Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Catalytic Synergy Effect of MoS_2/Reduced Graphene Oxide Hybrids for a Highly Efficient Hydrogen Evolution Reaction

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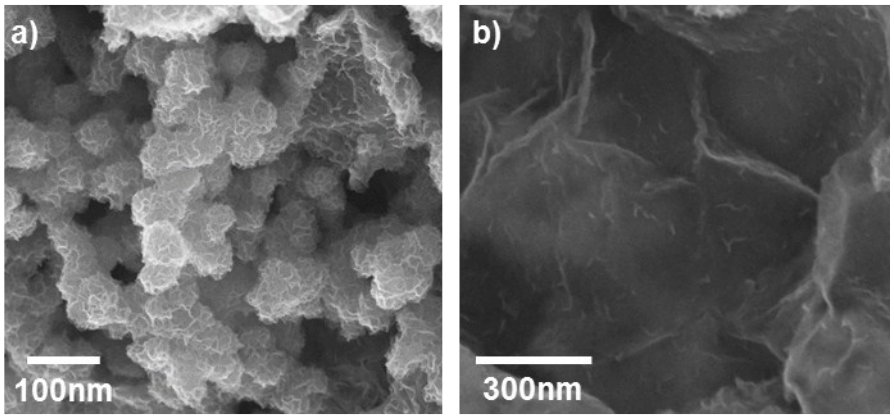

Fig. S1. Scanning electron microscope images of (a) MoS_2/rGO hybrids with 3.3 mg GO (MS-GO_2). (b) MoS_2/rGO hybrids with 20 mg GO.

