Supporting Information for

Heterostructured MoO_x supported Ru as robust bifunctional catalyst for overall water splitting

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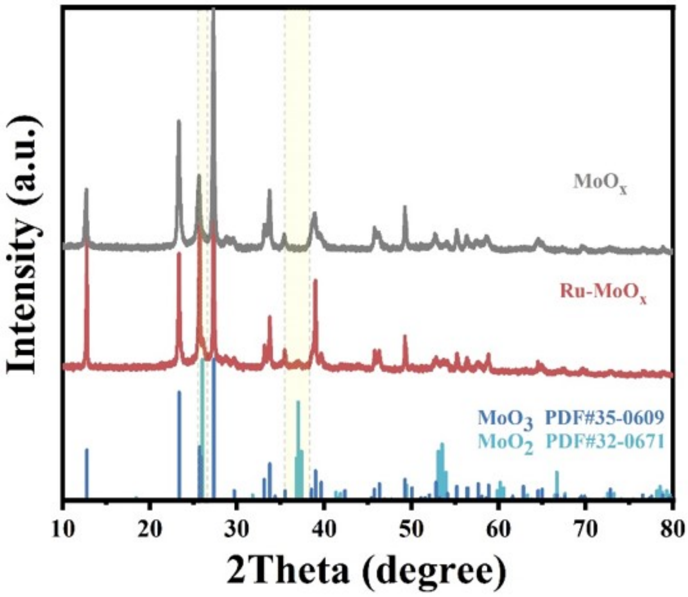

Figure S1 XRD patterns of MoO_x.

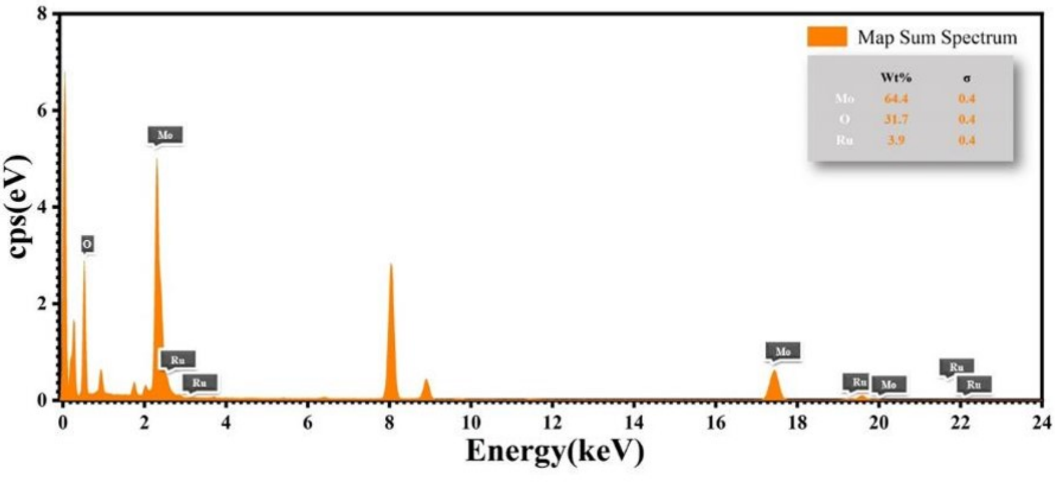

Figure S2 EDX patterns of the Ru-MoO_x.

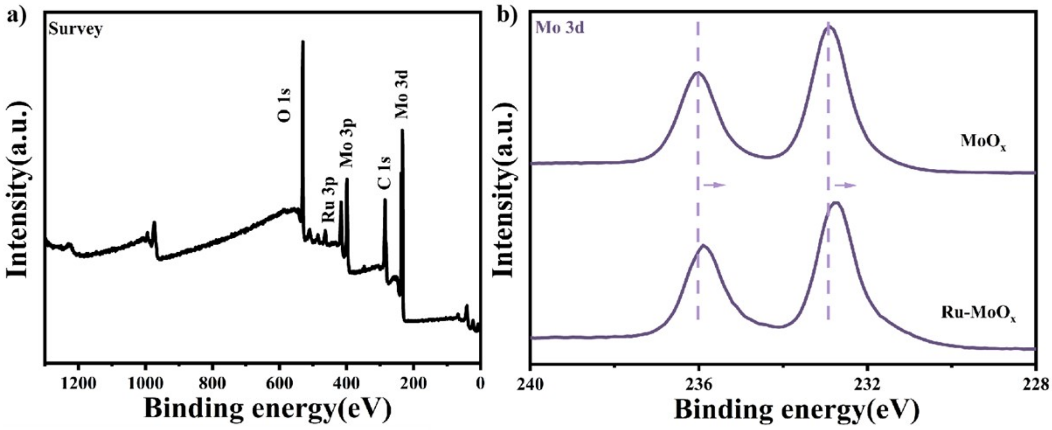

Figure S3 a) XPS survey for Ru-MoO_x; b) Mo 3d of MoO_x and Ru-MoO_x.

