Supporting Information for

In-Situ Synthesis of Edge-Enriched MoS_2 Hierarchical Nanorods with 1T/2H Hybrid Phases for Highly Efficient Electrocatalytic Hydrogen Evolution

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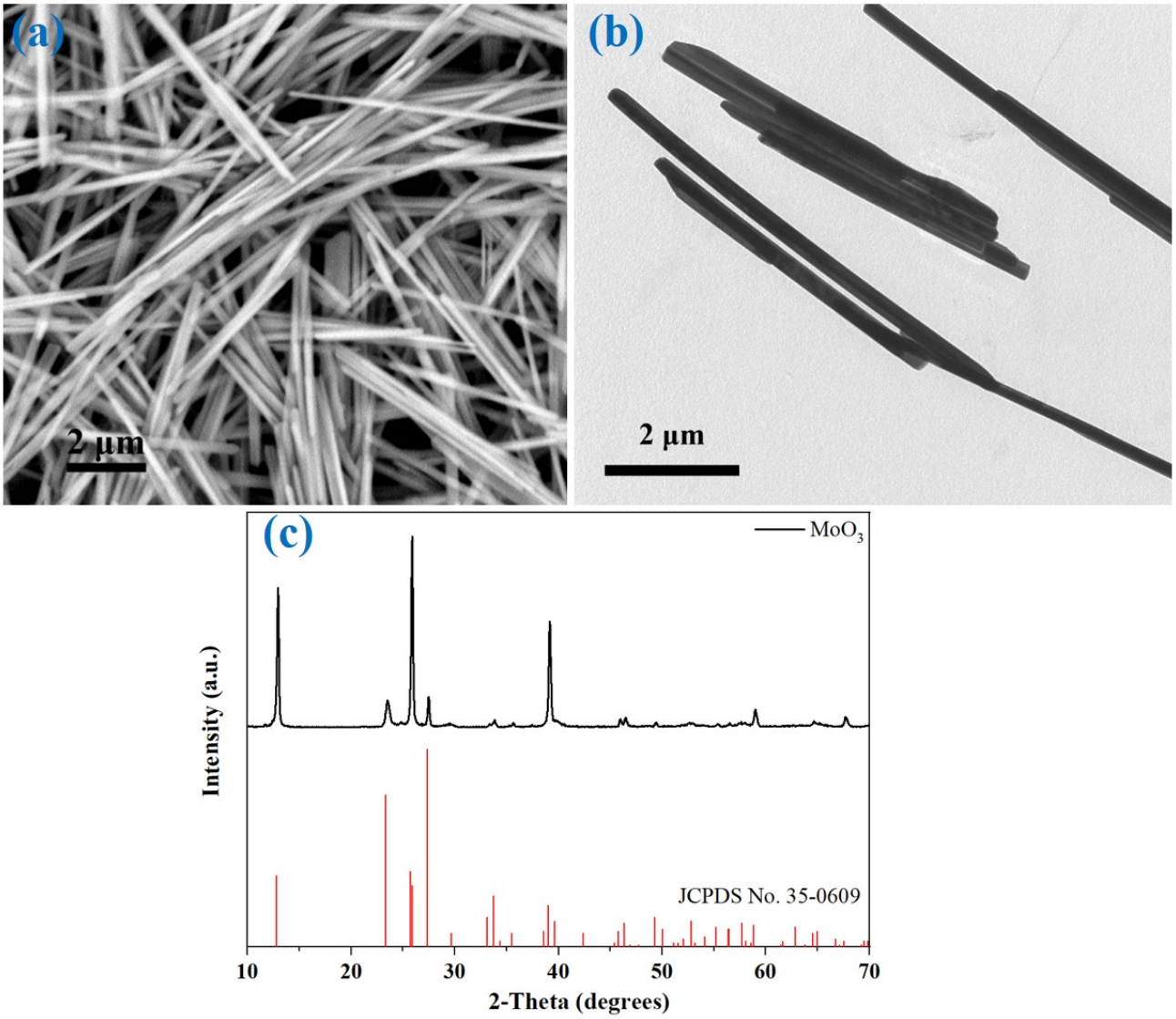

Figure S1. (a) SEM image and (b) TEM images of the as-prepared MoO_3 templates; (c) XRD spectra of the as-prepared MoO_3 templates

Table 1 Summary of hydrogen evolution reaction performance of Mo-based electrocatalysts.

