

Electronic Supplementary Information

Large-scale Controlled Synthesis of Porous Two-dimensional Nanosheets for Hydrogen Evolution Reaction Through a Chemical Pathway

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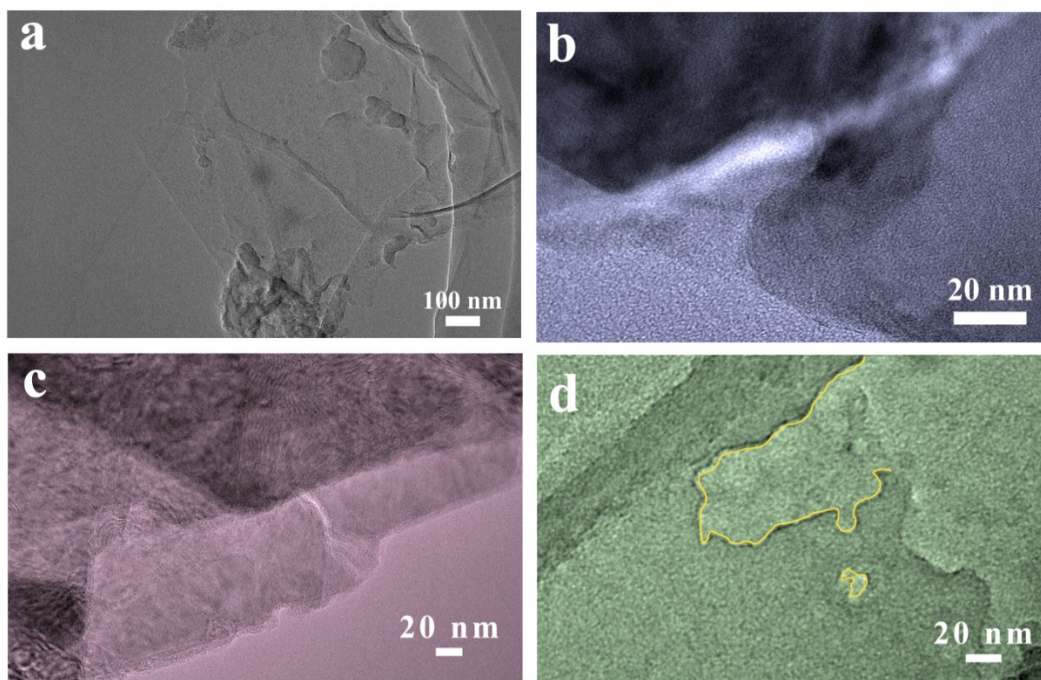


Figure S1. TEM images of a) MoS₂-E; b) MKHE-1; c) MKHE-3; d) MKHE-5.

