Supporting Information

Surface Reorganization Engineering on N Dopants MoS_2 by In-situ Electrochemically Oxidation Activated for Efficient Oxygen Evolution Reaction

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§Author Contributions

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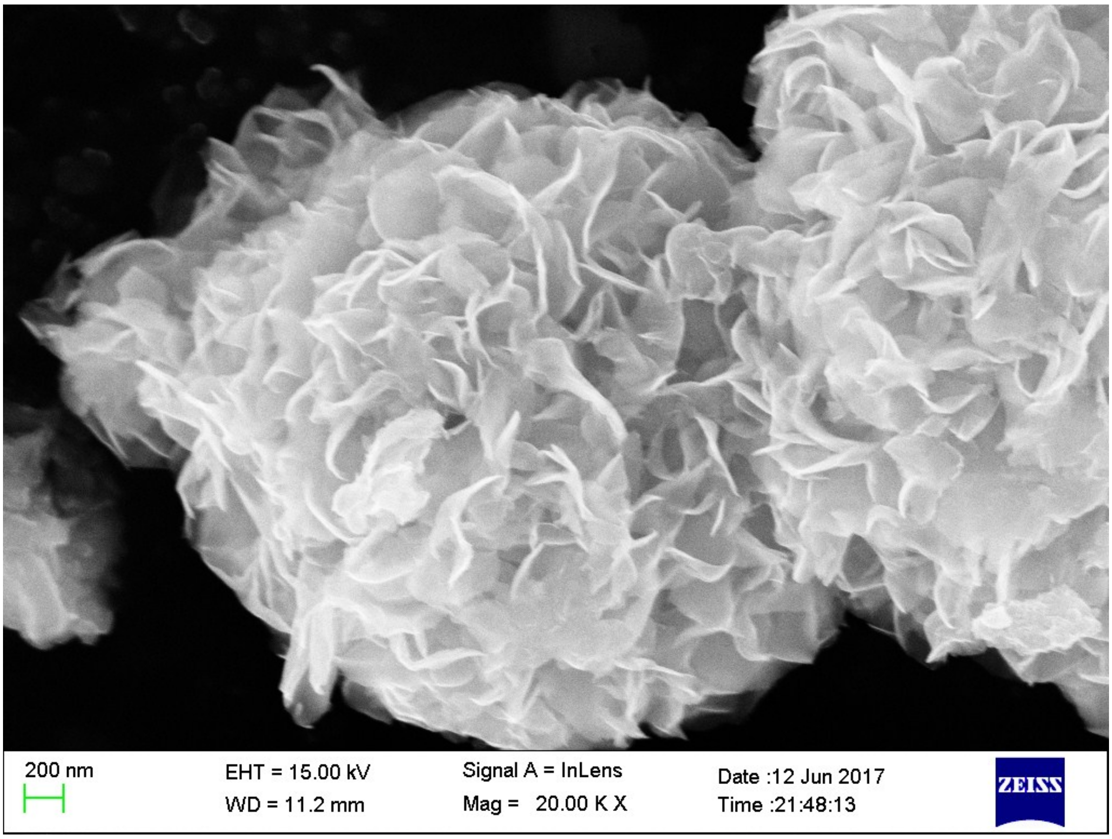

