Supporting Information

Non-noble metal Li, Mn co-doped Ni_3S_2 electrocatalyst for glycerol oxidation synergistic coupling to promote hydrogen evolution reaction

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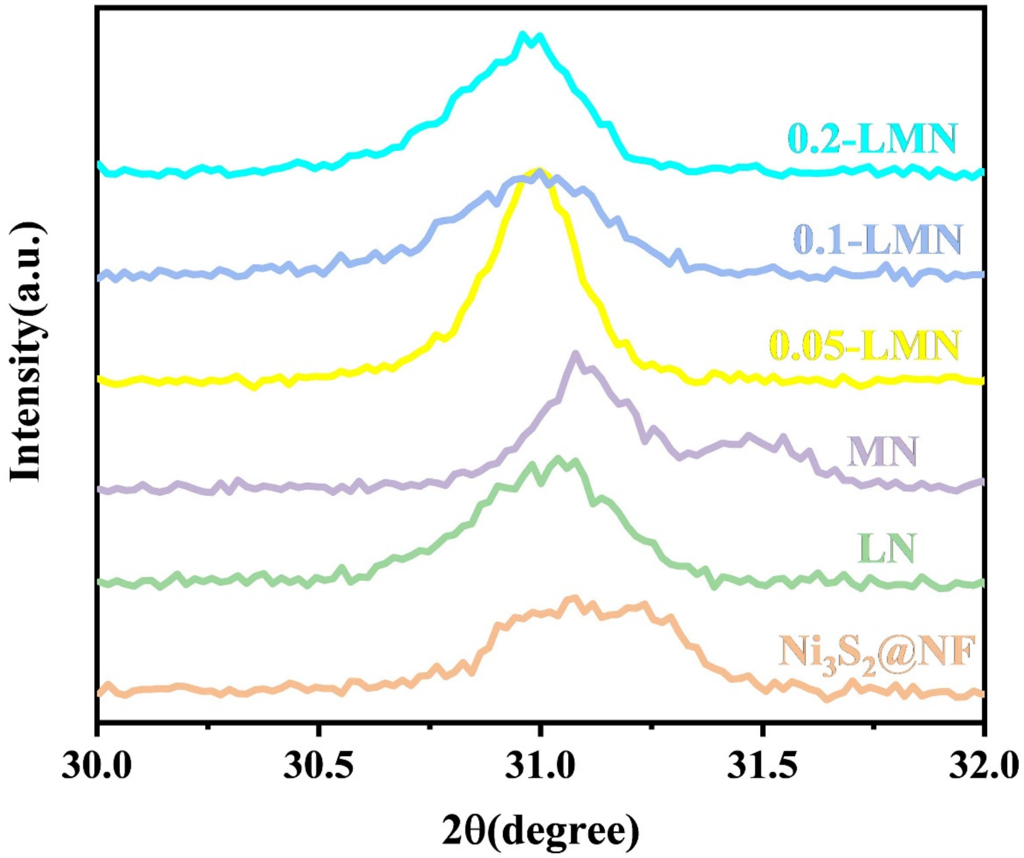

Fig. S1 n-LMN,LN,MN, and Ni_3S_2@NF highest diffraction peak angle shift.