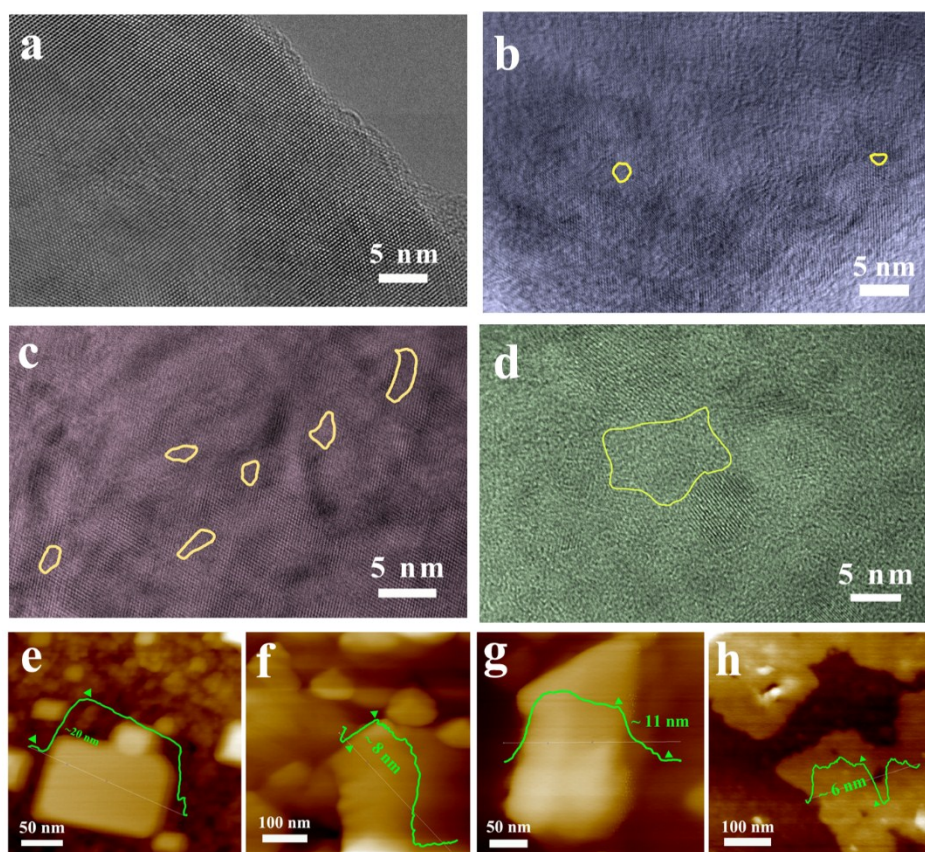


Figure S2. HR-TEM images of a) MoS₂-E; b) MKHE-1; c) MKHE-3; d) MKHE-5;
AFM images of e) MoS₂-E, f) MKHE-1, g) MKHE-3, h) MKHE-5.

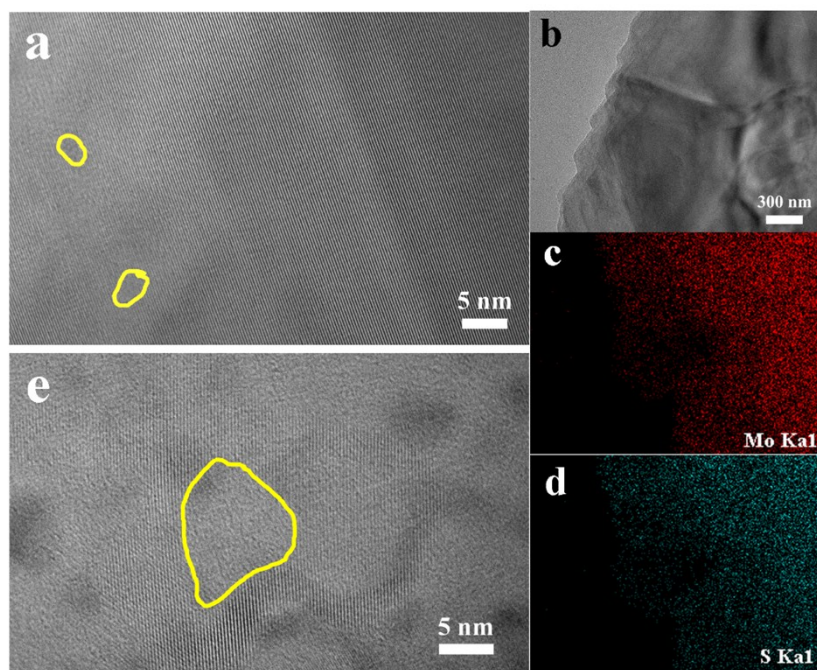


Figure S3. HR-TEM images of a) MKHE-2, e) MKHE-4; TEM images of b) MKHE-2; EDX-mapping of c, d) MKHE-2.

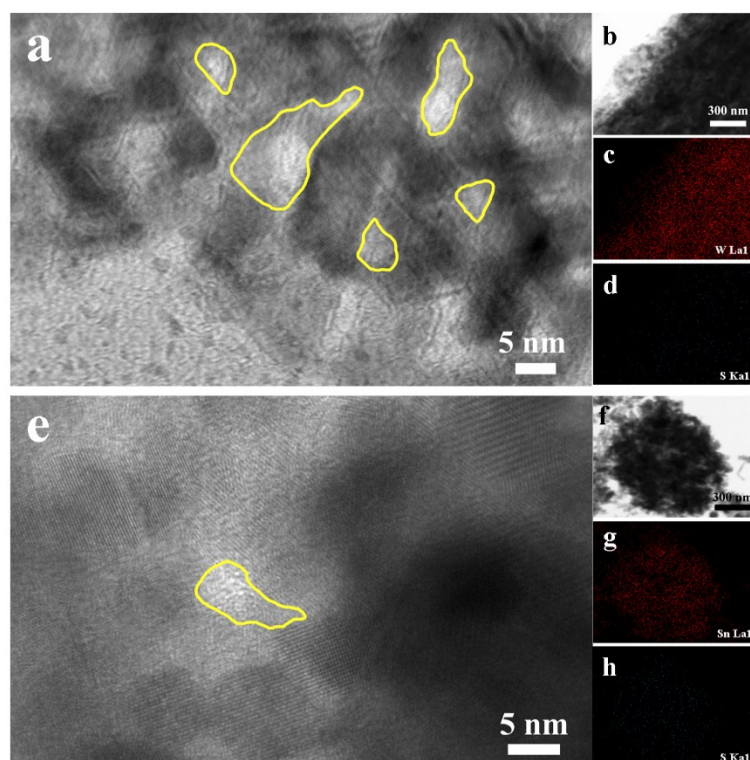


Figure S4. HR-TEM images of a) WKHE, e) SKHE; TEM images of b) WKHE, f) SKHE; EDX-mapping of c, d) WKHE, g, h) SKHE.