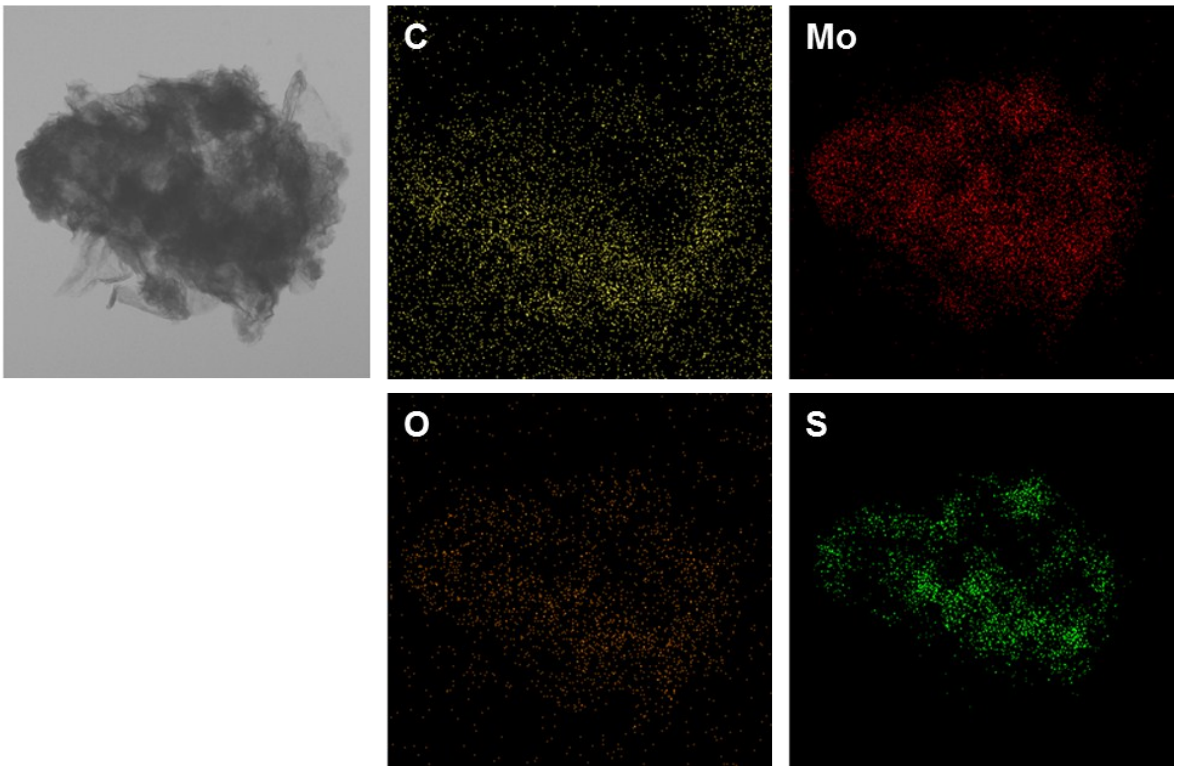

Fig. S2. EDS analysis taken from MoS_2/rGO hybrids with 10 mg GO (MS-GO_4).

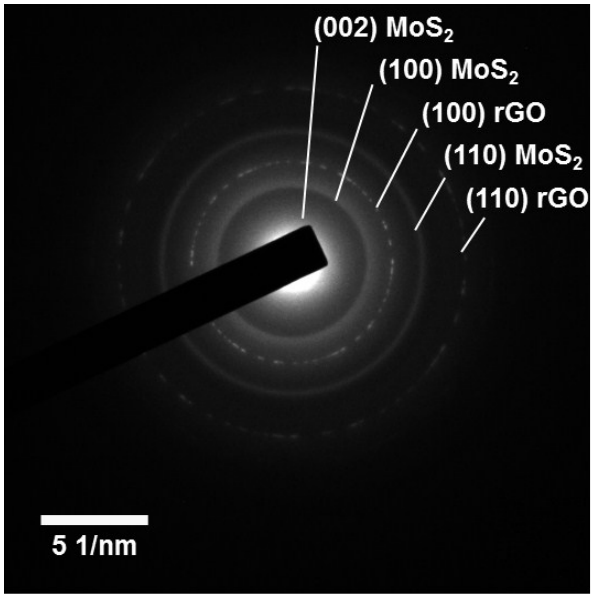

Fig. S3. SAED pattern of MoS_2/rGO hybrids with 10 mg GO (MS-GO_4).

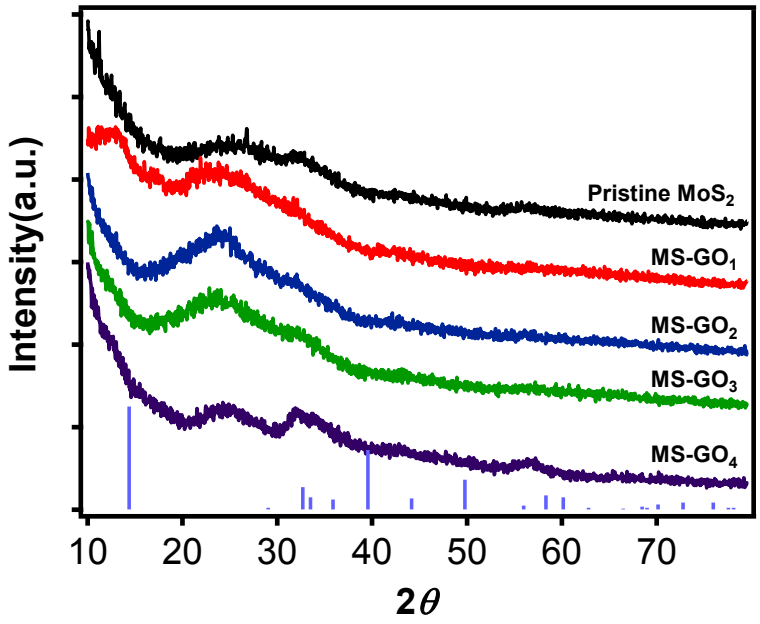

Fig. S4. X-ray diffraction (XRD) spectra of pristine MoS_2 and MoS_2/rGO hybrids with different GO contents. The standard XRD pattern of MoS_2 (JCPDS 37-1492) is overlapped in the figure for comparison.

