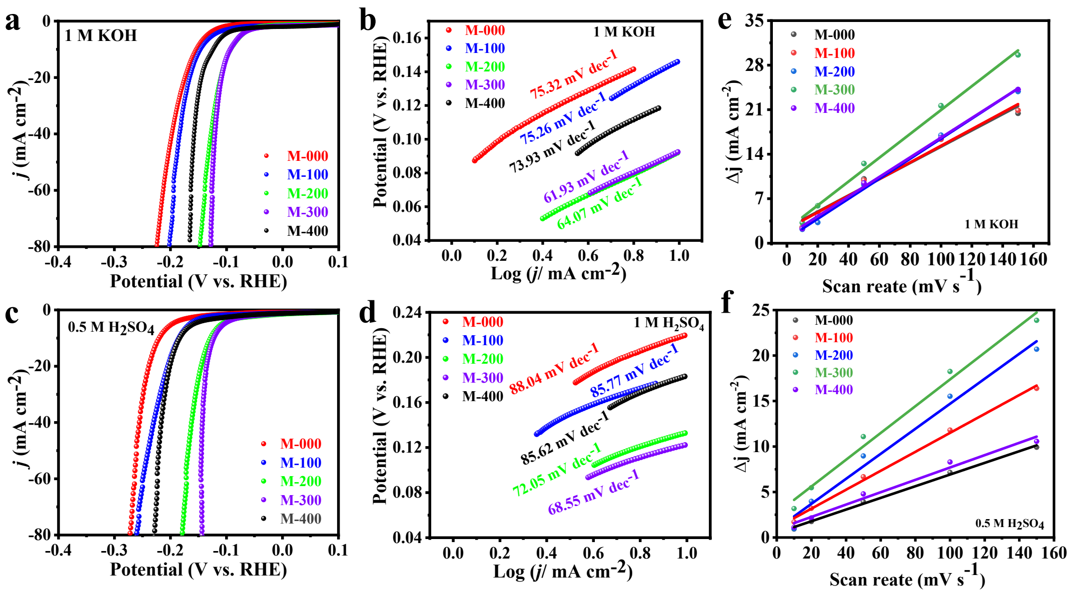

Figure S9. (a) and (c) The LSV curves, (b) and (d) the Tafel plots, (e) and (f) Current density as a function of the scan rate for M-000, M-100, M-200, M-300, and M-400 electrodes.

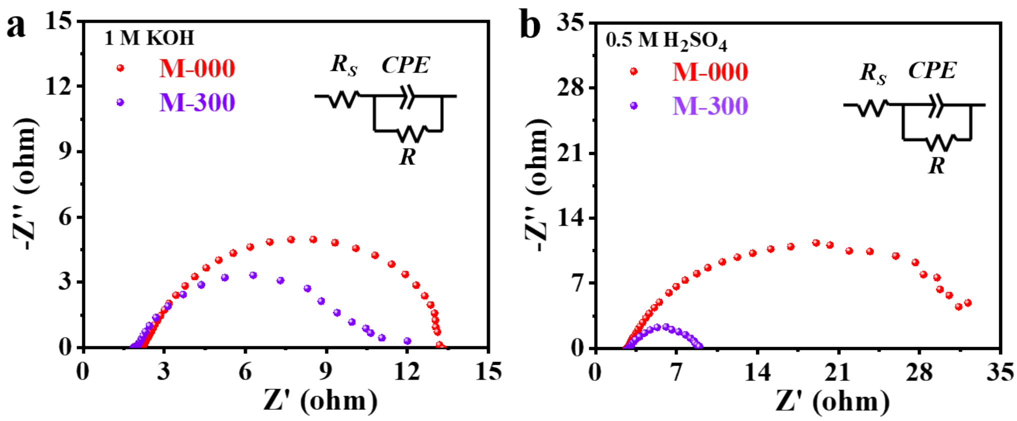

Figure S10. The Nyquist plots of M-000 and M-300.