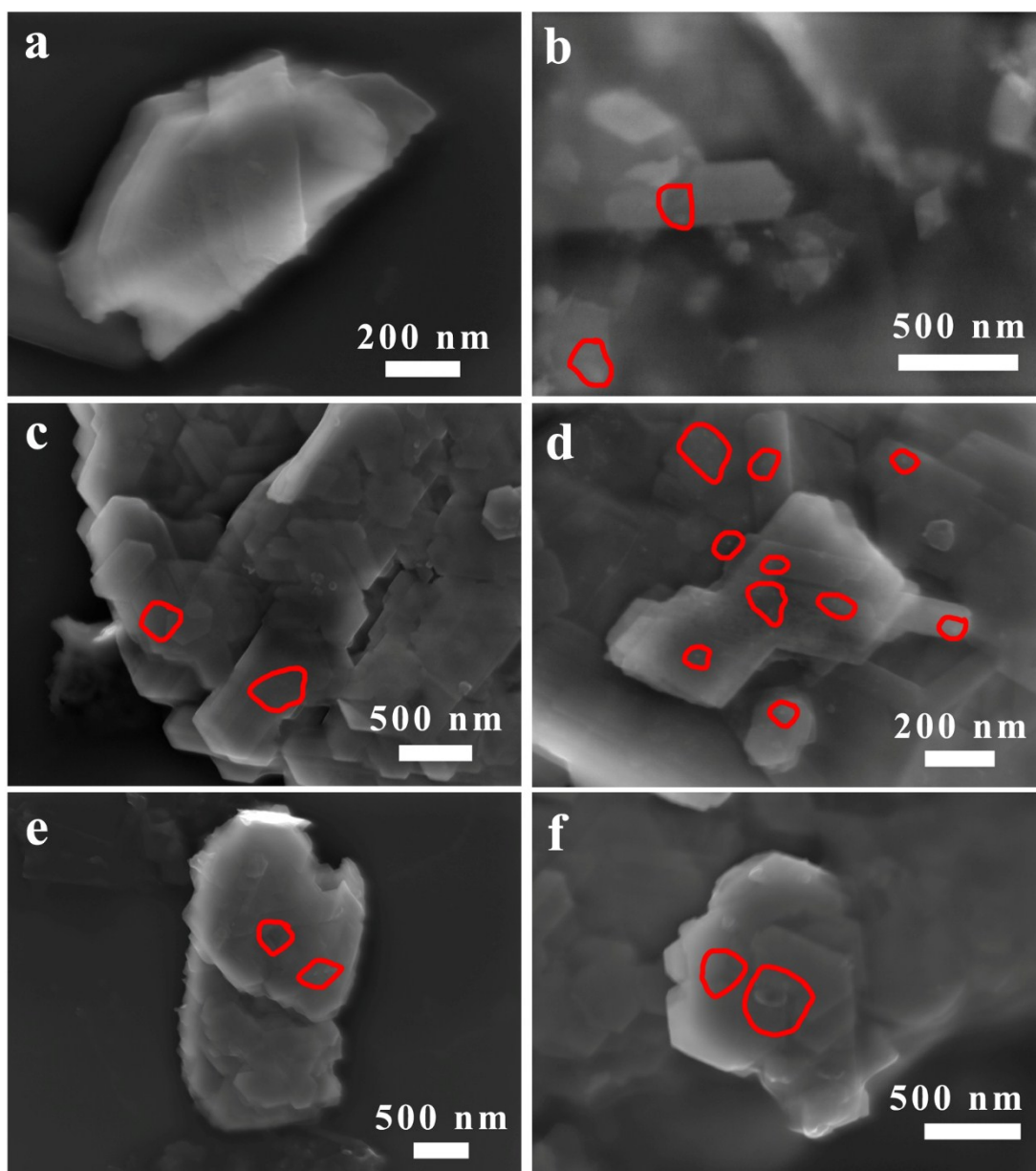


Figure S5. SEM images of a) MoS₂-E; b) MKHE-1; c) MKHE-2; d) MKHE-3; e) MKHE-4 and f) MKHE-5.