Fig. S1 The SEM of N0-MoS_2

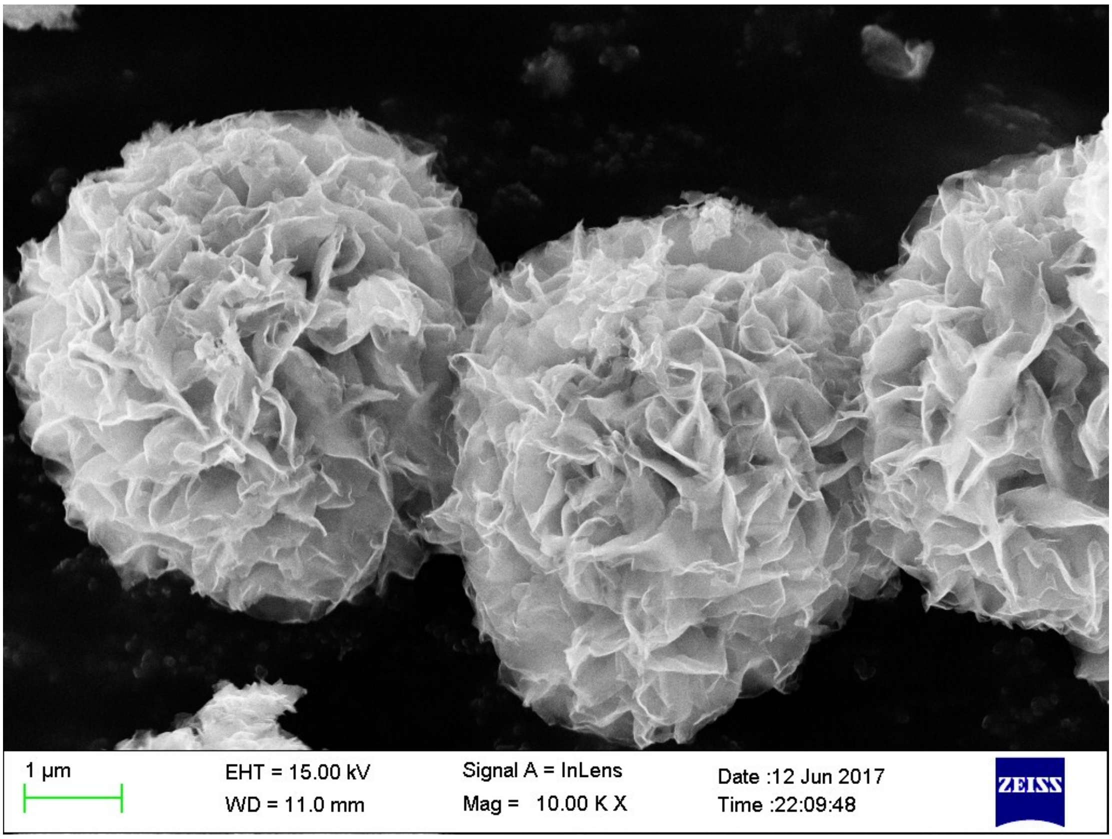

Fig. S2 The SEM of N1-MoS_2

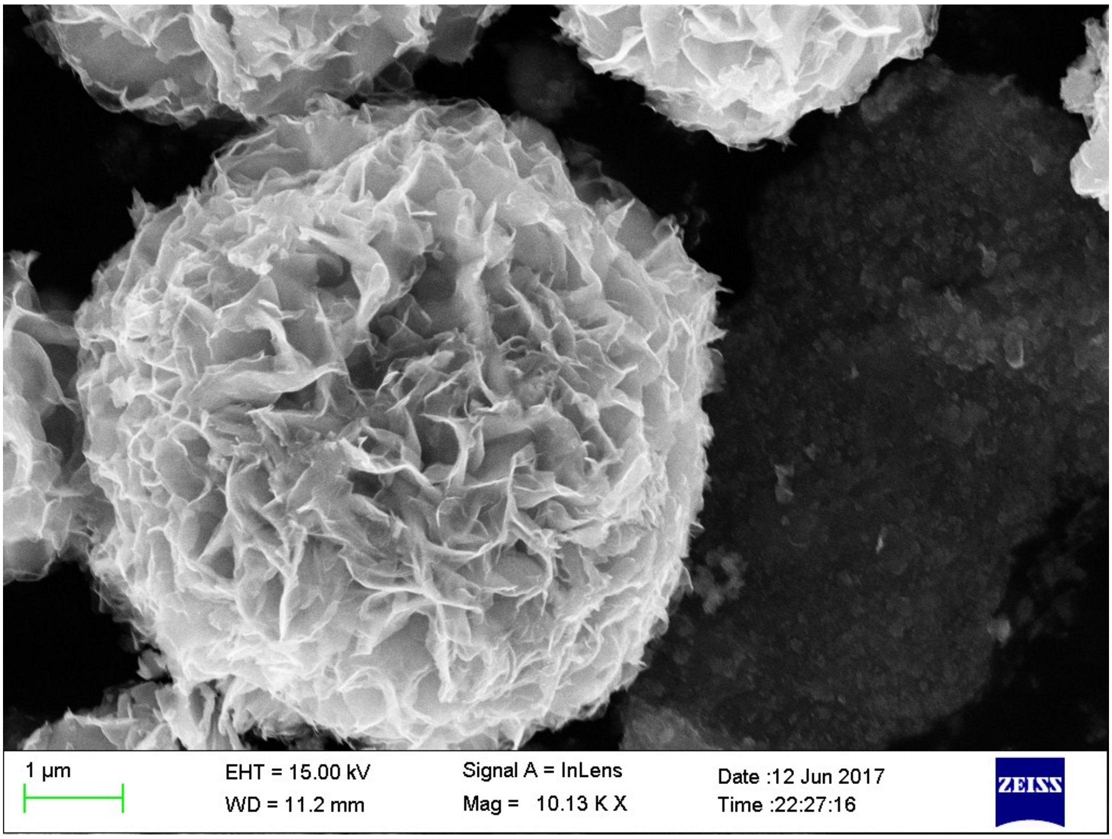

