Supporting Information

Ultrafine Rh nanoparticles decorated $MoSe_2$ nanoflowers for efficient alkaline hydrogen evolution reaction

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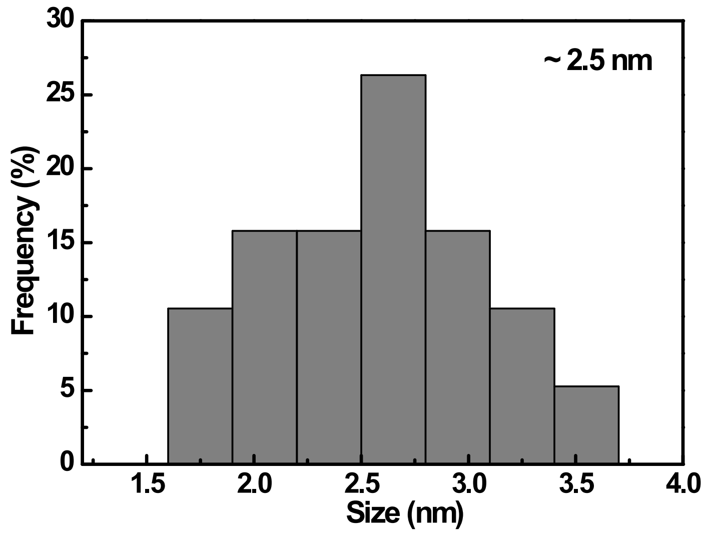

Fig. S1 The size distribution histogram of 8.2 wt% Rh-$MoSe_2$.

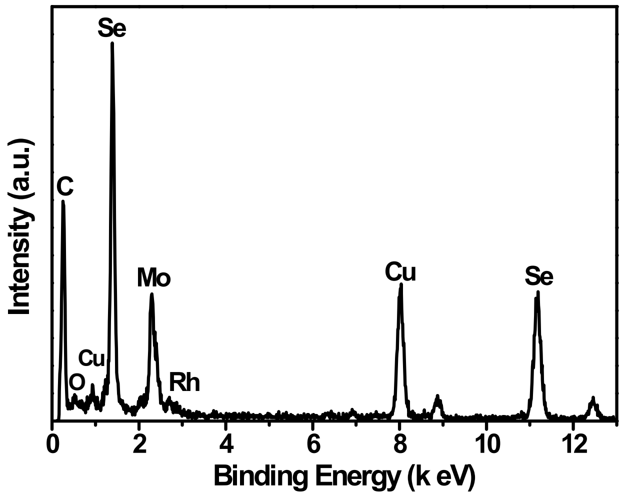

Fig. S2 The EDX spectrum of 8.2 wt% Rh-$MoSe_2$.

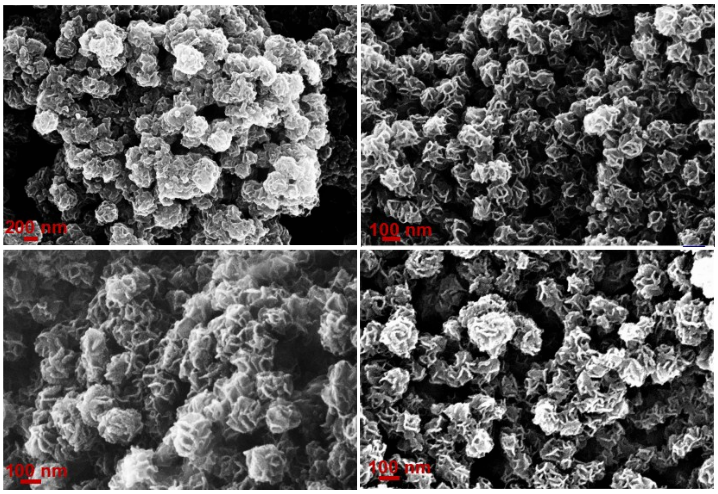

Fig. S3 SEM images of Rh-$MoSe_2$ with different contents of Rh: (a) pure $MoSe_2$; (b) 2.9 wt%; (c) 8.2 wt% and (d) 12.6 wt% of Rh.

