Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

FeMo-N nanosheet arrays supported on nickel foam for efficient electrocatalytic reduction of N_2 to NH_3 at ambient condition

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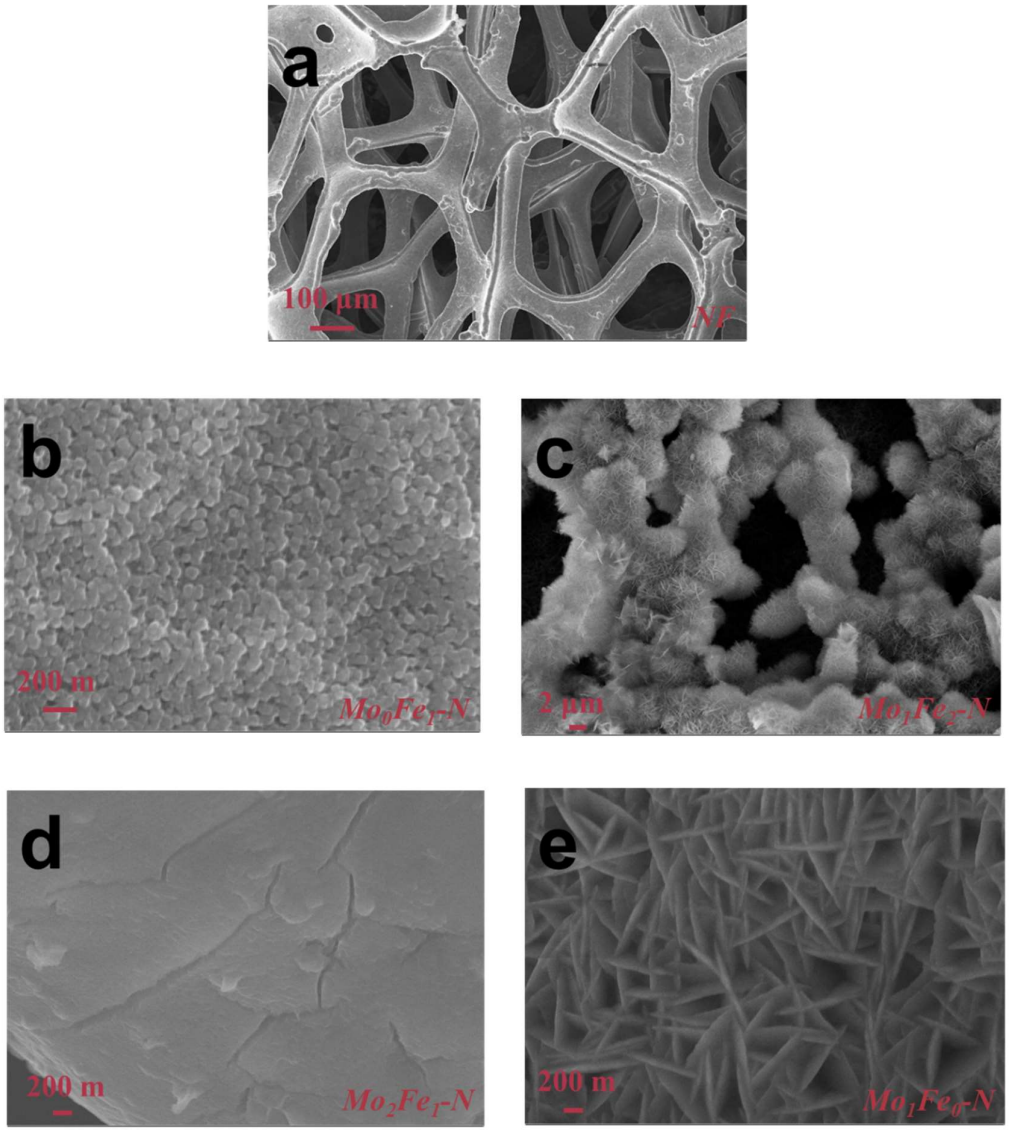


Figure. S1 SEM images for NF and for Fe_mMo_n-N at other molar ratios.

