Supporting Information

Hierarchical Ultrathin $Mo(S_xSe_{1-x})_2$ Nanosheets with Tunable Ferromagnetism and Efficient Hydrogen Evolution Reaction Activity: Towards Defect Sites Effect

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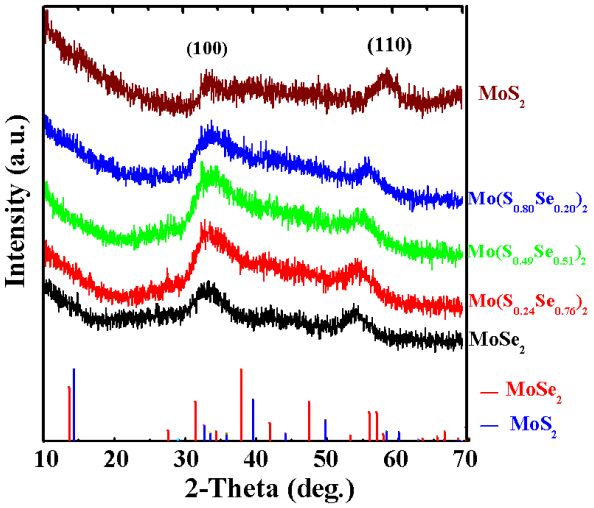

MoS_2 PDF#37-1492

2θ	Intensity(a.u.)	*h*	*k*	*l*
14.378	100	0	0	2
29.026	2	0	0	4
32.676	22	1	0	0
33.508	12	1	0	1
35.87	10	1	0	2
39.538	58	1	0	3
44.151	11	0	0	6
49.787	29	1	0	5
55.977	4	1	0	6
58.334	14	1	1	0
60.144	12	0	0	8
62.813	2	1	0	7

$MoSe_2$ PDF#29-0914

2θ	Intensity(a.u.)	*h*	*k*	*l*
13.696	75	0	0	2
27.593	15	0	0	4
31.418	55	1	0	0
34.398	14	1	0	2
37.883	100	1	0	3
41.927	25	0	0	6
47.489	55	1	0	5
53.31	7	1	0	6
55.916	40	1	1	0
56.973	40	0	0	8
57.913	9	1	1	2
63.443	3	1	1	4

Figure S1: The standard XRD pattern of MoS_2 and $MoSe_2$.

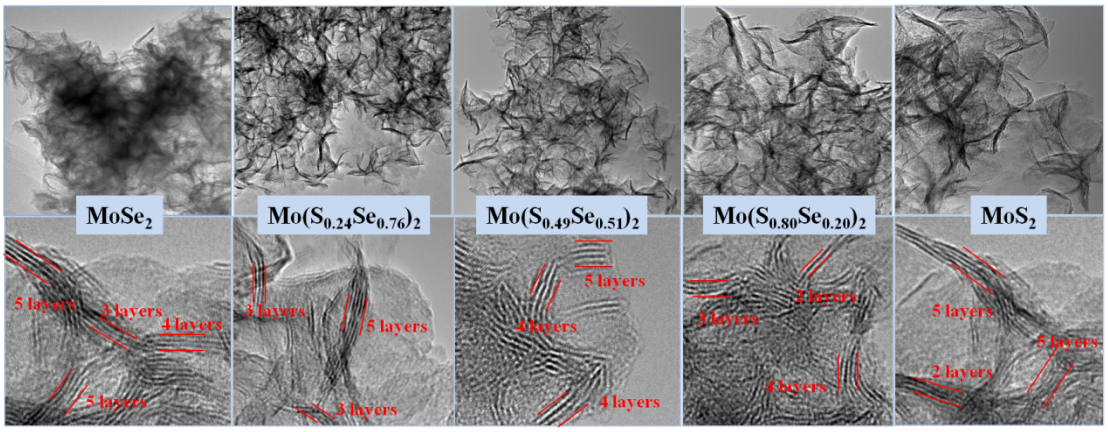

Figure S2: The TEM and HRTEM results for the sample S1-S5.

The TEM and HRTEM results for the sample S1-S5 are shown in **figure S2**. As can be seen that all the samples show the 3D hierarchical structure, where these hierarchical structure are composed of ultrathin nanosheets. Generally, HRTEM investigation in the edge areas was a common and direct method to determine the layer numbers microscopically. In our case, three to five dark and bright patterns can be readily identified, indicating that the sample is stacked with three to five single layers.