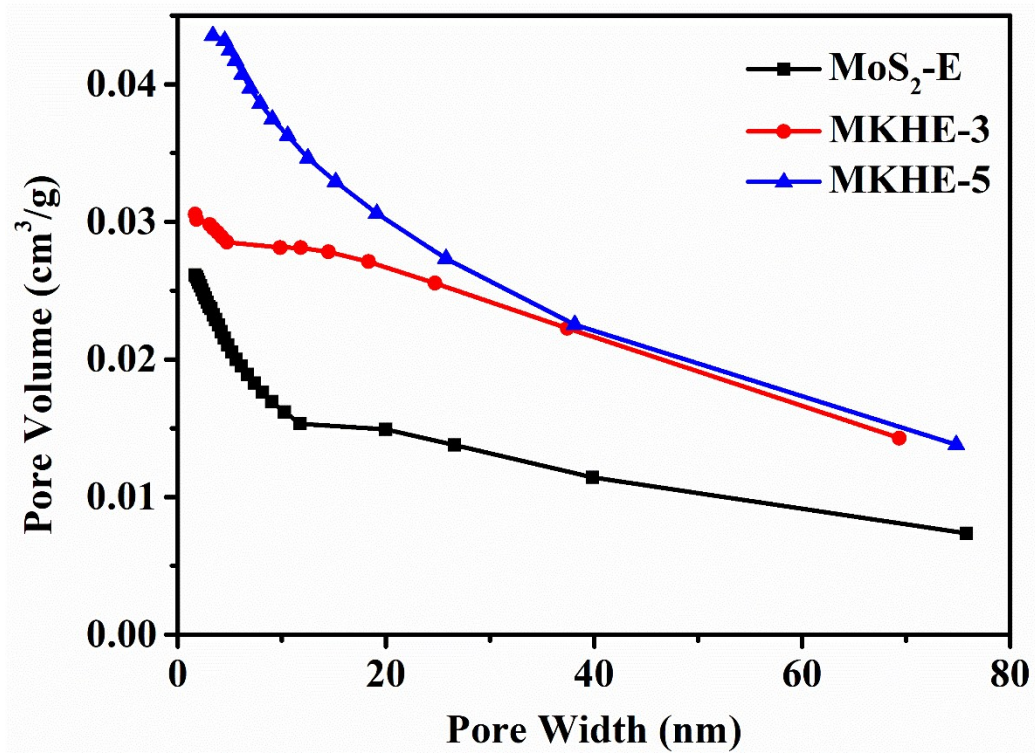


Figure S6. BJH Adsorption Cumulative Pore Volume of MoS₂-E, MKHE-3 and MKHE-5.

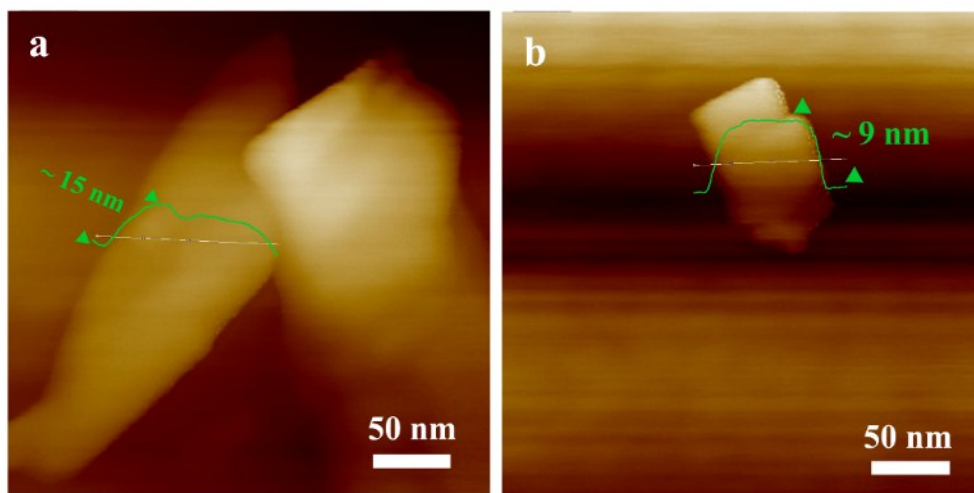


Figure S7. AFM images of a) WKHE, b) SKHE.