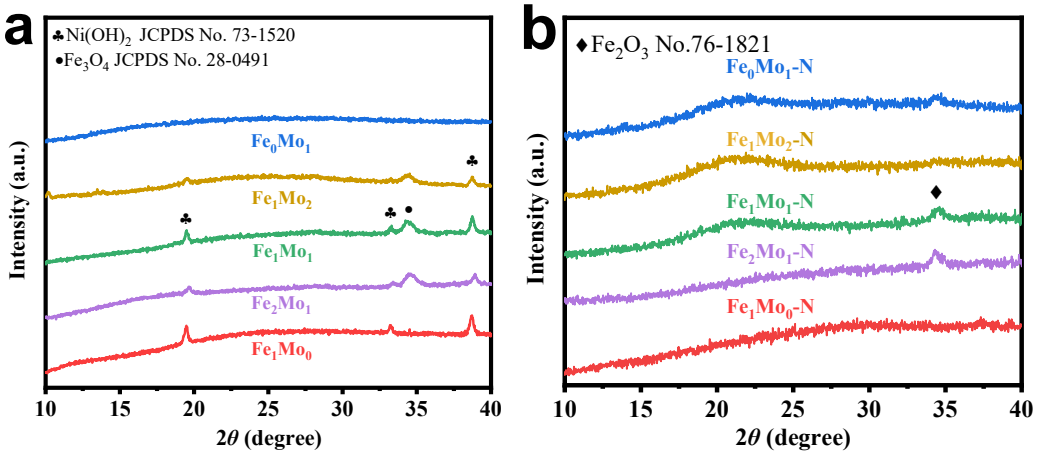


Figure. S2 XRD patterns of (a) Fe_mMo_n and (b) Fe_mMo_n-N.

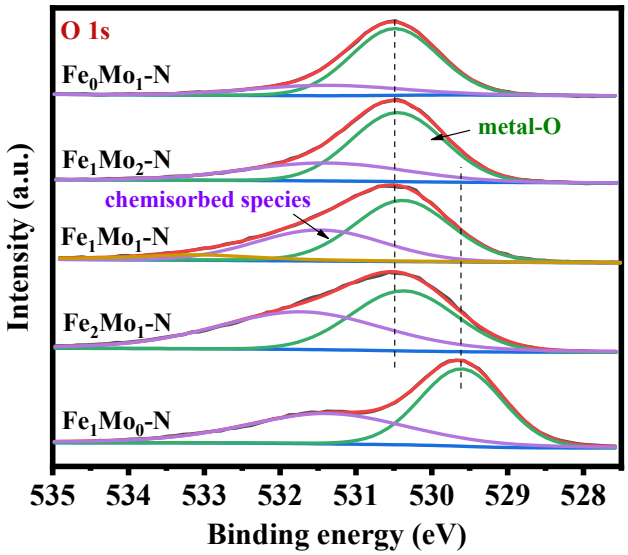


Figure. S3 High-resolution XPS spectra of O 1s for Fe_mMo_n-N.