Fig. S3 The SEM of N2-MoS_2

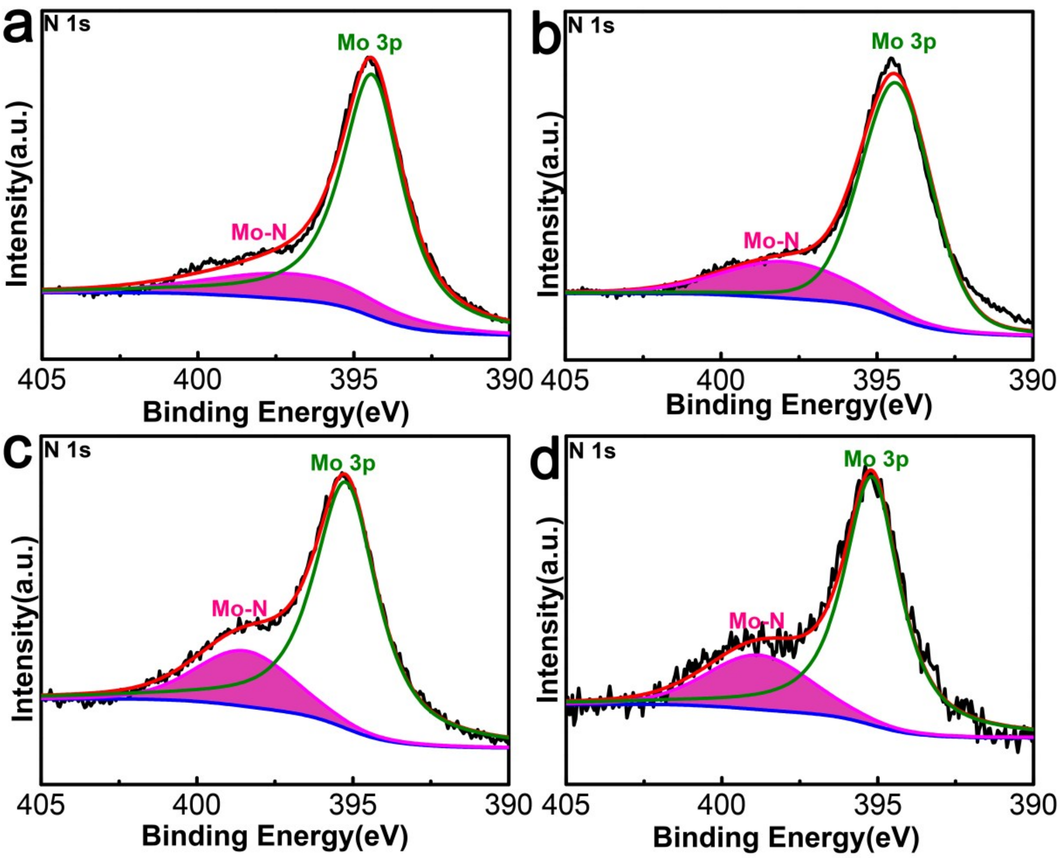

Fig. S4 The XPS spectra of N 1s orbitals for N0-MoS_2,N1-MoS_2,N2-MoS_2 and N3-MoS_2