Catalysts	Electrode/supporting materials	electrolyte	η10 (mV)	Tafel (mV/dec)	Ref.
Mo_2C	Glass carbon	0.5 M H_2SO_4	150	55	1
(1T/2H) MoS_2/a-MoO_3 nanoflowers	Glass carbon	0.5 M H_2SO_4	232	81	2
1T MoSSe nanodots	Glass carbon	0.5 M H_2SO_4	140	40	3
1T/2H-MoS_2 nanosheets	Glass carbon	0.5 M H_2SO_4	220	61	4
1T/2H MoS_2	Glass carbon	0.5 M H_2SO_4	234	46	5
Defect-rich MoS_2 nanowall	Glass carbon	0.5 M H_2SO_4	95	78	6
MoO_2/$MoSe_2$ Core–Shell Nanosheet Arrays	Glass carbon	0.5 M H_2SO_4	181	49.1	7
Metallic-phase MoS_2	Glass carbon	0.5 M H_2SO_4	175	41	8
Strained vacancy MoS_2	Glass carbon	0.5 M H_2SO_4	170	60	9
Flower-like MoS_2 nanosheet film	Glass carbon	0.5 M H_2SO_4	200	49	10
Porous 1T MoS_2	Glass carbon	0.5 M H_2SO_4	153	43	11
Ni–Co–MoS_2 Nanoboxes	Glass carbon	0.5 M H_2SO_4	155	51	12
MoS_2/carbon hybrids	Glass carbon	0.5 M H_2SO_4	216	64	13
1T/2H-MoS_2 hierarchical nanorods	Glass carbon	0.5 M H_2SO_4	156	47.9	This work

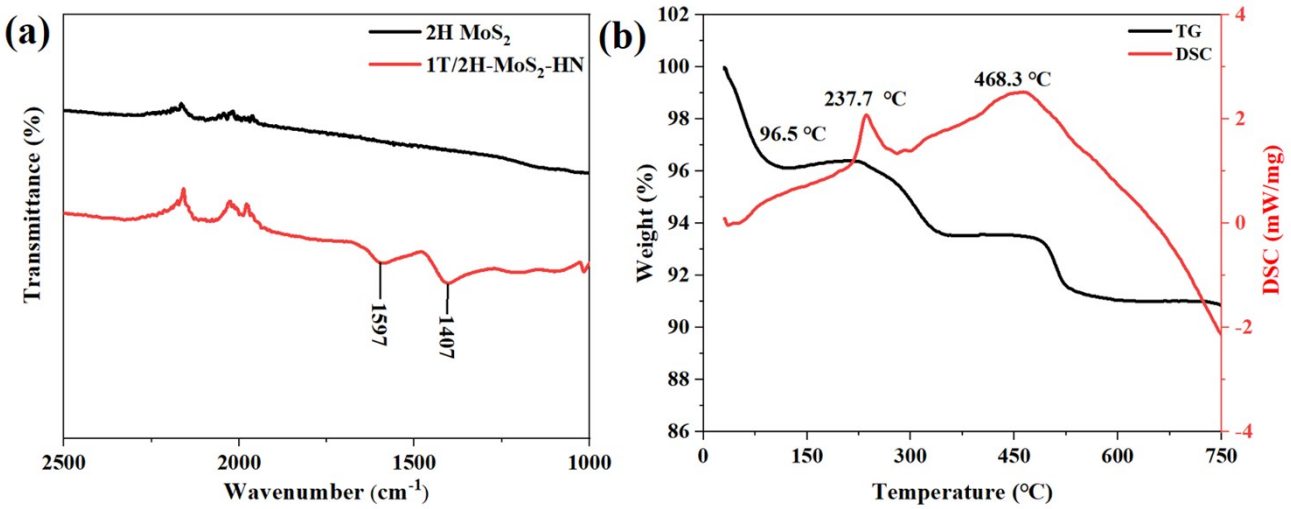

Figure S2. (a)FTIR spectrum, (b) DSC/TGA analyzation of the 1T/2H-MoS_2-HN sample