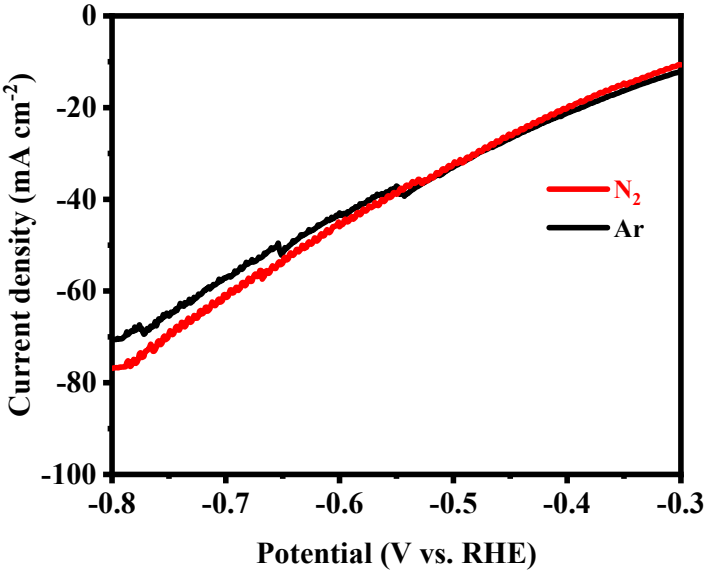


Figure. S4 LSV curves of Fe_1Mo_1-N for NRR in N_2- (red line) and Ar- (black line) saturated electrolytes with a scan rate of 5 mV s^{-1}.

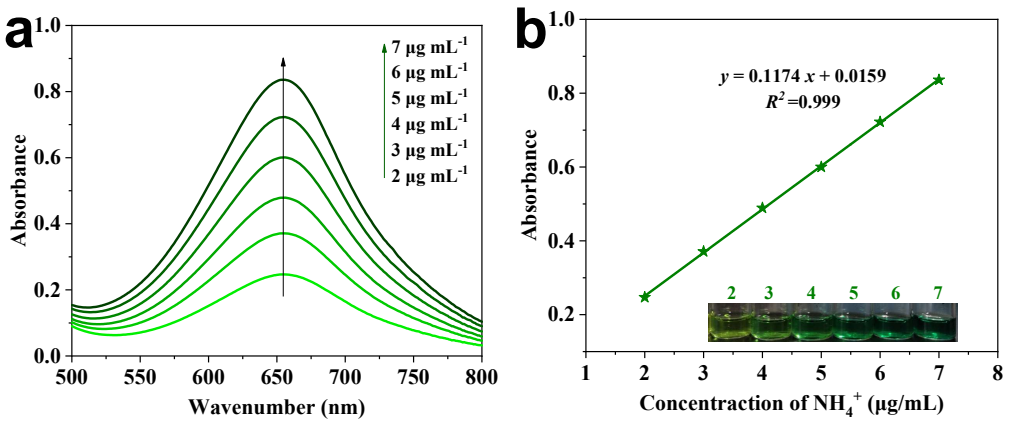


Figure. S5 (a) UV-Vis spectra of indophenol assays with NH_4^+ concentrations after incubated for 2 h at room temperature. (b) Calibration curve used for calculation of NH_4^+ concentrations.

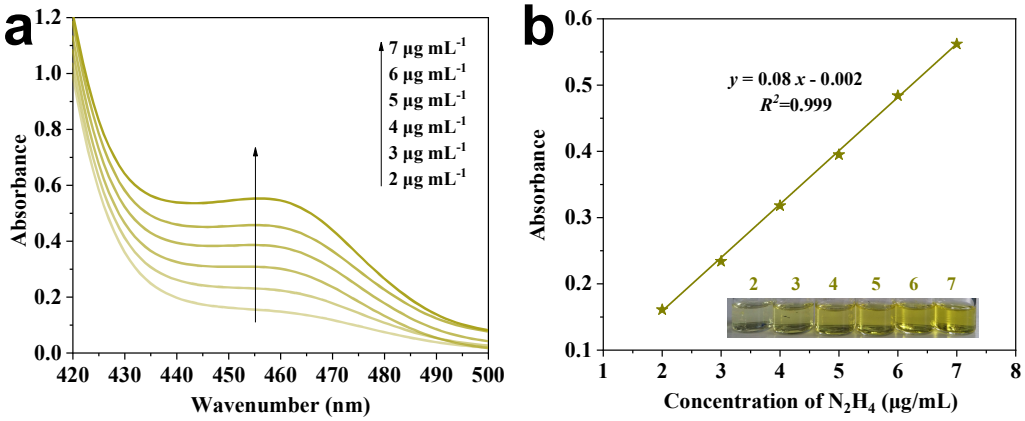


Figure. S6 (a) UV-Vis adsorption spectra of various N_2H_4 concentrations after incubated for 10 min at room temperature. (b) Calibration curve used for calculation of N_2H_4 concentrations.