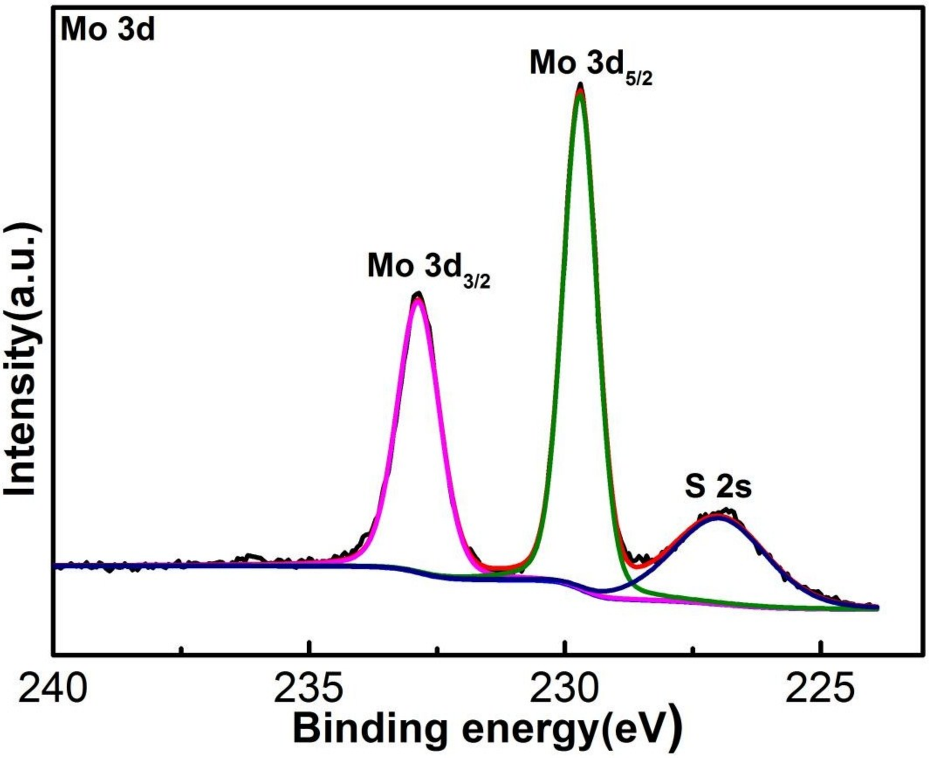

Fig. S5 The XPS spectra of Mo orbitals for N3-MoS_2

Table S1 The concentration of elements in four samples before ECT

Catalyst	Mo（Atomic%）	S（Atomic%）	N（Atomic%）	O（Atomic%）
N0-MoS2	28.5	70.76	0.65	0.09
N1-MoS2	28.21	70.03	1.68	0.08
N2-MoS2	27.96	69.12	2.85	0.07
N3-MoS2	27.6	69.06	3.26	0.08

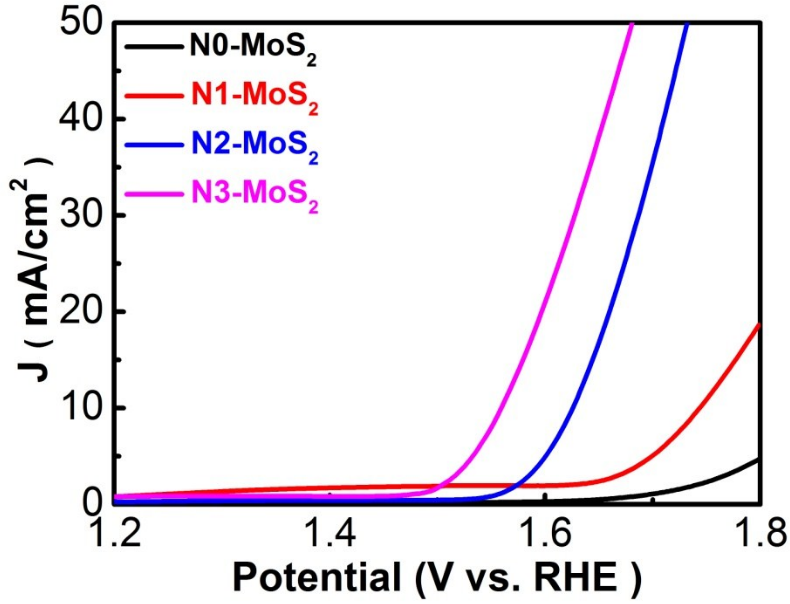

Fig. S6 Polarization curves of N0-MoS_2, N1-MoS_2, N3-MoS_2 and N4-MoS_2

Table S2 The concentration of elements in MoOx@N3-doped MoS2-x and Before-ECT-MoS2