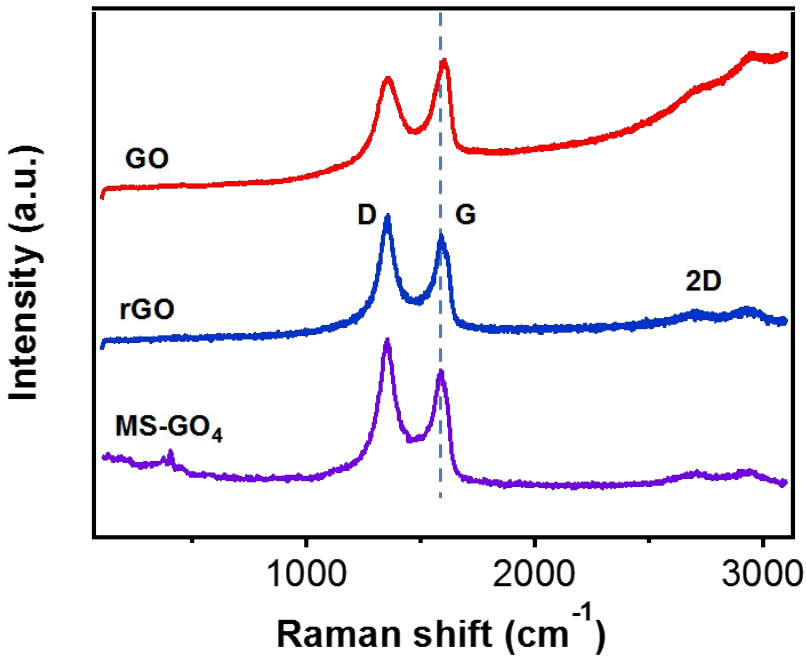

Fig. S5. Raman spectra of GO, rGO, and MoS_2/rGO hybrids. The dashed line indicates shift of G modes.

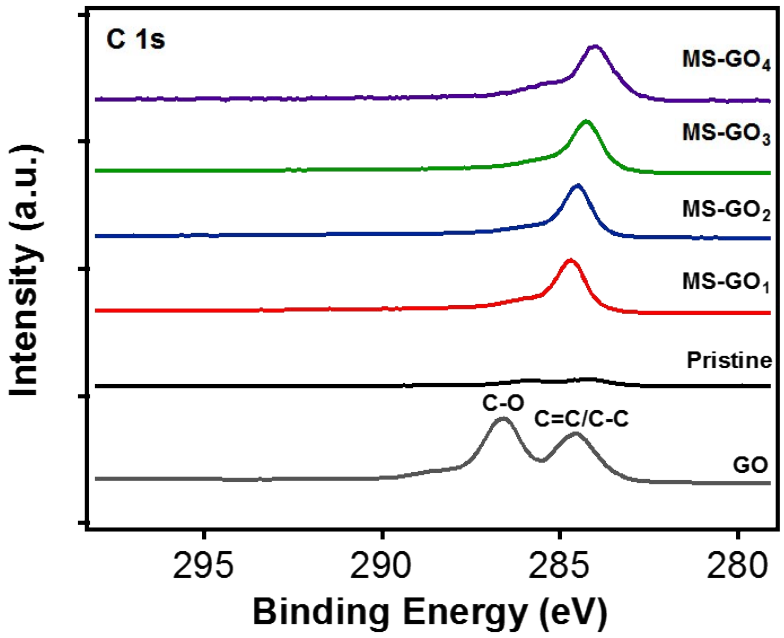

Fig. S6. C1s XPS spectra of pristine MoS_2 and MoS_2/rGO hybrids with various GO contents.