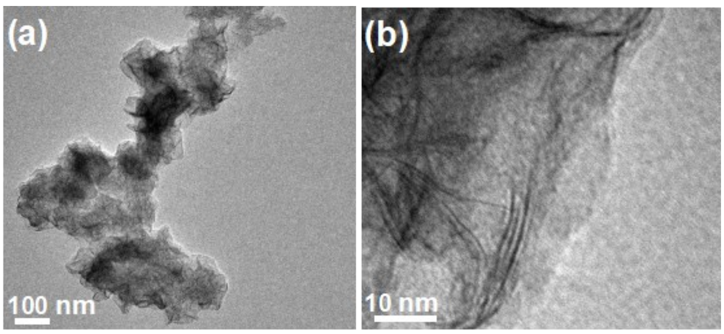

Fig. S4 TEM image of as-synthesized pure $MoSe_2$.

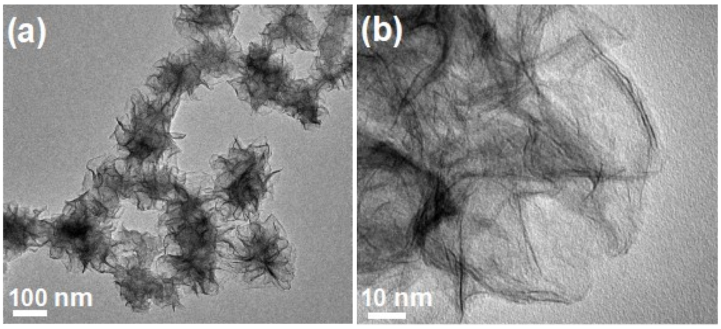

Fig. S5 TEM image of as-synthesized 2.9 wt% Rh-$MoSe_2$.

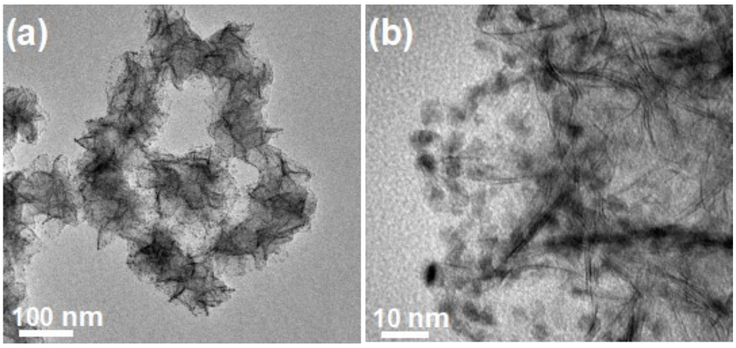

Fig. S6 TEM image of as-synthesized 12.6 wt% Rh-$MoSe_2$.

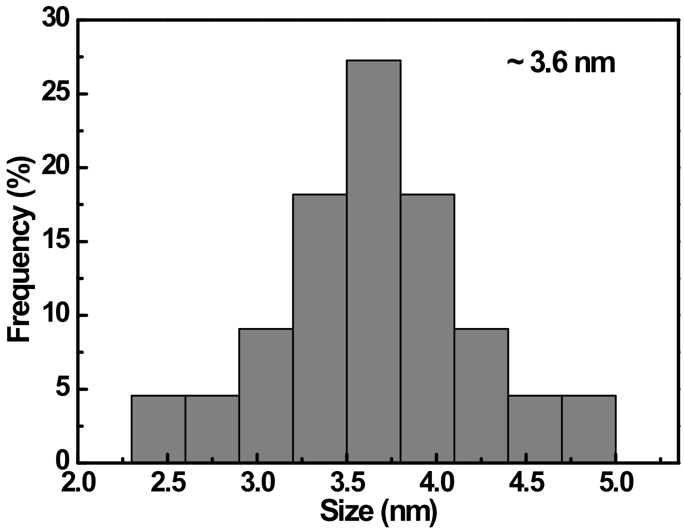

Fig. S7 The size distribution histogram of 12.6 wt% Rh-$MoSe_2$.