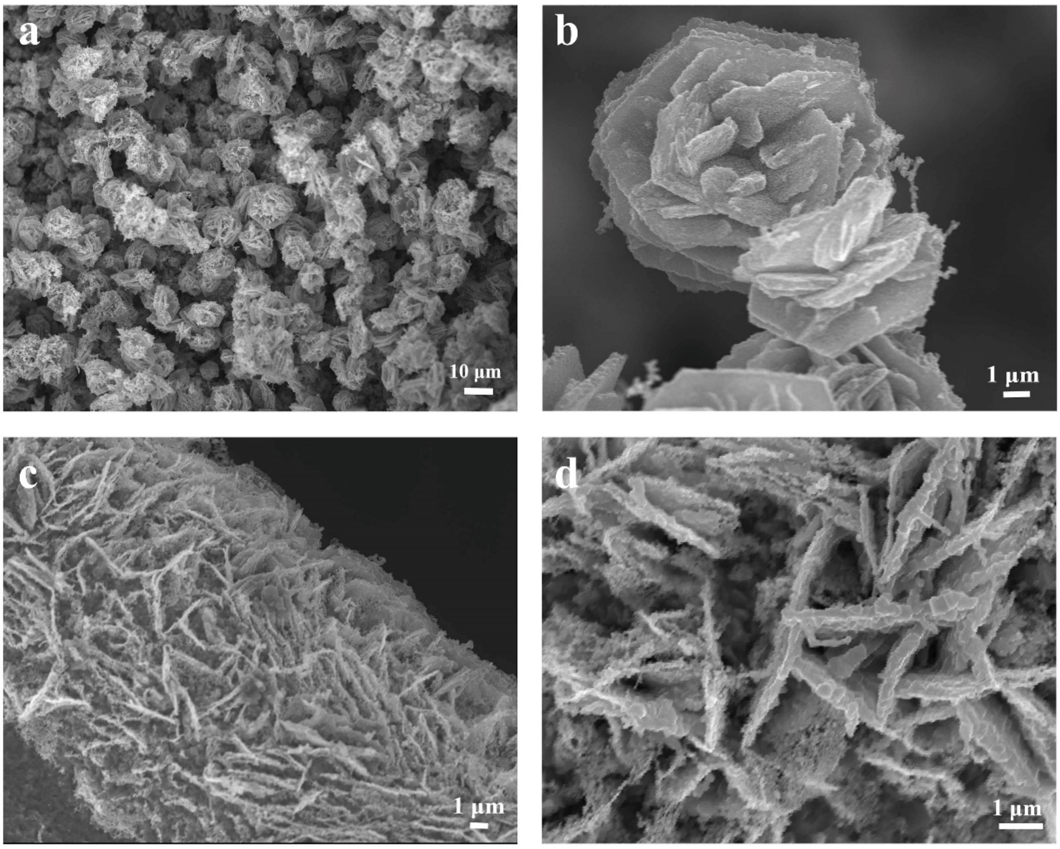

Fig. S2 The SEM images of a, b MN and c, d LN at different multiples were obtained.