Catalyst	Mo（Atomic%）	S（Atomic%）	N（Atomic%）	O（Atomic%）
Before-ECT-MoS_2	27.6	69.06	3.26	0.08
MoOx@N3-doped MoS_{2-x}	26.86	68.18	3.12	1.84

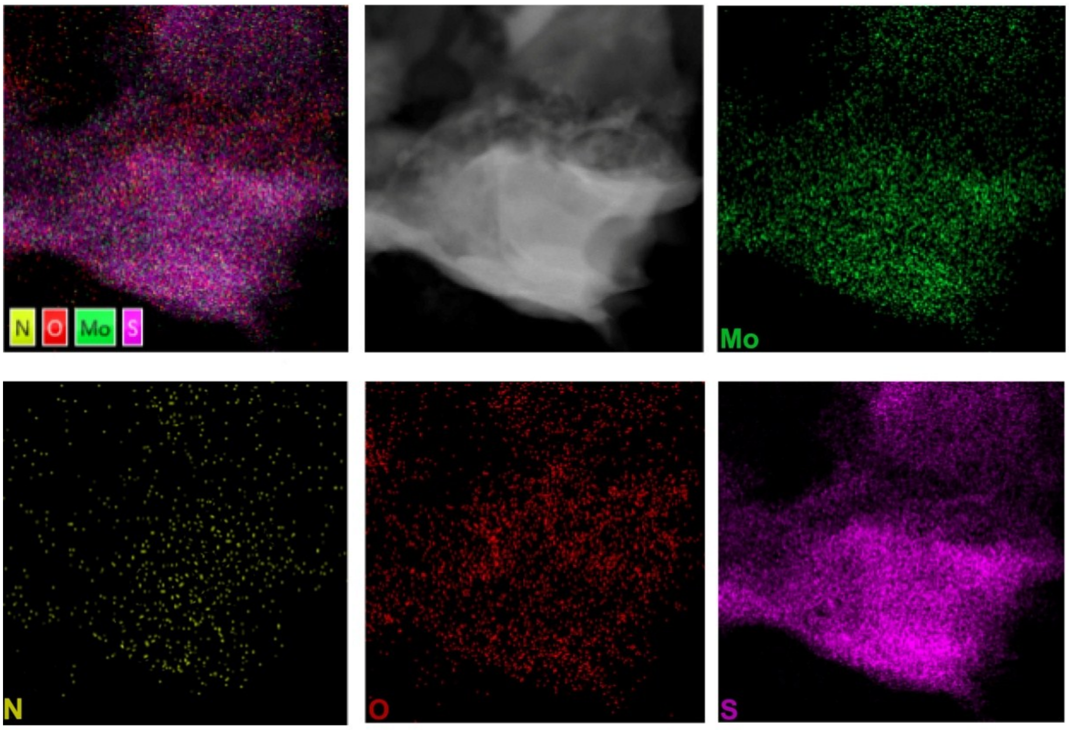

Fig. S7 The corresponding energy-dispersive X-ray spectroscopy (EDX) mapping MoOx@N3-doped MoS_{2-x}.