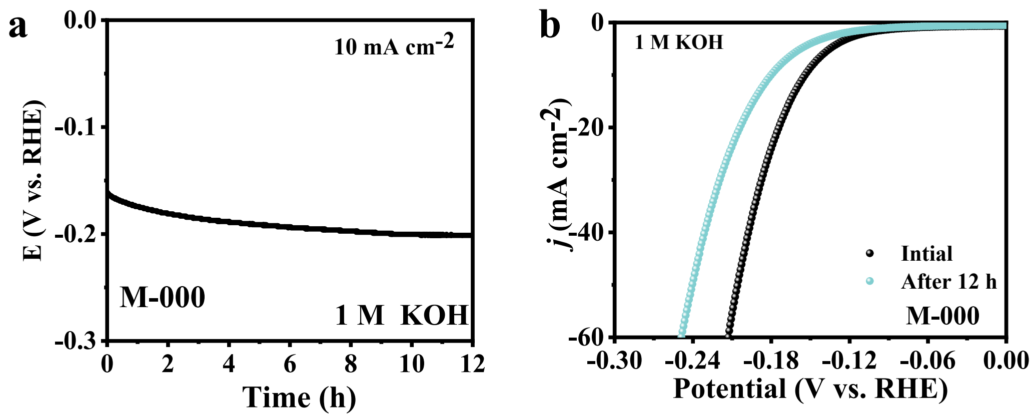

Figure S11. (a) The stability curves (voltage vs. time) and (b) LSV curves of initial and after stability tests in 1 M KOH of the M-000.

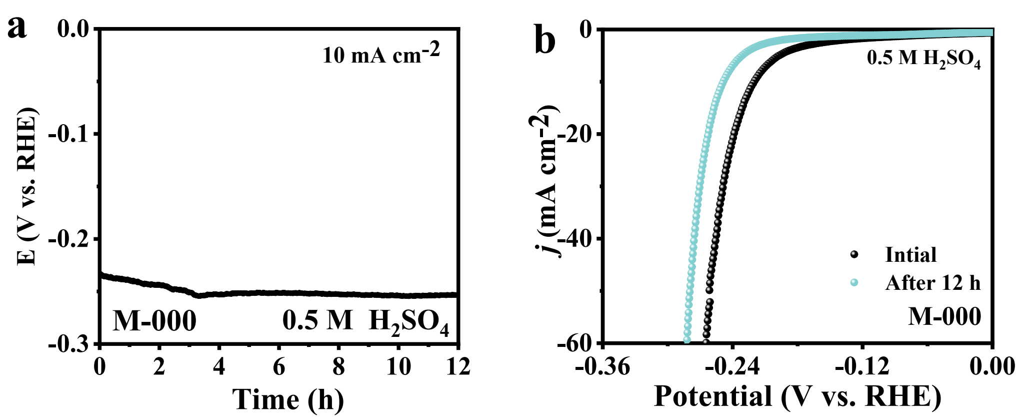

Figure S12. (a) The stability curves (voltage vs. time) and (b) LSV curves of initial and after stability tests in 0.5 M H_2SO_4 of the M-000.

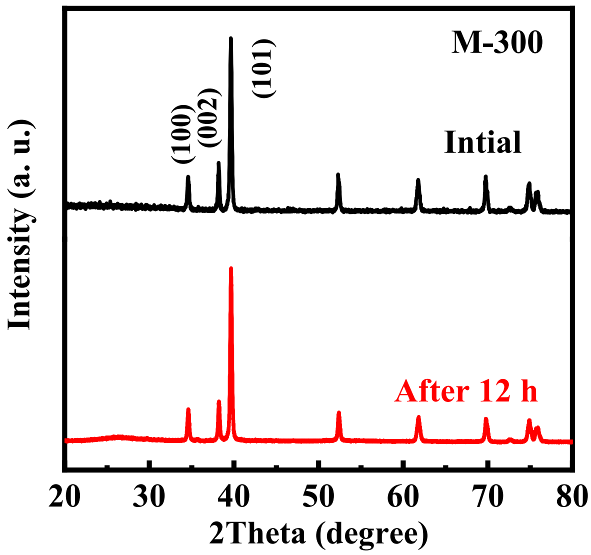

Figure S13. XRD patterns of M-300 before and after stability test in 0.5 M H_2SO_4