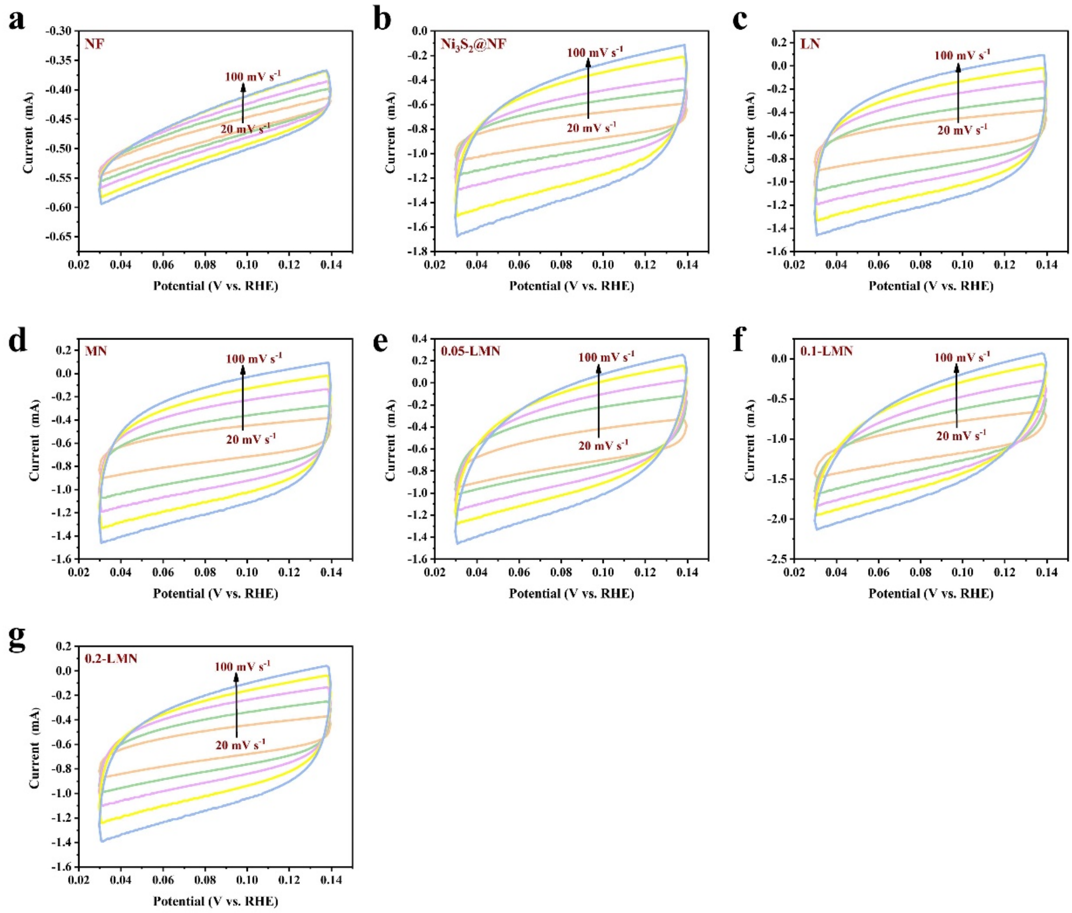

Fig. S3 Cyclic voltammetry curves of different materials between 0.03–0.138 V vs. RHE.

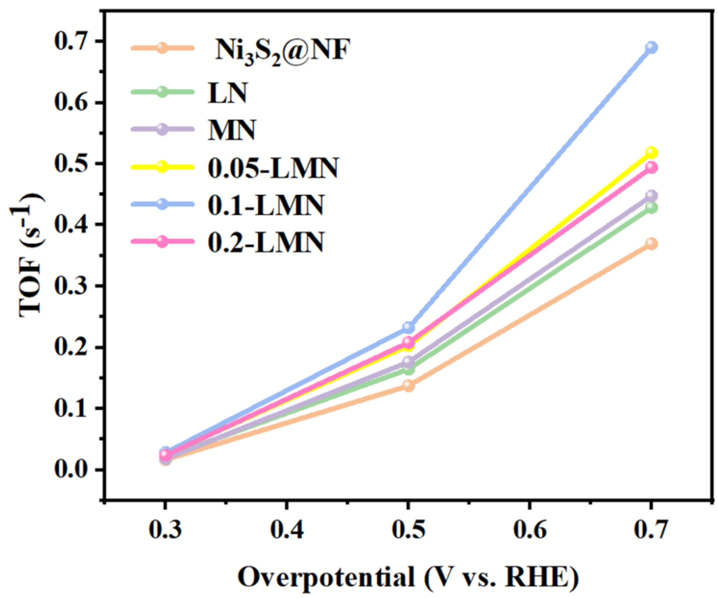

Fig. S4 The TOF of HER in Ni_3S_2@NF, LN, MN, 0.05-LMN, 0.1-LMN, and 0.2-LMN at different overpotentials.

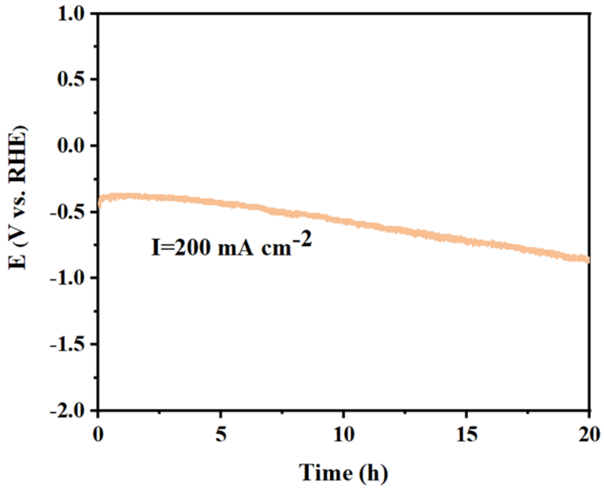

Fig. S5 The stability of 0.1-LMN catalyzed HER at a current density of 200 mA cm^{-2}.