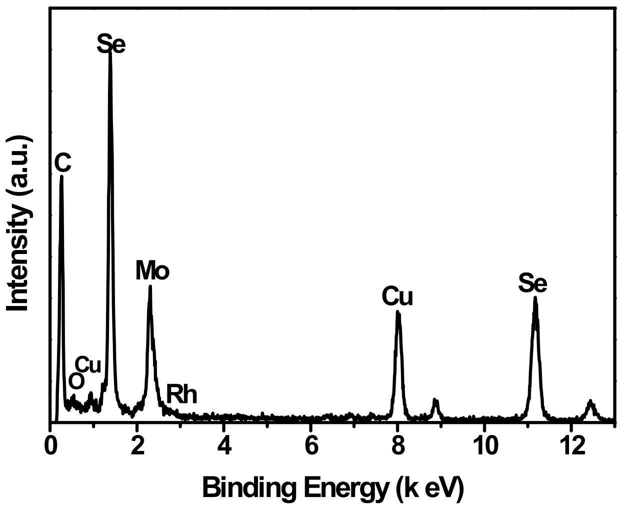

Fig. S8 The EDX spectrum of 2.9 wt% Rh-$MoSe_2$.

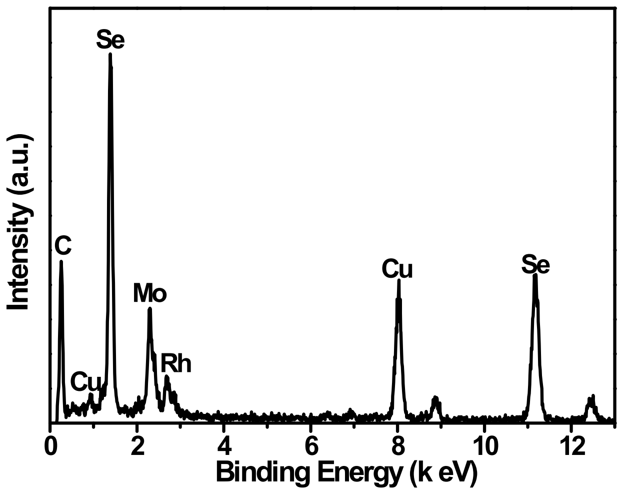

Fig. S9 The EDX spectrum of 12.6 wt% Rh-$MoSe_2$.

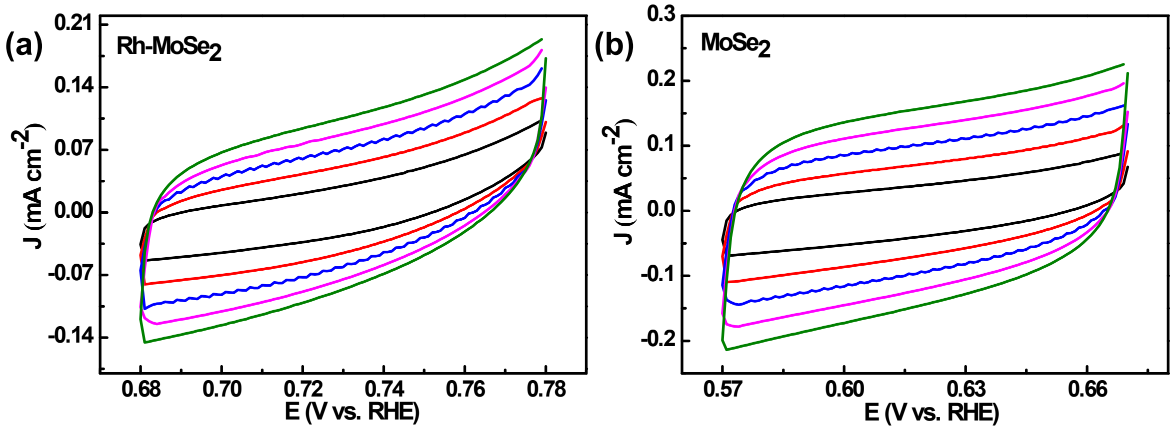

Fig. S10 Electrochemical double layer capacitance curves on wt% Rh-$MoSe_2$ (a) and $MoSe_2$ (b) with different scan rates from 50 mV s^{-1} to 10 mV s^{-1} in 1.0 M KOH.