Table S1：The distribution of the oxidation state of Mo atoms on the surface of the catalysts obtained at different temperatures based on XPS analysis.

Catalyst	Mo^{4+}(at%)	Mo^{5+}(at%)	Mo^{6+}(at%)
RuMoO_x-350	49.17	------	50.83
RuMoO_x-400	------	26.76	73.24
Ru-MoO_x	------	28.36	71.64
RuMoO_x-500	------	25.46	74.54

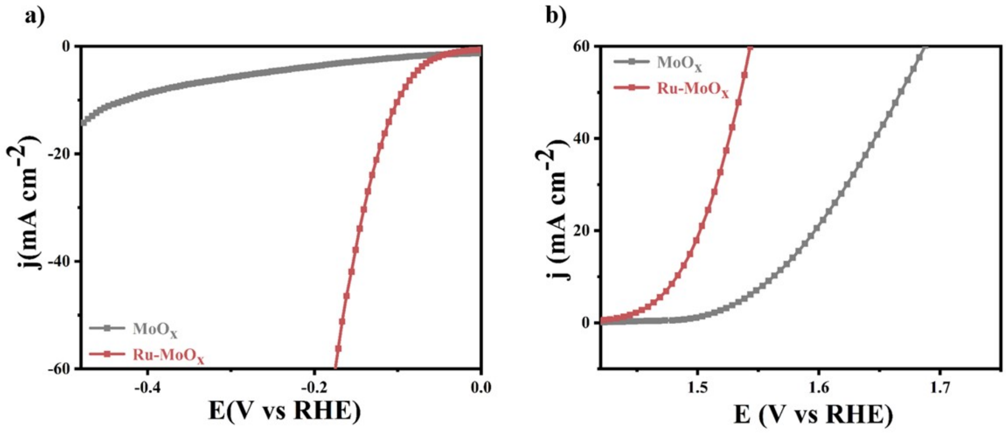

Figure S4 a) The HER polarization curves and b) The OER polarization curves of MoO_x and Ru-MoO_x.

Table S2：Comparison of some recently reported representative electrocatalysts for HER.

Catalysts	Electrolytes	η @ (10 mA cm^{-2})	Ref.
Ru-MoO_x	1.0 M KOH	85 mV	This work
Ru-VN	1.0 M KOH	144 mV	Ref [1]
RuO_2–Fe_2O_3	1.0 M KOH	148 mV	Ref [2]
Ru-CoNi@NC-2	1.0 M KOH	268 mV	Ref [3]
Ru–WSe_2	1.0 M KOH	87 mV	Ref [4]
S-RuP@NPSC-900	1.0 M KOH	92 mV	Ref [5]
Ru_{1+NPs}/N–C	1.0 M KOH	39 mV	Ref [6]
Ru/Co_4N-CoF_2	1.0 M KOH	53 mV	Ref [7]
CoRu-O/A@HNC-2	1.0 M KOH	85 mV	Ref [8]

Table S3：Comparison of some recently reported representative electrocatalysts for OER.

Catalysts	Electrolytes	η @ (10 mA cm^{-2})	Ref.
Ru-MoO_x	1.0 M KOH	235 mV	This work
RuCo@NC	1.0 M KOH	280 mV	Ref [9]
Ru-$Ni(OH)_2$	1.0 M KOH	295 mV	Ref [10]
Ru-FeRu@C/NC	1.0 M KOH	345 mV	Ref [11]
Ru/N-BP2000	1.0 M KOH	285 mV	Ref [12]
Ru-CoNi@NC-2	1.0 M KOH	240 mV	Ref [3]
Ru/Co_3O_{4-x}	1.0 M KOH	280 mV	Ref [13]
Ru/Co-N-C	1.0 M KOH	247 mV	Ref [14]
RuO_x NCs	1.0 M KOH	266 mV	Ref [15]