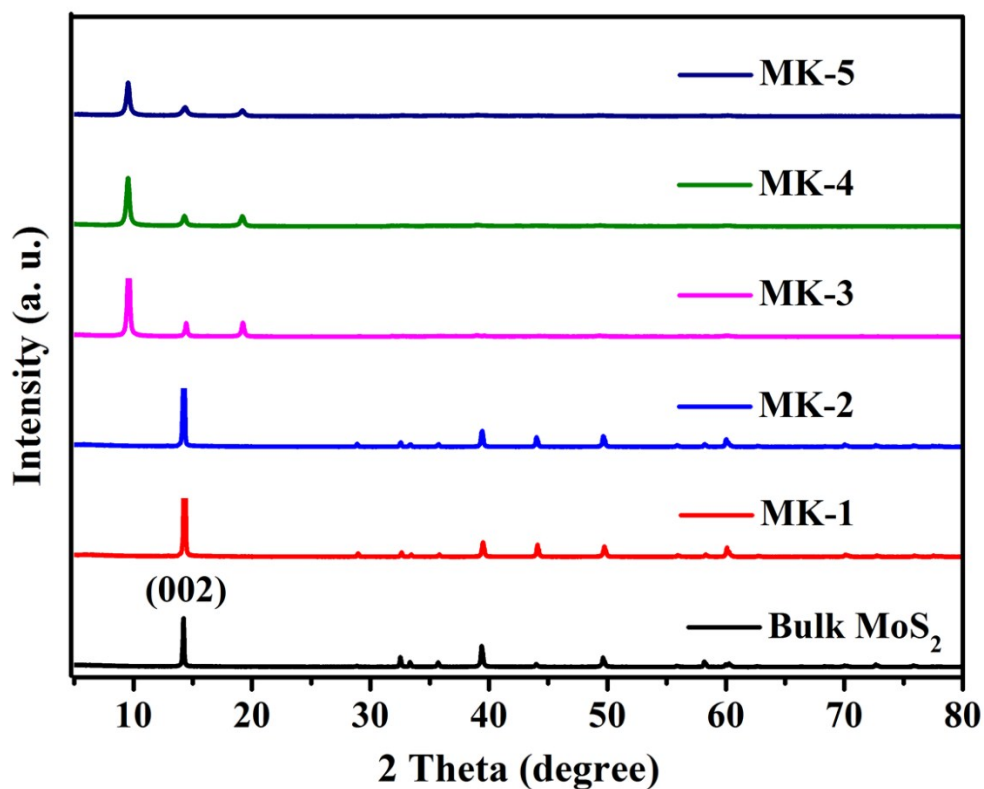


Figure S8. XRD patterns (enlarged edition) of bulk MoS₂, MK-1, MK-2, MK-3, MK-4 and MK-5.

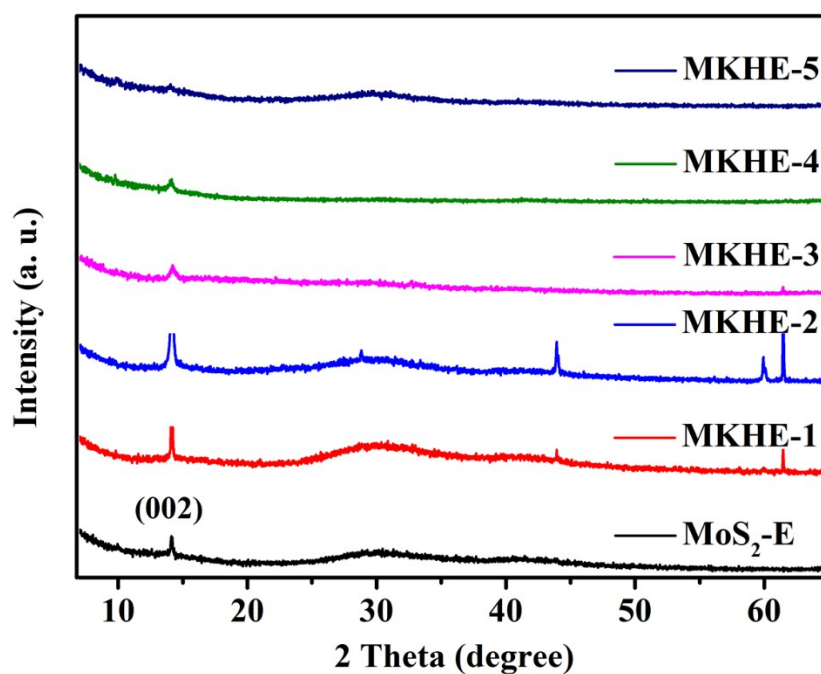


Figure S9. XRD patterns (enlarged edition) of MoS₂-E, MKHE-1, MKHE-2, MKHE-3, MKHE-4 and MKHE-5.