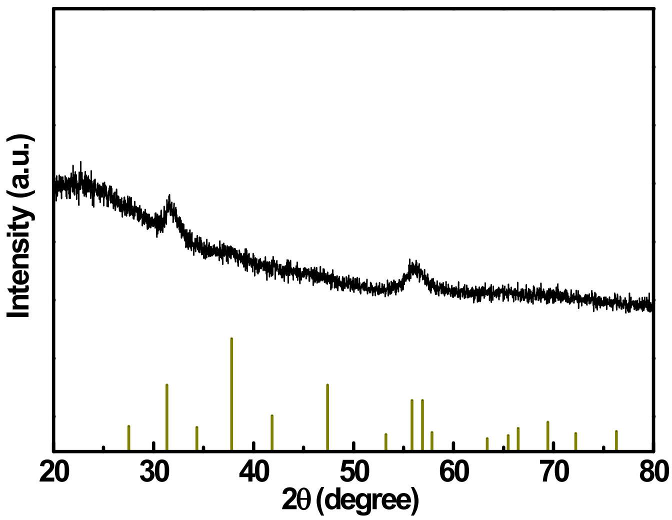

Fig. S11 XRD patterns of the 8.2 wt% Rh-$MoSe_2$ nanoflowers after chronopotentiometry test.

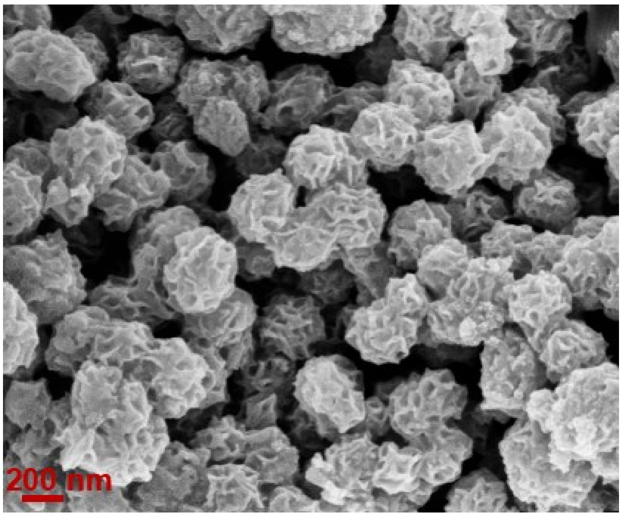

Fig. S12 SEM image of the 8.2 wt% Rh-$MoSe_2$ nanoflowers after chronopotentiometry test.

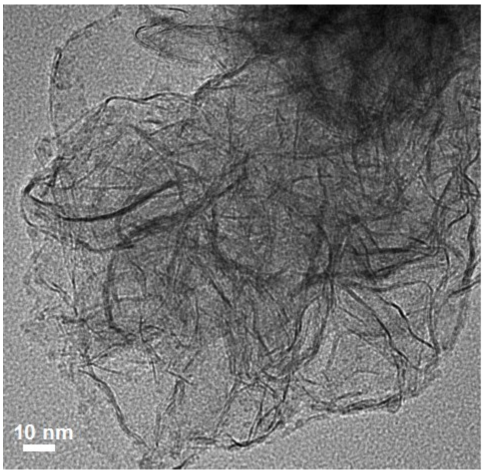

Fig. S13 TEM image of 8.2 wt% Rh-$MoSe_2$ nanoflowers after stability testing.