The absorption peak at 1597 cm^{-1} was attributed to the bending vibration of surface water, and the absorption peak at 1403 cm^{-1} is attributed to the NH_4^+ group (Figure S2a). The DSC curve of 1T/2H-MoS_2-HN (Figure S2 b) shows obvious endothermic peaks at 96.5 ℃, 237.7 ℃ and 468.3℃, respectively, corresponding to the mass loss steps. The first mass loss step at 96.5 ℃ can be attributed to the release of the inserted water, H_3O^+ and possible NH_3 (4%).[5] The second mass loss step can be attributed to the deintercalation of inserted NH_4^+(3%).[14, 15] Besides, the peaks at a remarkable exothermic peak emerges at 237.7℃, revealing a structural conversion from the metastable 1T MoS_2 to the stable 2H MoS_2, which is much higher than the transformation temperature (95 ℃) of the monolayer 1T phase. Therefore, it can be concluded that the guest species of NH_4^+ in 1T/2H-MoS_2-HN could stable the 1T phase. The third mass loss step can be attribute to the transformation from amorphous MoS_3 to MoS_2(2%). And there is also an exothermic peak at 468.3℃ caused by the structure conversion and the transformation from amorphous MoS_3 to MoS_2.[16-20]

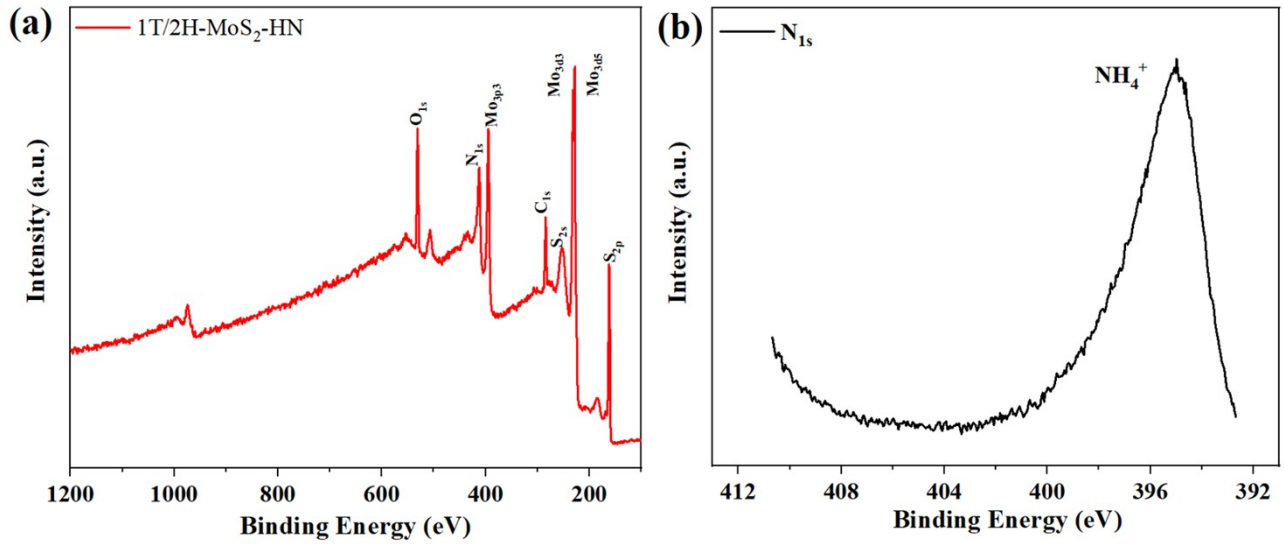

Figure S3. (a) X-ray photoelectron spectroscopy survey data, (b) X-ray photoelectron spectroscopy of N_{1s}.

