Electronic Supplementary Information (ESI)

Interlayer-expanded and defect-rich metal dichalcogenide (MX_2) nanosheets for active and stable hydrogen evolution

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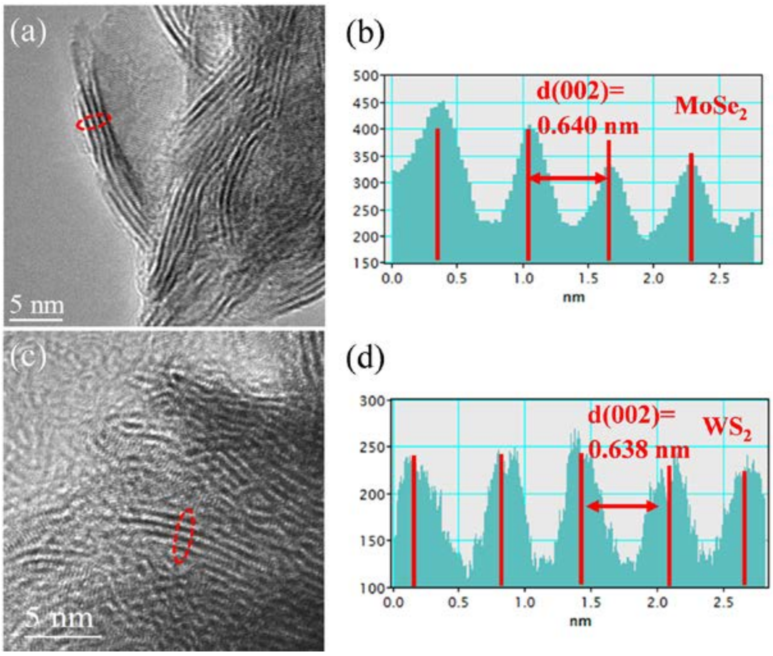

Fig. S1 HRTEM images of the annealed $MoSe_2$ (a,b) and WS_2 (c,d) nanosheets and the corresponding line intensity profile for measuring the spacings.

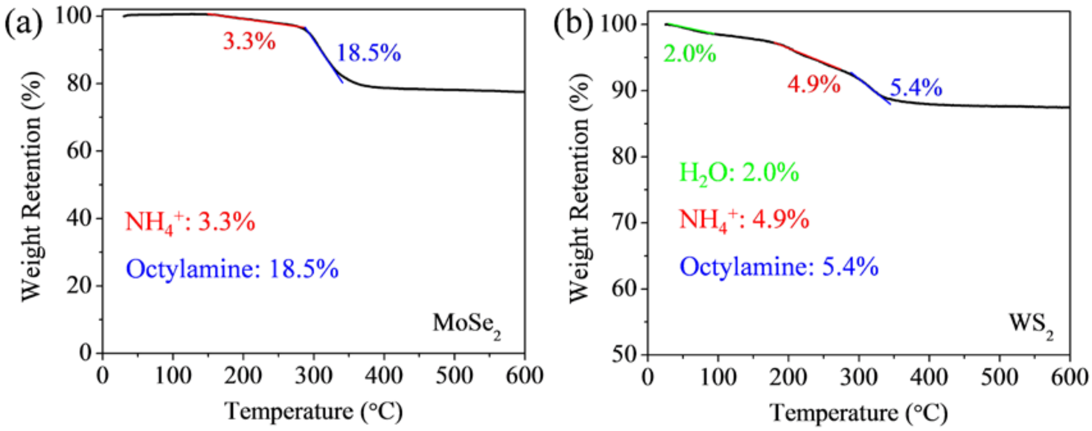

Fig. S2 TG curves of the freshly-prepared $MoSe_2$ and WS_2 samples.

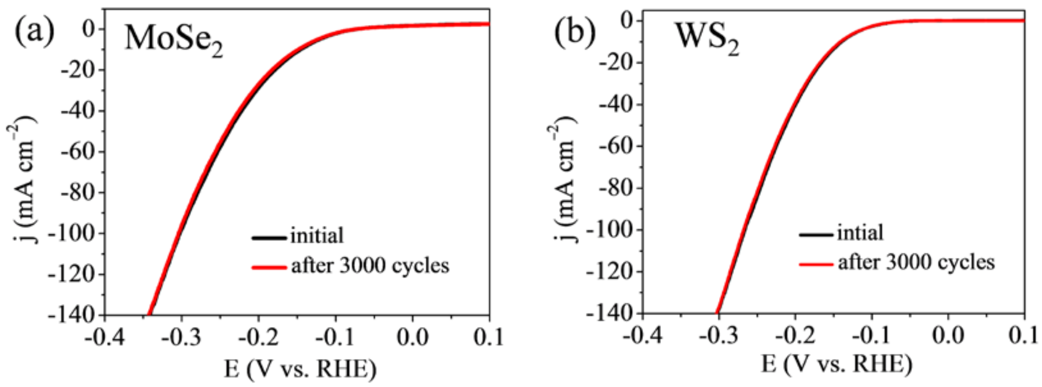

Fig. S3 LSV curves of the various freshly-prepared $MoSe_2$ and WS_2 catalysts before and after 3000 cycles.