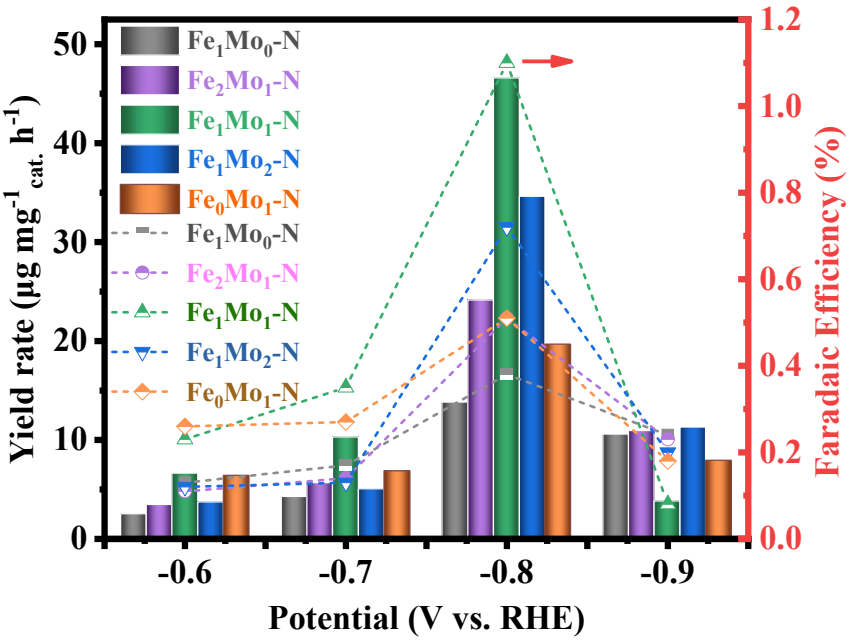
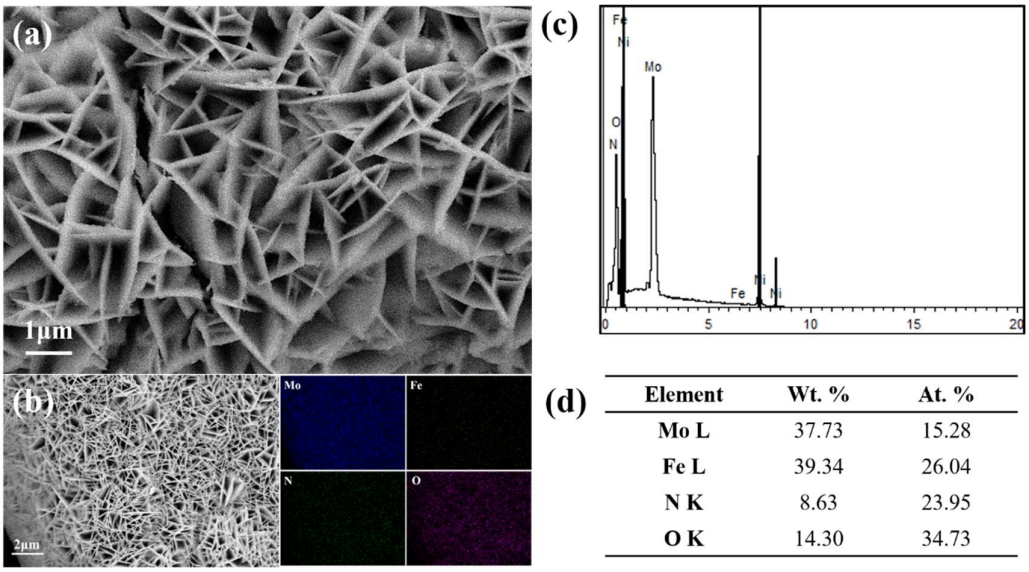


Figure. S7 NH_3 yield rates and FEs of different molar ratios of Fe_mMo_n-N in 0.05 M H_2SO_4 at different potentials.