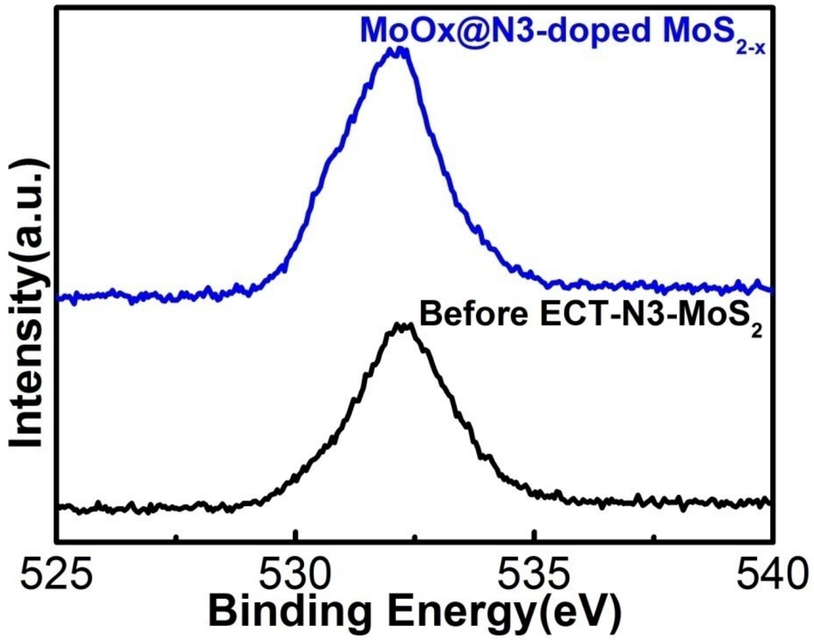

Fig. S8 The XPS spectra of O orbitals for Before ECT-N3-MoS_2 and MoOx@N3-doped MoS_{2-x}

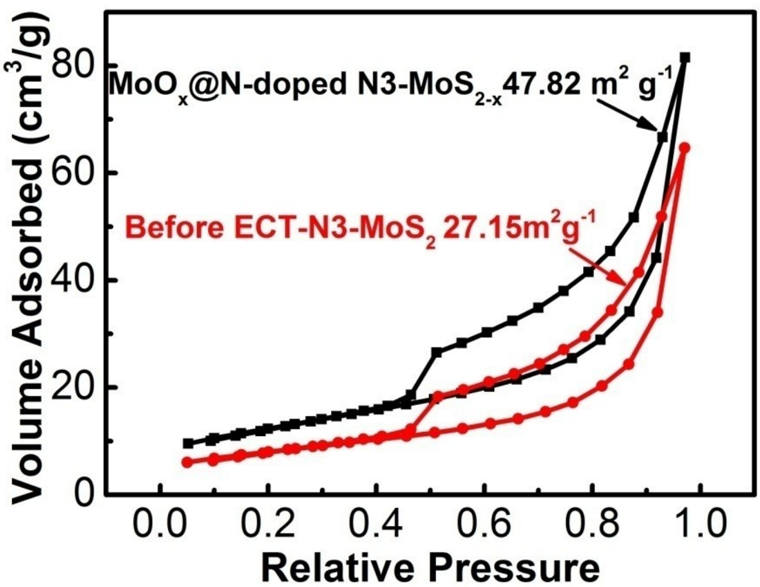

Fig. S9 N_2 sorption isotherms of Before ECT-N3-MoS_2 and MoOx@N3-doped MoS_{2-x}