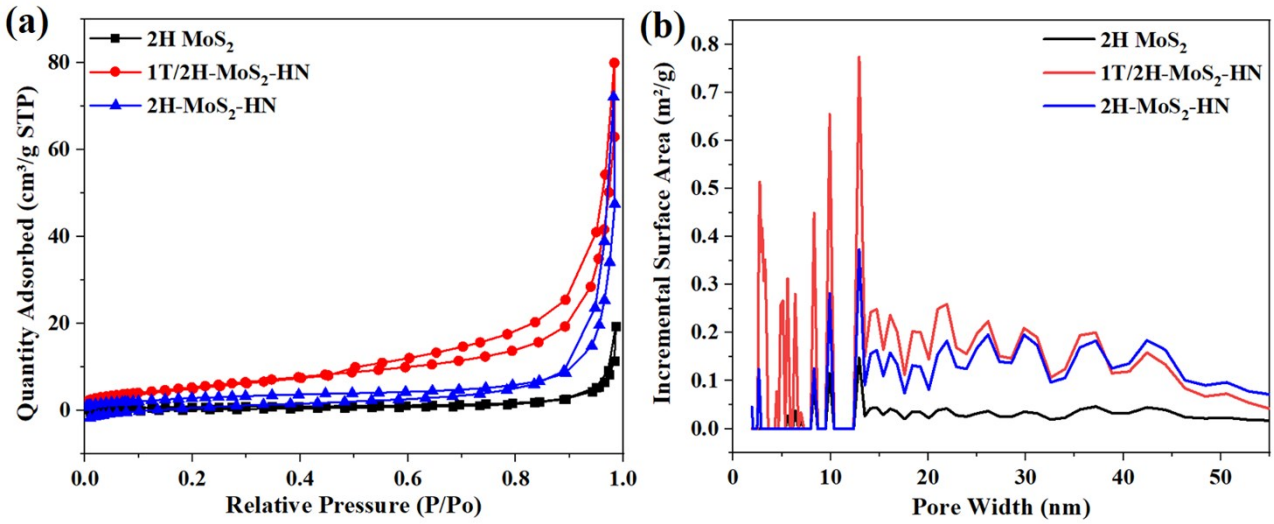

Figure S4. (a) The N_2 adsorption/desorption isotherms and (b) corresponding pore size distribution.

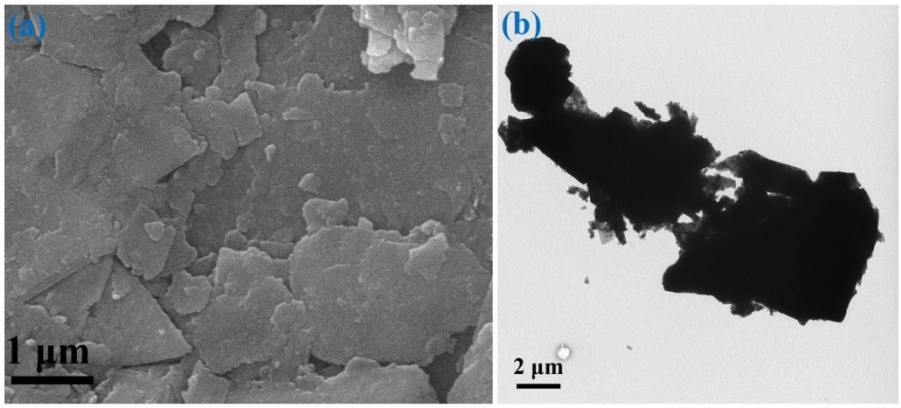

Figure S5. SEM and TEM images of the purchased MoS_2

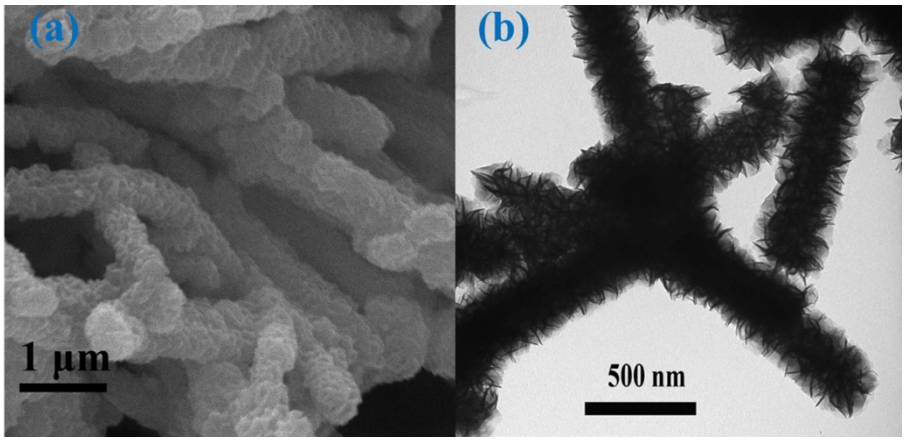

Figure S6. (a) SEM image, (b) TEM image of the 2H-MoS_2-HN

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