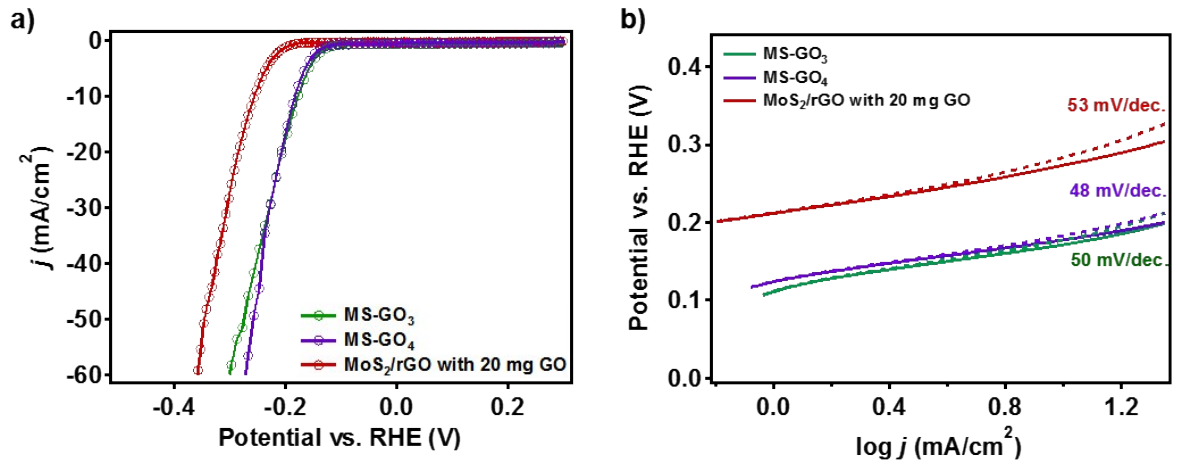

Fig. S7. (a) Polarization curves of MoS_2/rGO hybrids with 20 mg GO and (b) corresponding Tafel slope with other catalysts.

Table S1. Electrochemical properties of pristine MoS_2 and various MoS_2/rGO hybrids.

Samples	Tafel slope (mV/dec.)	η (mV) @ j = 3 mA/cm^2	j (mA/cm^2) @ η = 200 mV
Pristine MoS_2	178	-347	-0.83
MS-GO_1	82	-207	-3.04
MS-GO_2	60	-157	-16.14
MS-GO_3	50	-147	-24.41
MS-GO_4	48	-152	-24.58

Table S2. Impedance parameters of pristine MoS_2 and various MoS_2/rGO hybrids.

Samples	C_{DL} (mF)	R_S (Ω)	R_{CT} (Ω)
Pristine MoS_2	0.00058	9.69	467.5
MS-GO_1	0.27	12.6	242.0
MS-GO_2	1.70	13.3	104.6
MS-GO_3	3.91	8.50	25.59
MS-GO_4	4.20	7.89	31.56

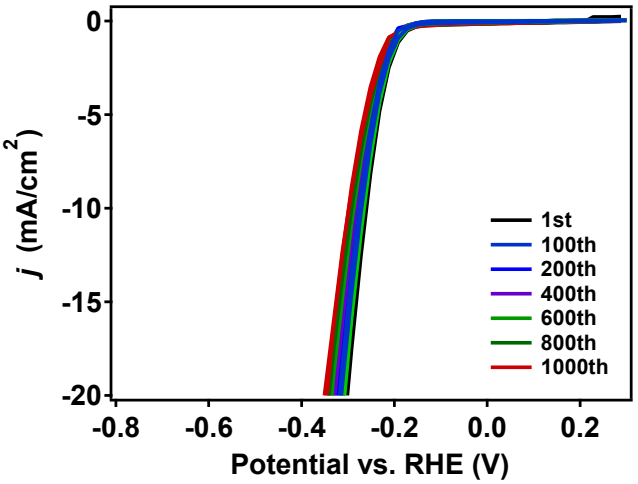

Fig. S8. Stability test of 1000 cycles for the MS-GO_4 HER catalyst.