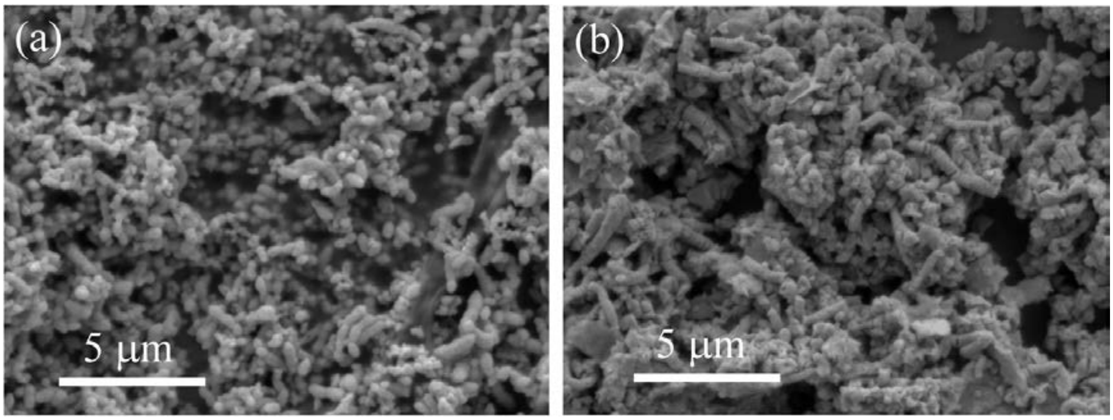

Fig. S4 SEM images of (a) the $MoSe_2$ and (b) the WS_2 electrocatalysts after stability measurement.

Table S1 Electrocatalytic HER performances of the MX_2-based catalysts.

No.	Catalysts	η_0 (mV)	η_{10} (mV)	Tafel Slope (mV dec^{-1})	Stability	Ref.
1	**IEDR $MoSe_2$**	**-83**	**-146**	**51**	**48 h**	**This work**
2	1T-$MoSe_2$ nanosheets	-60	-240	78	3000 cycles	J. Mater, Chem. A 2016, 4, 14949.
3	$MoSe_2$ nanoparticles	-120	-270	94	2 h	J. Mater. Chem. A 2014, 2, 360.
	$MoSe_2$ nanosheets	-200	-290	110	/	
4	Expanded $MoSe_2$ nanosheets on N-doped carbon nanotubes	/	-102	53	20 h	Nanoscale 2016, 8, 16886.
5	3D hierarchial $MoSe_2$ on carbon fiber paper	-171	/	69.2	/	J. Mater. Chem. A 2017, 5, 19752.
	3D hierarchial $MoSe_2$/$NiSe_2$ composite nanowires on carbon fiber paper	-148	/	46.9	1000 cycles	
6	$MoSe_2$ nanosheets on carbon paper	-70	-182	69	10000 s	ACS. Appl. Mater. Interfaces 2016, 8, 7077.
7	$MoSe_2$/rGO nanocrystals on carbon nanotubes	-200	-240	53	10000 s	ACS. Appl. Mater. Interfaces 2017, 9, 10673.
	$MoSe_2$ nanocrystals on carbon paper	-200	-260	70	/	
	$MoSe_2$ nanocrystals	-250	-330	115	/	
8	1T and 2H $MoSe_2$/Mo Core-Shell 3D-Hierarchial	-89	-166	34.7	/	Adv. Mater. 2016, 28, 9831.
9	**IEDR WS_2**	**-70**	**-139**	**55**	**48 h**	**This work**
10	1T-WS_2	-58	-110	55	/	ACS. Appl. Mater. Interfaces 2016, 8, 13966.
	$WO_3 \cdot 2H_2O$ nanoplates/WS_2 hybrid catalysis	-60	/	54	3 h	
11	WS_2 nanodots	-90	-170	51	1000 cycles	ACS Nano 2016, 10, 2159.
	Bulk WS_2	-290	-600	119	/	
12	WS_2 nanotubes	-169	-310	113	2 h	ACS Nano 2014, 8, 8468.

13	WS_2/graphene hybrid catalyst	119	/	43	8 h	J. Mater. Chem. A 2016, 4, 9472.
14	WS_2-Ta	-320	-750	180	/	ACS Catal. 2016, 6, 5724.
	Undoped-WS_2	-340	-690	220	/	
15	WS_2 nanosheets on carbon paper	-75	-115.7	79.6	1000 cycles	J. Mater. Chem. A 2017, 5, 15552.
16	WS_2 nanosheets coated graphene foam	/	-190	84	1000 cycles	ACS. Appl. Mater. Interfaces 2017, 9, 30591.
	WS_2 nanosheets on glass carbon electrodes	/	-350	91	/	
17	Ultrathin WS_2 nanoflakes	-100	/	48	10000 cycles	Angew. Chem. Int. Ed. 2014, 53, 7860.
18	**IEDR SnS_2**	**-92**	**-182**	**65**	**48 h**	**This work**
19	Trace Pt decorated SnS_2 nanosheets on carbon paper	-32	-117	69	12 h	ACS. Appl. Mater. Interfaces 2017, 9, 37750.
20	SnS_2 nanosheets by CVD	-350	-730	150	/	J. Phys. Chem. C 2016, 120, 244098.