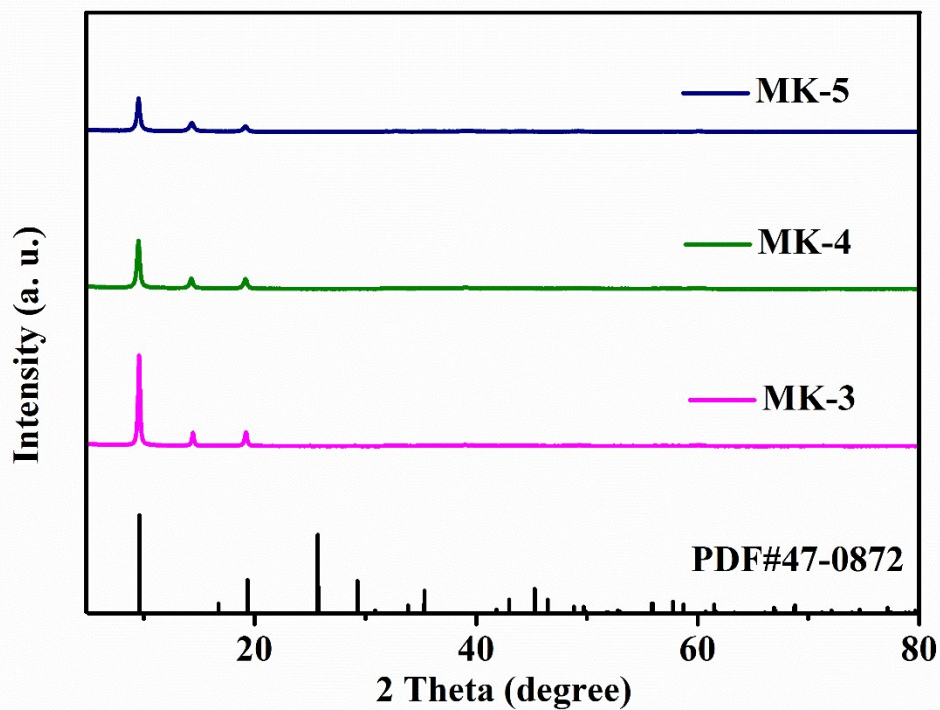


Figure S10. XRD patterns of MK-3, MK-4 and MK-5.

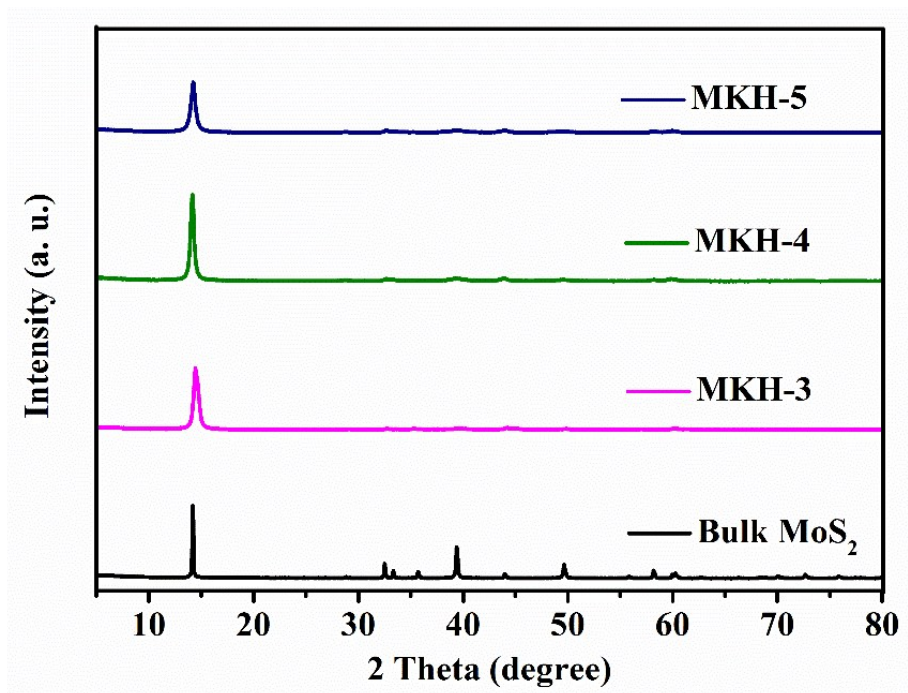


Figure S11. XRD patterns of bulk MoS₂, MKH-3, MKH-4 and MKH-5.

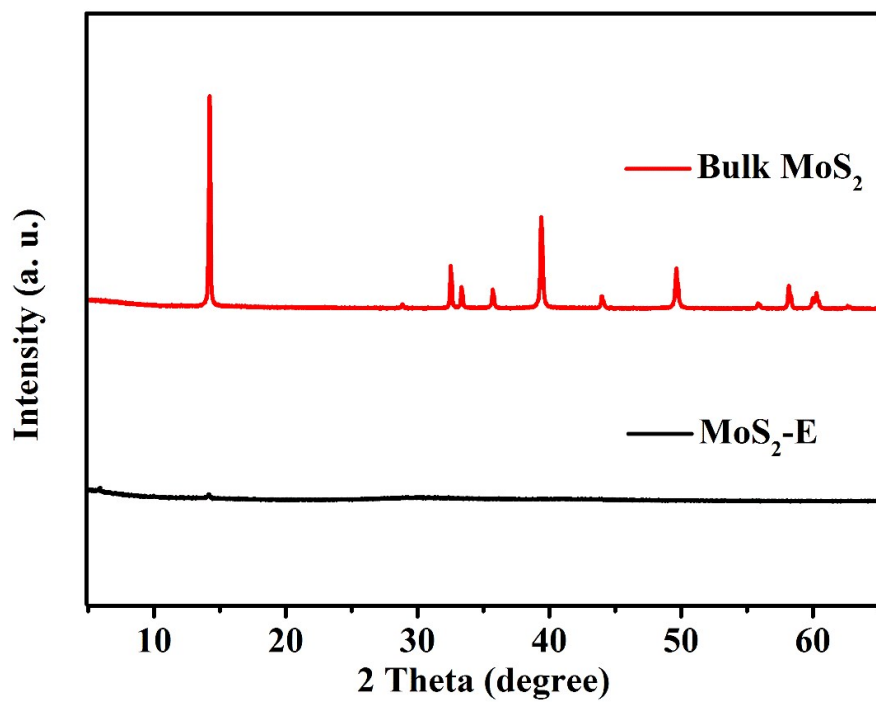


Figure S12. XRD patterns of MoS₂-E and Bulk MoS₂.