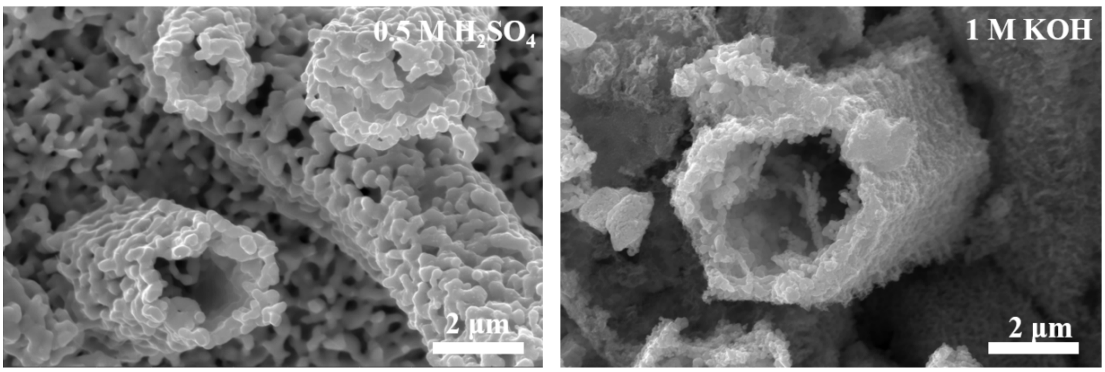

Figure S14. SEM images of M-300 after stability test

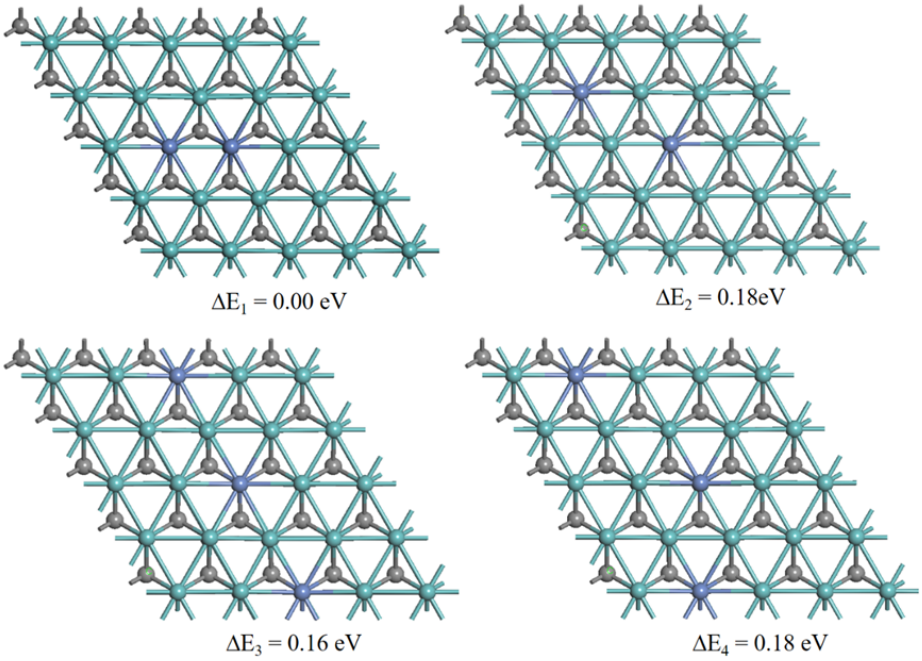

Figure S15. The optimized structures of 2Ni-doped Mo_2C.