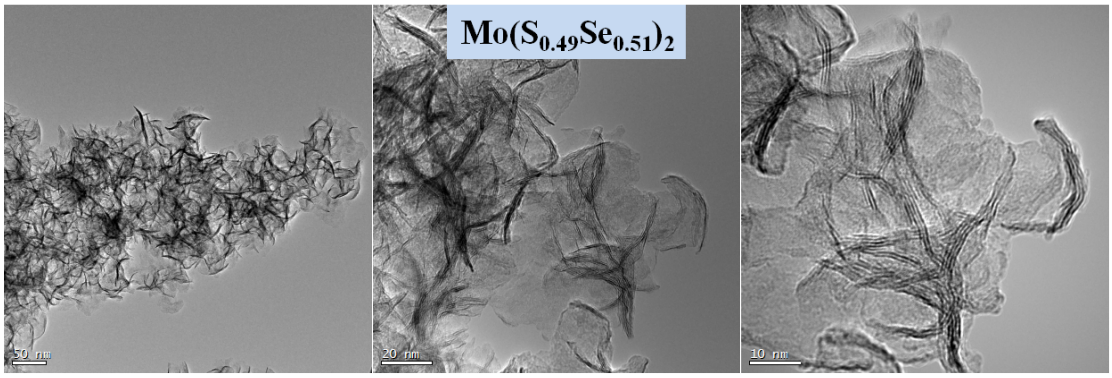

Figure S3: The TEM images with different magnification for sample $Mo(S_{0.49}Se_{0.51})_2$[**S3**].

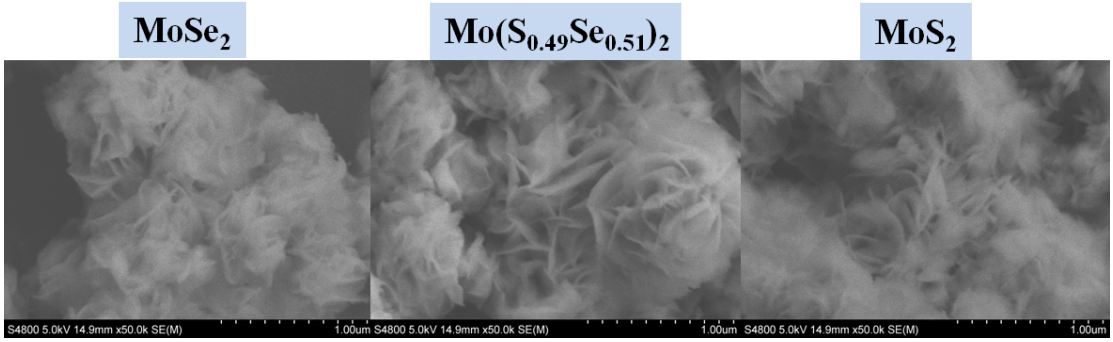

Figure S4: The SEM images with for sample $MoSe_2$, MoS_2 and $Mo(S_{0.49}Se_{0.51})_2$.

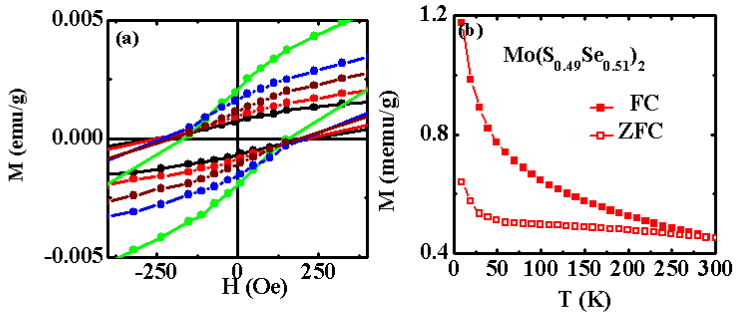

Figure S5: (a) An enlarged view of the M-H curves for sample S1-S5. (b)The zero-field cooling (ZFC) and field cooling (FC) curves for sample $Mo(S_{0.49}Se_{0.51})_2$[**S3**].

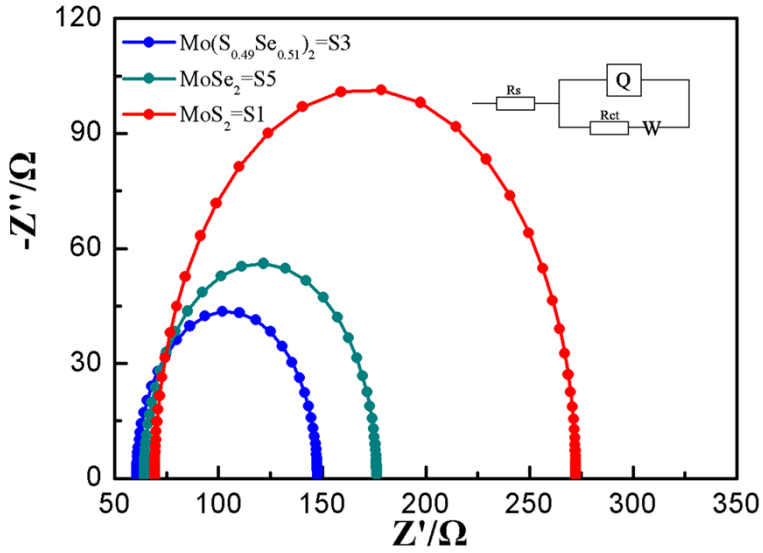

Figure S6. Nyquist plots of different samples showing the facile electrode kinetics.