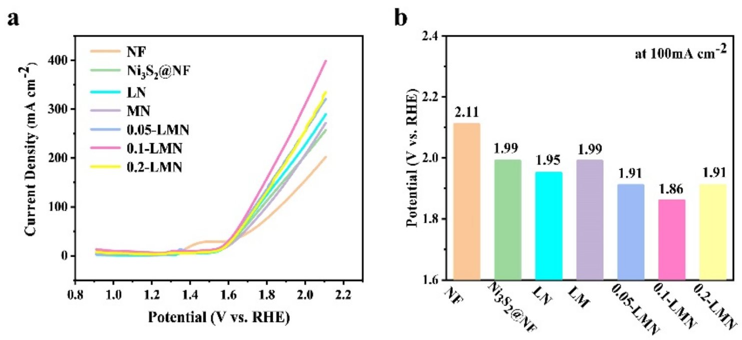

Fig. S6 The (a) LSV curve of OER catalyzed by different materials; (b) Overpotential comparison at a current density of 100 mA cm^{-2}.

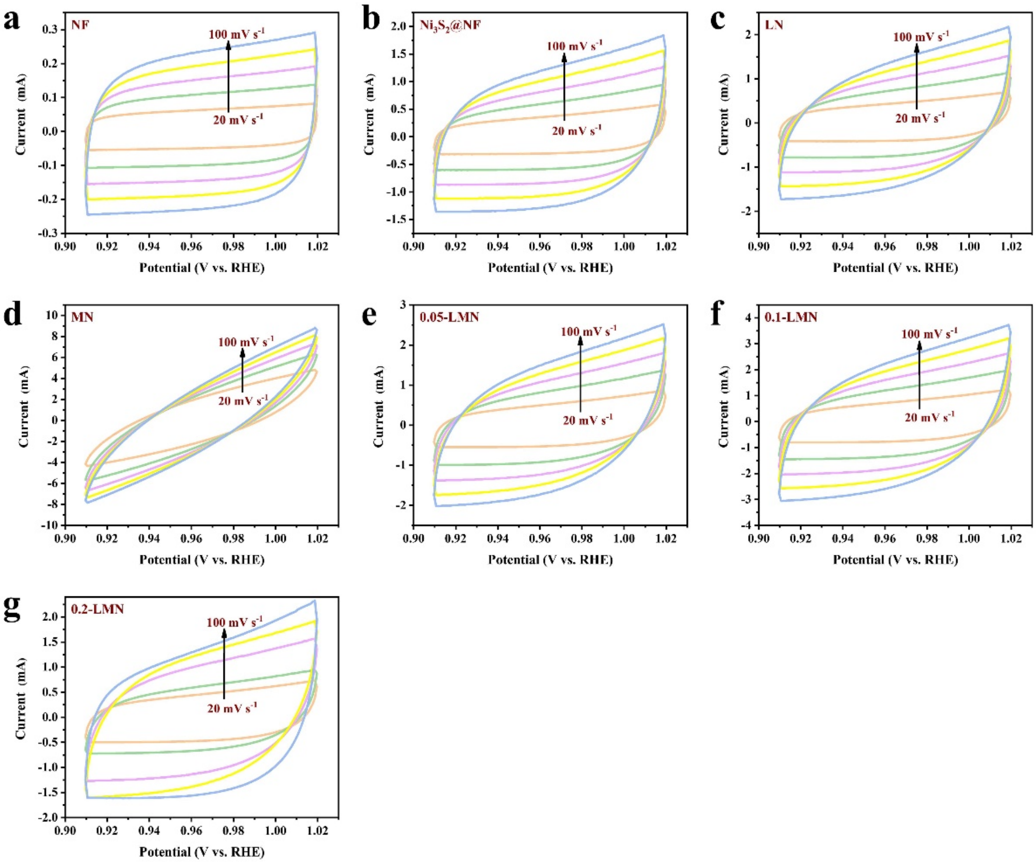

Fig. S7 Cyclic voltammetry curves of different materials between 0.909–1.019 V vs. RHE.