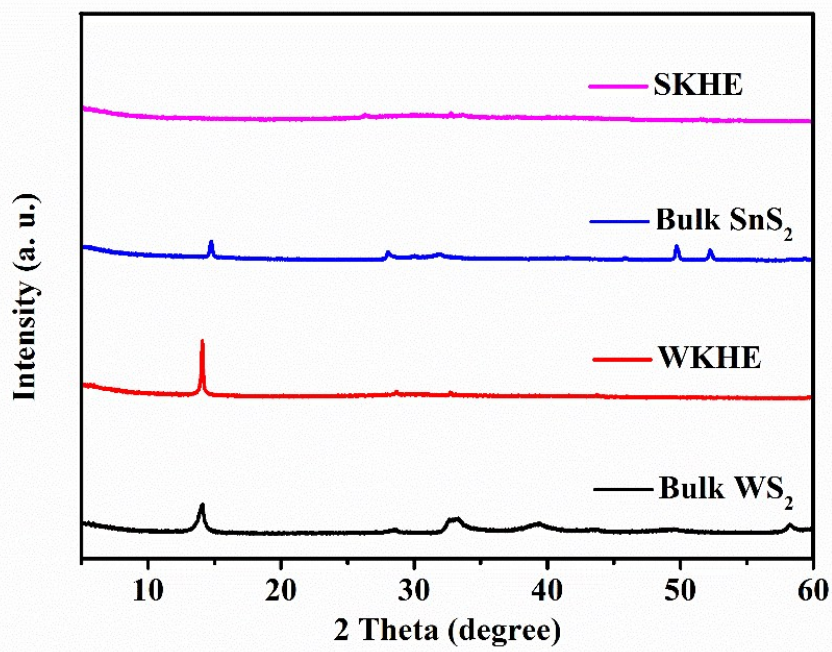


Figure S13. XRD patterns of bulk WS₂, WKHE, Bulk SnS₂, SKHE.

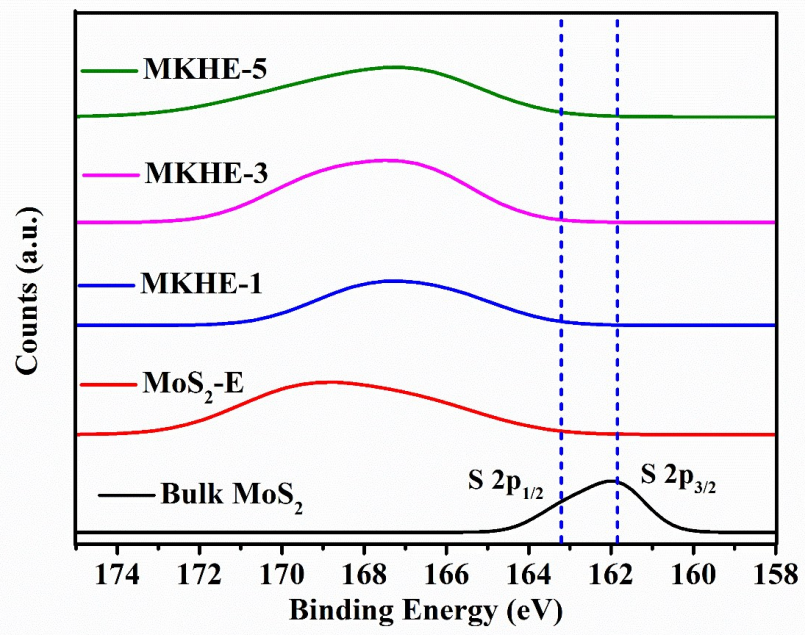


Figure S14. XPS spectra of the S 2p in bulk MoS₂, MoS₂-E, MKHE-1, MKHE-3, MKHE-5.