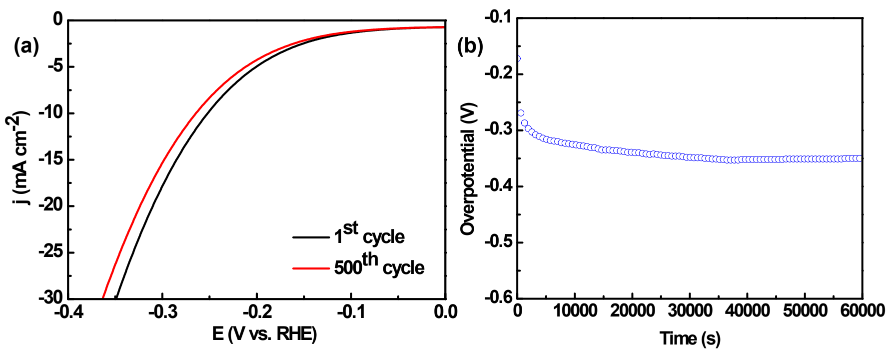

Fig. S14 (a)Polarization curves of $MoSe_2$ before and after 500 CV cycles. (b) Chronopotentiometric measurements of the HER at 10 mA cm^{-2} using $MoSe_2$ as a catalyst.

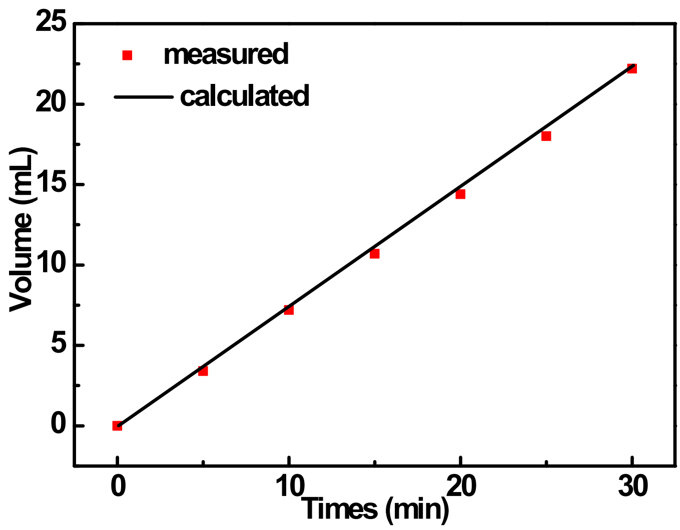

Fig. S13. The amount of hydrogen theoretically calculated and experimentally measured versus time for 8.2 wt% Rh-$MoSe_2$ in 1.0 M KOH.

Table S1. The raw material of $Rh(acac)_3$ and the corresponding contents of Rh in Rh-$MoSe_2$ nanoflowers.

Raw material $Rh(acac)_3$ (mg)	Rh content in Rh-$MoSe_2$ Rh (wt%)
4	2.9
12	8.2
20	12.6

Table S2. Comparison of representative TMDs-based catalysts in 1.0 M KOH.

Catalyst	Substrate	Loading (mg cm^{-2})	η_{10}/(mV)	Reference
Rh-$MoSe_2$	GCE	0.3	73	This work
$CoSe_2/MoSe_2$	GCE	0.204	218	1
CS-MS/rGO-C	GCE	0.57	215	2
MS-CS NTs	GCE	0.57	237	3
Co-WSe_2/MWNT	GCE	0.25	241	4
2D-$MoS_2/Co(OH)_2$	GCE	~0.285	128	5
$Co_9S_8@MoS_2$	GCE	~0.4	145	6
MoS_2/NiS	nickel foam	4.9	92	7
MoWSe alloys	GCE	1	262	8
$Ni(OH)_2/MoS_2$	Carbon cloth	~4.8	80	9

$MoSe_2@Ni_{0.85}Se$	nickel foam	6.48	117	10
CoS/MoS_2	GCE	0.18	214	11
$Co_3S_4/MoS_2/Ni_2P$ NTs	GCE	0.18	178	11
Ru/MoS_2	Carbon paper	1.0	13	12
$MoS_2\|NiS\|MoO_3$	Ti sheet	2	91	13
MoS_2-Ni_3S_2 HNRs/NF	Nickel foam	13	98	14
MoS_2/Ni_3S_2	Nickel foam	9.7	110	15
Ni-MoS_2	Carbon cloth	0.89	98	16
MoS_2@Ni/CC	Carbon cloth	4.0	91	17
HF-MoSP	GCE	0.35	119	18
$Co_9S_8@MoS_2$/CNFs	GCE	0.212	190	19

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