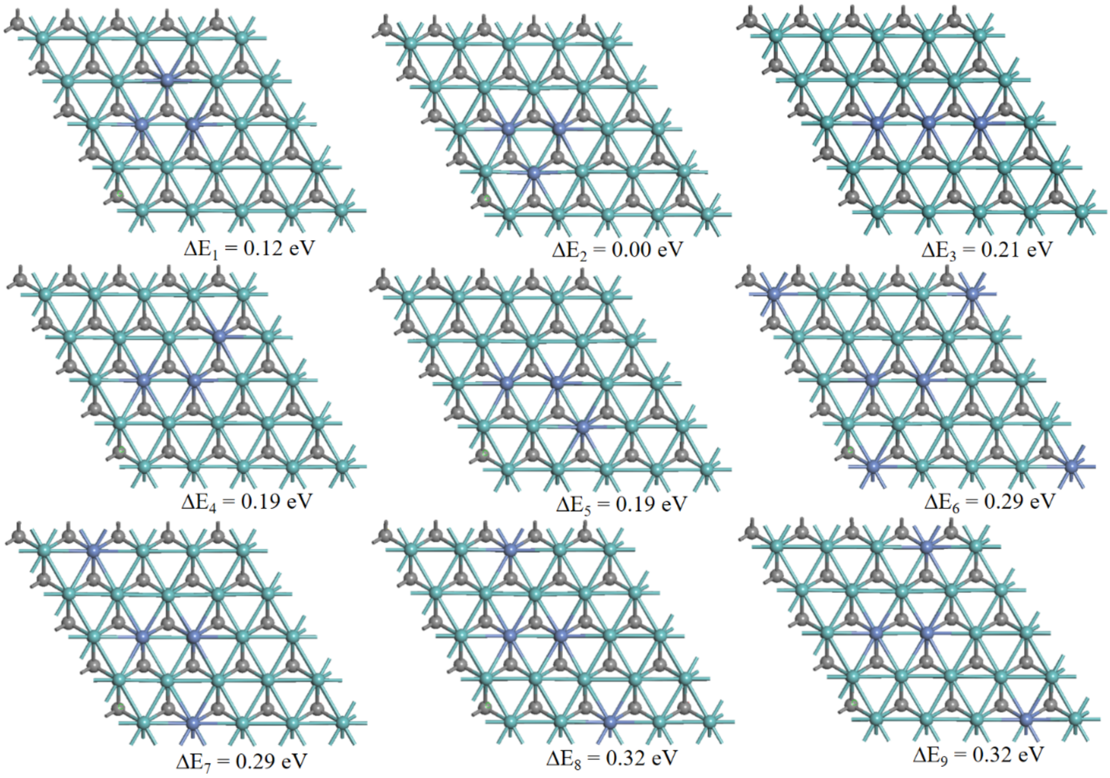

Figure S16. The optmized structures of 3Ni-dped Mo_2C.

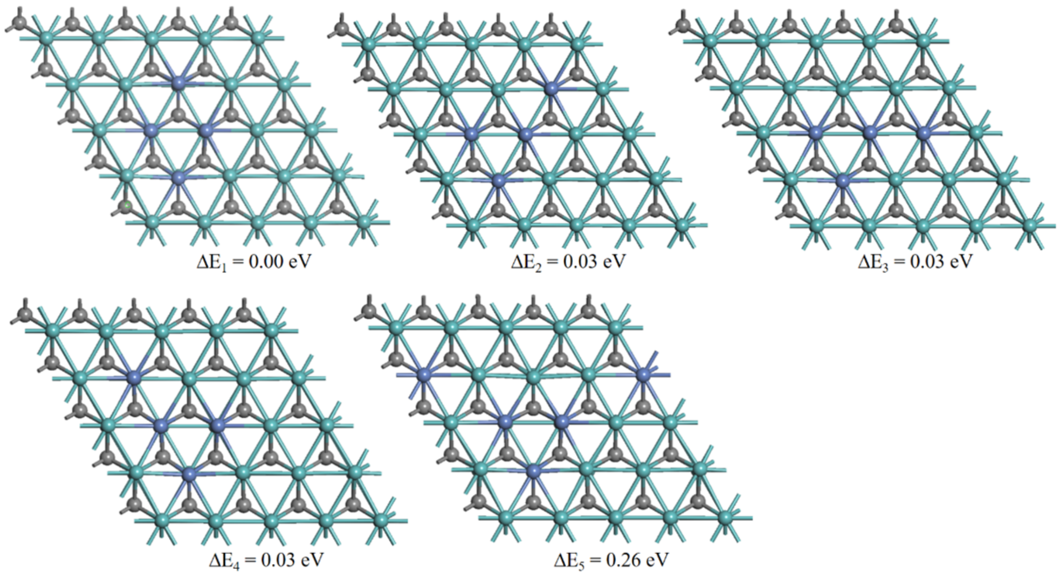

Figure S17. The optimized structures of 4Ni-dped Mo_2C.