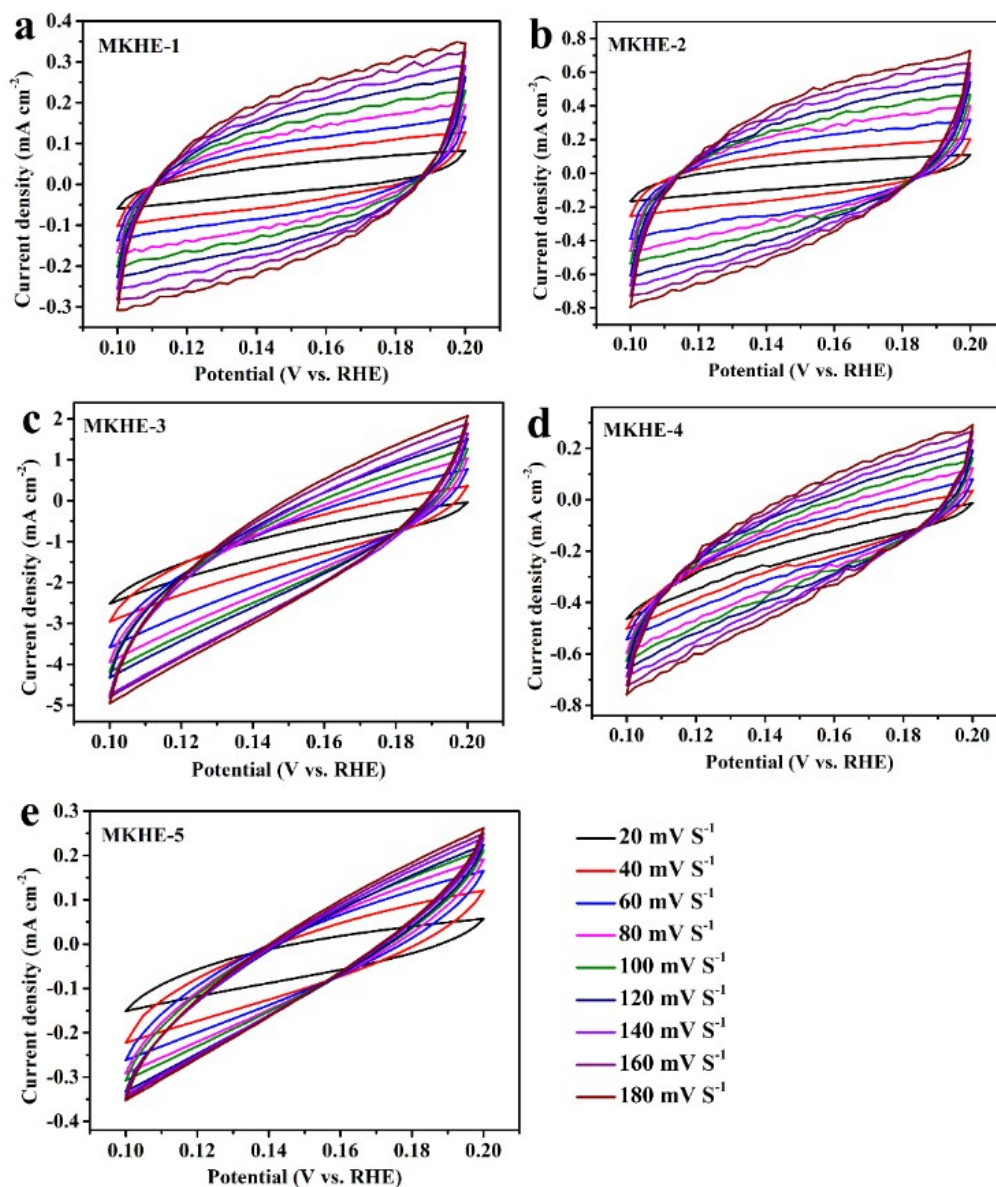


Figure S15. Cyclic voltammograms of the MKHEs under different scan rates, in the region of 0.1-0.2 V vs. RHE. These data were used to present the plots showing the extraction of the C_{dl} for different MoS₂ samples shown in Figure 5c.

Table S1. Comparison of the Electrocatalytic Parameters for MKHE-3 with Various MoS₂ NS Samples in other papers

Samples	η (mV vs RHE) for $j = -10 \text{ mA cm}^{-2}$	Tafel slope (mV dec ⁻¹)	Cdl (mF cm ⁻²)
MKHE-3	240.7	88.4	6.45
Porous 2H-MoS ₂	218	62	8.2
Functionalized 2H-MoS ₂	343	106	0.3 ¹
sH-MoS ₂	262	132	6.5 ²
Functionalized 2H-MoS ₂	330	136 ³	-
Functionalized 2H-MoS ₂	190	160 ⁴	-
2H c-MoS ₂	309	92	2.2 ⁵

Notes and references

1. Yin, Y., Han, J., Zhang, Y., Zhang, X., Xu, P., Yuan, Q., Samad, L., Wang, X., Wang, Y. and Zhang, Z., *J AM CHEM SOC*, 2016, **138**, 7965.
2. Guo, B., Ke, Y., Li, H., Song, H., Zhang, Y., Xiang, L., Hao, F., Tan, Y. and Zhu, Z., *ACS APPL MATER INTER*, 2016, **8**, 5517.
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4. Li, G., Du, Z., Qiao, Q., Yu, Y., Peterson, D., Zafar, A., Kumar, R., Curtarolo, S., Hunte, F. and Shannon, S., *J AM CHEM SOC*, 2016, **138**, 16632.
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