(d)

Element	Wt. %	At. %
Mo L	37.73	15.28
Fe L	39.34	26.04
N K	8.63	23.95
O K	14.30	34.73

Figure. S8 (a) nanostructure image; (b) element mapping; (c) element spectrum; (d) element content of SEM of Fe_1Mo_1-N after 10 h chronoamperometry test.

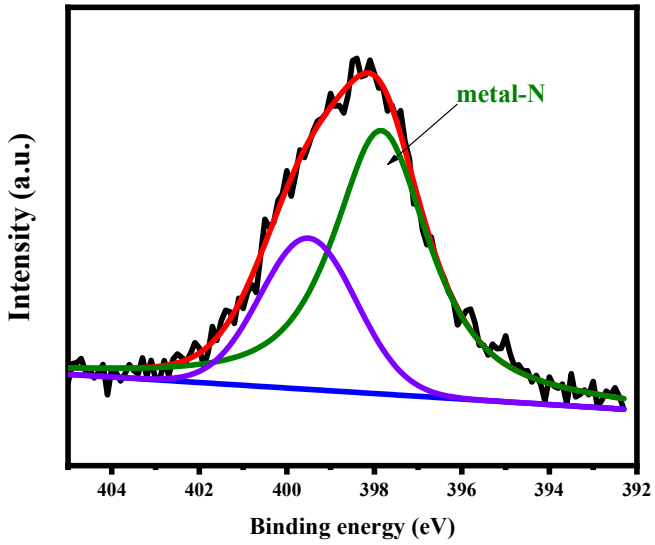


Figure. S9 XPS spectra in N 1s region for Fe_1Mo_1-N after 10 h chronoamperometry in Ar-saturated 0.05 M H_2SO_4 electrolyte.

Table. S1. Elemental atom ratio of Fe_mMo_n-N determined by XPS peak area.

Sample	Mo^{4+}/Mo^{6+}	Fe^{2+}/Fe^{3+}	N atomic %	N atomic of M-N %
Fe_1Mo_0-N	/	0.97	**1.83**	/
Fe_2Mo_1-N	0.99	1.00	**19.51**	10.77
Fe_1Mo_1-N	0.96	1.00	**32.14**	18.52
Fe_1Mo_2-N	1.09	1.00	**29.04**	16.66
Fe_0Mo_1-N	1.22	/	**26.11**	14.67

Table S2. Comparison of the NH_3 yield rate and FE of Fe_1Mo_1-N with other reported NRR electrocatalysts under ambient atmosphere.

Catalyst	Electrolyte	NH_3 yield/μg $mg^{-1}_{mg.}$ h^{-1}	FE/%	Reference
Fe_1Mo_1-N	**0.05 M H_2SO_4**	**46.64**	**1.43**	**This work**
FeTPPCl	0.1 M Na_2SO_4	18.28	16.76	[1][1]
BCN	0.05M Na_2SO_4	41.9	9.87	[2][2]
P-TiO_2	0.1 M $LiClO_4$	23.05	12.26	[3][3]
PdPb/C	0.1 M HCl	37.68	5.79	[4][4]
Ru-NC	0.1 KOH	16.68	14.23	[5][5]
Fe-$(O\text{-}C_2)_4$	0.1 KOH	32.1	29.3	[6][6]
Fe/Mo_2C	0.5 M Na_2SO_4	~37	20.1	[7][7]
Mo-FeS_2	0.1 KOH	26.15	14.41	[8][8]
NiFe-NF	0.1 M Na_2SO_4	16.89	12.50	[9][9]
Mo_2CTX	0.5 M K_2SO_4	40.57	25.77	[10][10]
CN/C	2 M H_2SO_4	2.9	62.1	[11][11]
Mo-Mo_2C/NCNTs	0.005 M H_2SO_4	16.1	7.1	[12][12]
Cu_9S_5	0.5 M Na_2SO_4	10.8	35	[13][13]
$CaCoO_x$	0.05 M Na_2SO_4	16.25	20.51	[14][14]
β-FeOOH	0.5 M $LiClO_4$	42.38	9.02	[15][15]

Notes and References

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