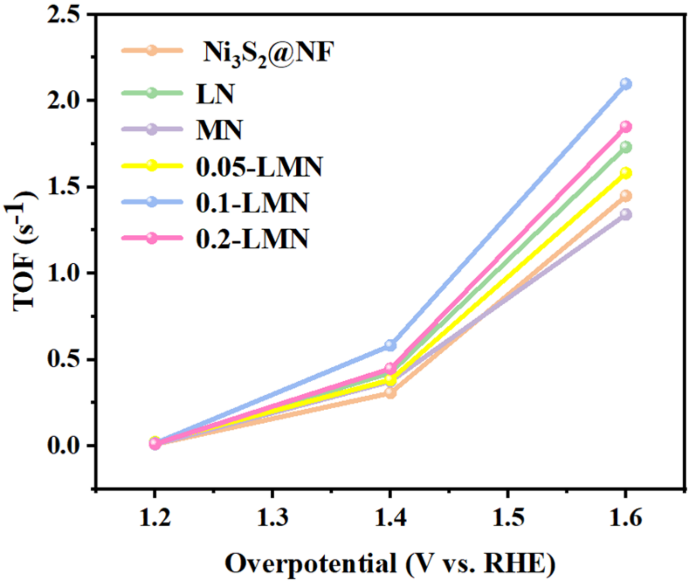

Fig. S8 The TOF of GOR in Ni_3S_2@NF, LN, MN, 0.05-LMN, 0.1-LMN, and 0.2-LMN at different overpotentials.

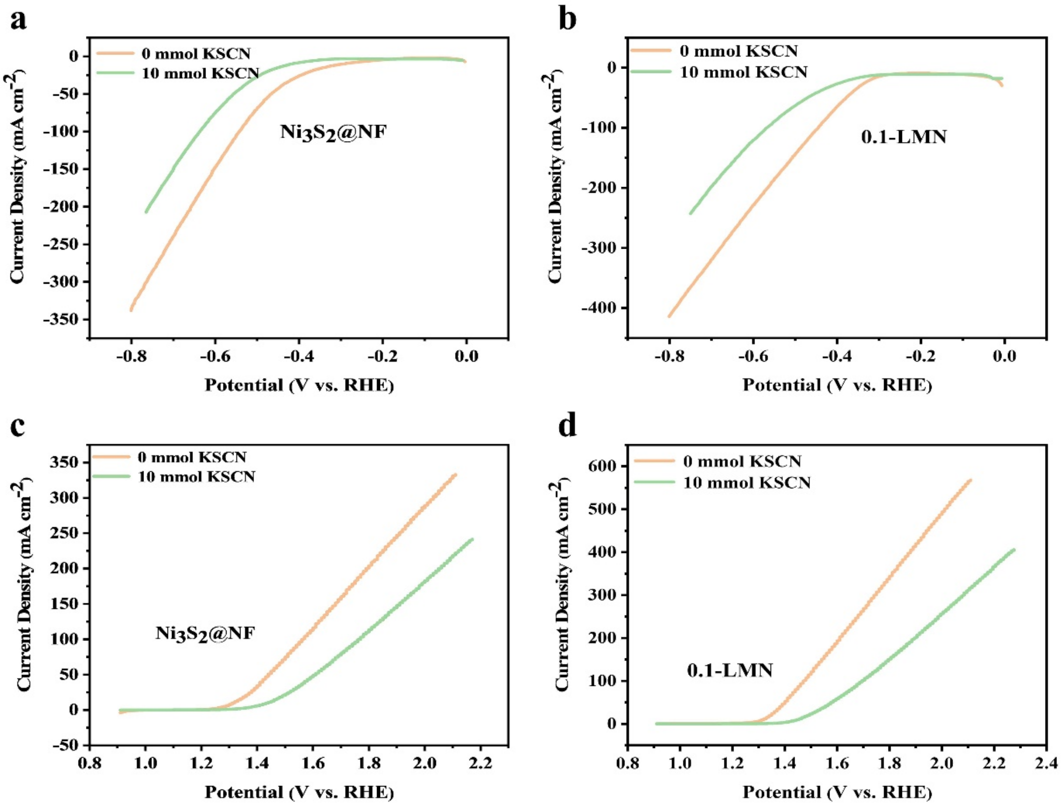

Fig. S9 The electrocatalytic performance of Ni_3S_2@NF and 0.1-LMN before and after poisoning test.