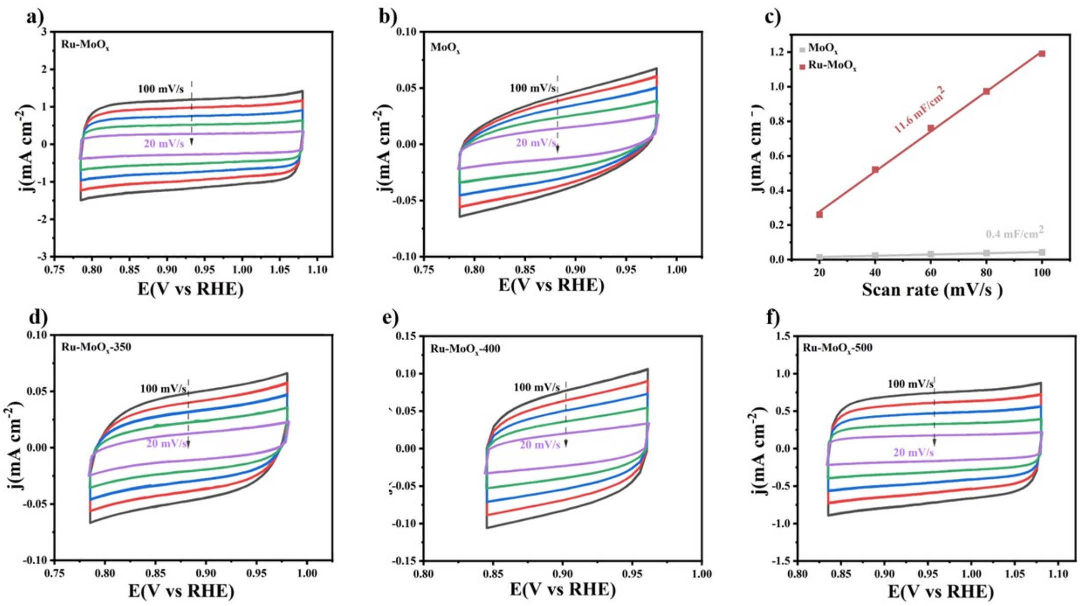

Figure S5 a, b and d-f) CVs measured for Ru-MoO_x, MoO_x, Ru-MoO_x-350, Ru-MoO_x-400 and Ru-MoO_x-500 in 1.0 M KOH at different scan rates of 20, 40, 60, 80 and 100 mV s^{-1}; c) C_{dl} for Ru-MoO_x and MoO_x.、

Table S4：Comparison of some recently reported representative bifunctional electrocatalysts for overall water splitting.

Catalysts	Electrolytes	η @ (10 mA cm^{-2})	Ref.
Ru-MoO_x(+,-)	1.0 M KOH	1.54 V	This work
Ru-HPC‖P-RuO_2	1.0 M KOH	1.53 V	Ref [16]
CoRu-O/A@HNC-2(+,-)	1.0 M KOH	1.558 V	Ref [8]
Ru/c-$Ti_3C_2T_x$/NF(+,-)	1.0 M KOH	1.53 V	Ref [17]
Ru/Co(OH)F‖Ru/Co_4N-CoF_2	1.0 M KOH	1.55 V	Ref [7]
Ru/NF-2(+,-)	1.0 M KOH	1.56 V	Ref [18]
NF@NiO@Ru(+,-)	1.0 M KOH	1.55 V	Ref [19]
Ru@MoO$(S)_3$(+,-)	1.0 M KOH	1.526 V	Ref [20]
$RuNi_1Co_1$@CMT(+,-)	1.0 M KOH	1.58 V	Ref [21]

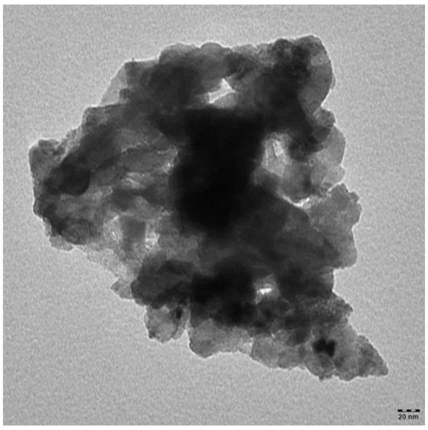

Figure S6 TEM of Ru-MoO_x after the durability test.

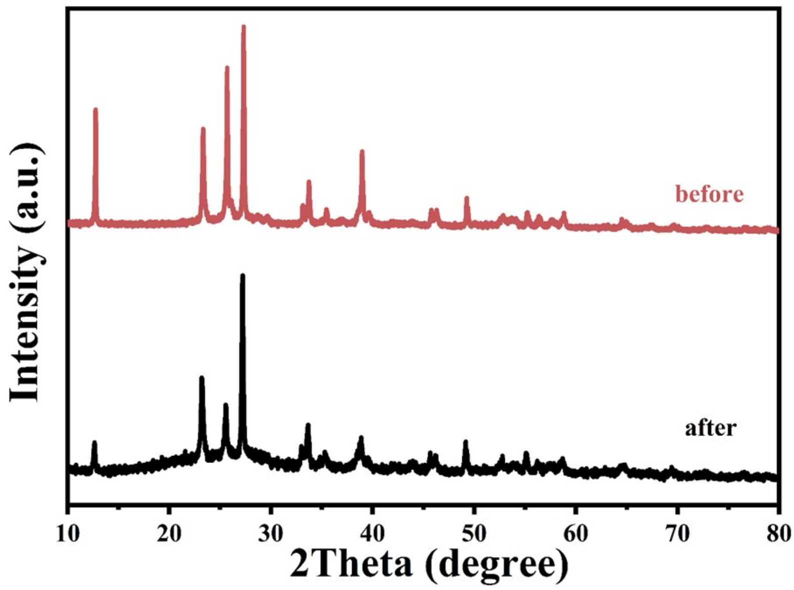

Figure S7 XRD of Ru-MoO_x before and after the durability test.

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