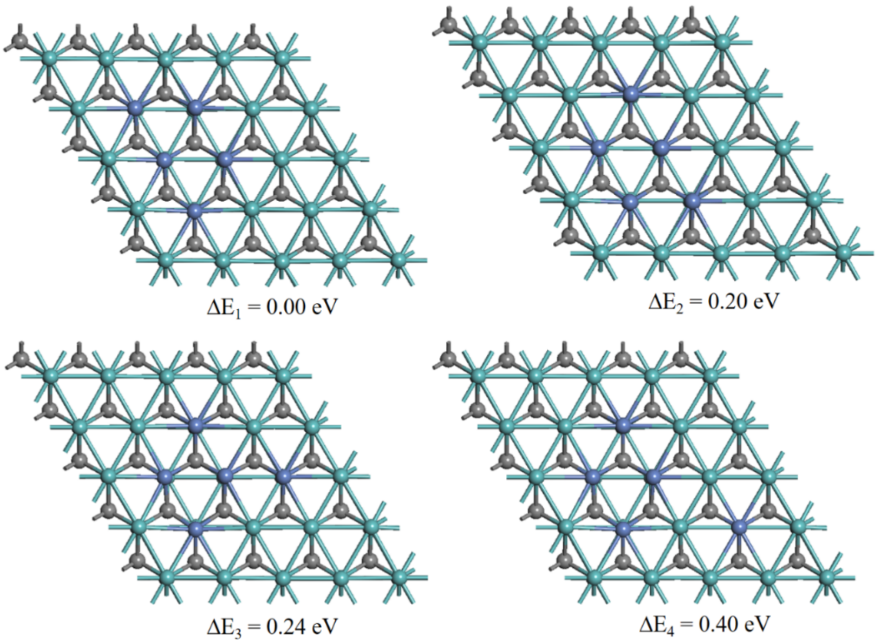

Figure S18. The optmized structures of 5Ni-dped Mo_2C.

Table S1. The content of Ni, Mo, and C was calculated from XPS fine spectra of M-100, M-200, M-300, and M-400.

	M_{Ni} (%)	M_{Mo} (%)	M_C (%)
M-100	-	38.00	61.00
M-200	3.53	80.06	16.41
M-300	8.86	75.91	15.22
M-400	10.48	72.08	17.43

Table S2. Comparison of HER electrocatalytic activity of M-300 with other recently reported high performance HER electrocatalysts.

Catalysts	Overpotential (mV) at j=10 mA cm^{-2}	Electrolyte	Reference
This work (M-300)	**93**	**1 M KOH**	
Ni/Mo_2C(1:2)-NCNFs	143	1 M KOH	1
Co-NC@Mo_2C	99	1 M KOH	2
Co, Mo_2C-CNF	128	1 M KOH	3
Co-Mo_2C@C	98	1 M KOH	4
Ni/Mo_2C-NCSs	131	1 M KOH	5
Co-Mo_2C-CN_{x-2}	92	1 M KOH	6
Ni-Mo_2C-0.67	151.1	1 M KOH	7
This work (M-300)	**122**	**0.5 M H_2SO_4**	
Co-NC@Mo_2C	143	0.5 M H_2SO_4	2
Mo_2C@NG/CNT	160	0.5 M H_2SO_4	8
Mo_2C-GNR	152	0.5 M H_2SO_4	9
Ni-Mo_2C-0.67	165	0.5 M H_2SO_4	7
L-Mo_2C	170	0.5 M H_2SO_4	10
Mo_2C/W_2C	140	0.5 M H_2SO_4	11
VN/Mo_2C	140	0.5 M H_2SO_4	12

Reference

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