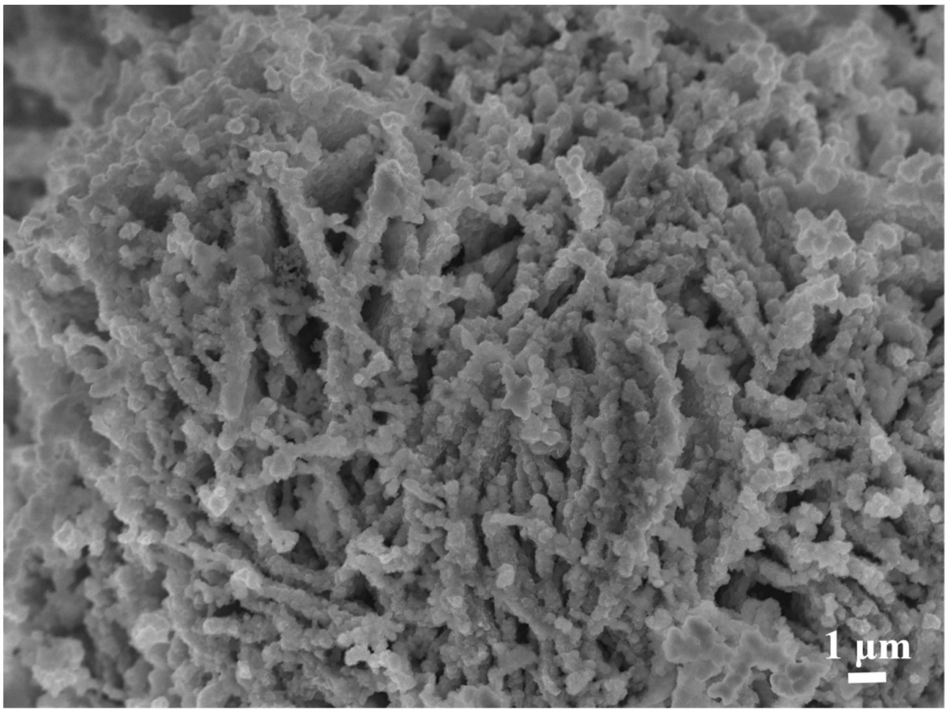

Fig. S10 SEM image of 0.1-LMN after long-term reaction.

Table S1 compares with other non-noble metal HER catalysts.

Catalyst	Electrolyte	η $_{10}$ (V vs.RHE)	Reference
This Work	1.0 M KOH	0.131	
$CoSe_2$/c-CoP	0.5 M H_2SO_4	0.127	[1]
Co_{12}@Ni_3S_2/NF	1.0 M KOH	0.297	[2]
$NiCo_2S_4$NW/NF	1.0 M KOH	0.260	[3]
THTNi 2DSP	0.5 M KOH	0.574	[4]
Ni-Co-S/Ni	1.0 M KOH	0.371	[5]
Ni_3S_2 nanoparticles/CNTs	1.0 M KOH	0.480	[6]

Table S2 Comparison of stability of different materials.

Catalyst	Electrolyte	Glycerol concent-ation	Settlin-g time	Current/Curr-ent density	Initial potential	Terminal potential	Refere-nce
This Work	1.0 M KOH	0.5 M	20 h	200 mA cm^{-2}	1.54 V	1.912 V	
$SnO_2/CoS_{1.097}$	1.0 M KOH	0.1 M	3000 s	100 mA	1.05 V	1.24 V	[7]
NiO/NF	1.0 M KOH	0.1 M	15 h	10 mA cm^{-2}	1.35 V	1.45 V	[8]
Ni_3N/WO_3	1.0 M KOH	0.1 M	24 h	10 mA cm^{-2}	1.45 V	1.56 V	[9]
Pt_{SA}-NiCo LDH/NF	1.0 M KOH	0.1 M	24 h	10 mA cm^{-2}	1.25 V	1.52 V	[10]
CoNiCuMnMo/CF	1.0 M KOH	0.1 M	25 h	10 mA cm^{-2}	1.21 V	1.26 V	[11]
Ni-Mo-N/CFC	1.0 M KOH	0.1 M	11 h	10 mA cm^{-2}	1.29 V	1.48 V	[12]

Reference

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