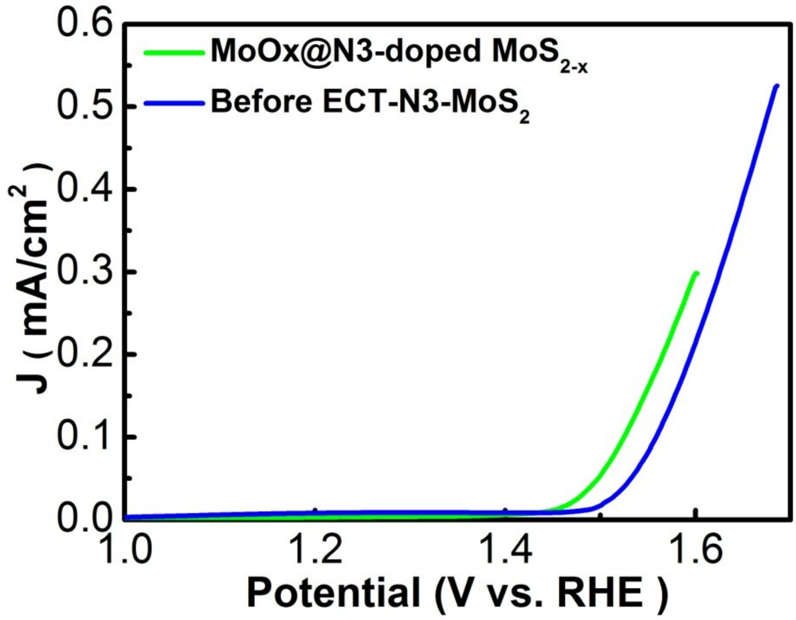

Fig. S10 The polarization curves normalized by the BET surface area

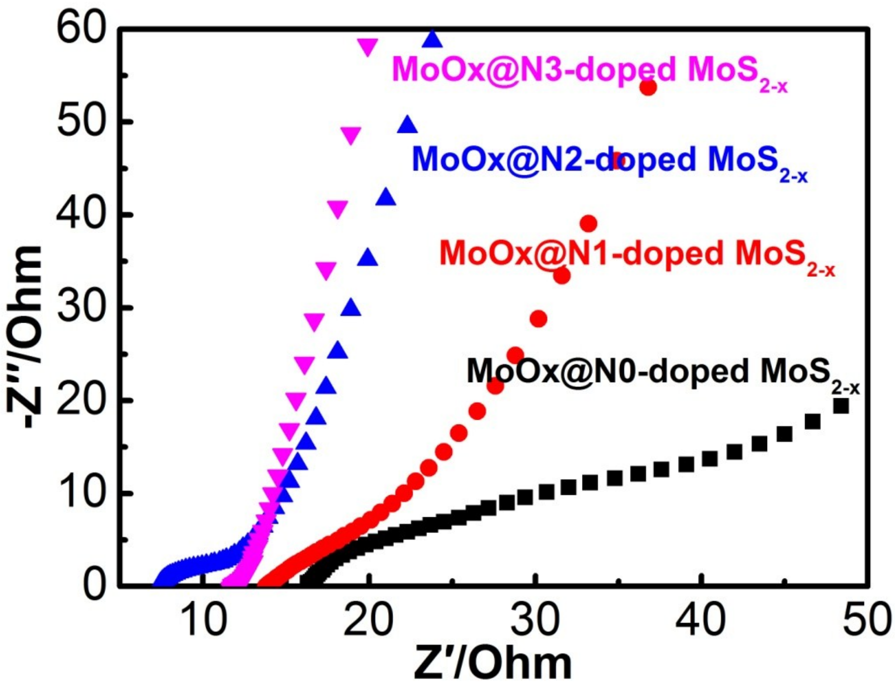

Fig. S11 Nyquist plots of the as-prepared MoS_2 nanosheets

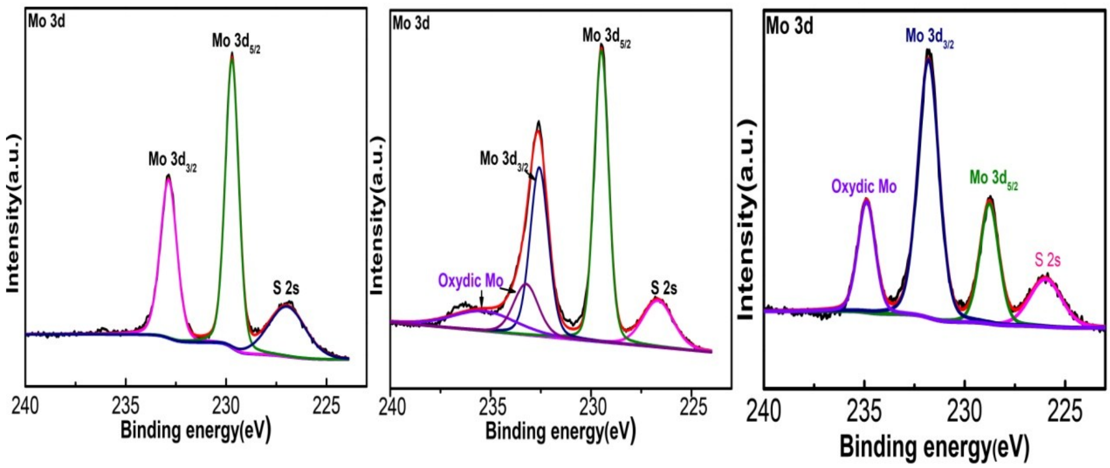

Fig. S12 The XPS spectra of Mo orbitals for Before ECT-N3-MoS_2, MoOx@N3-doped MoS_{2-x} and After durability test MoOx@N3-doped MoS_{2-x}

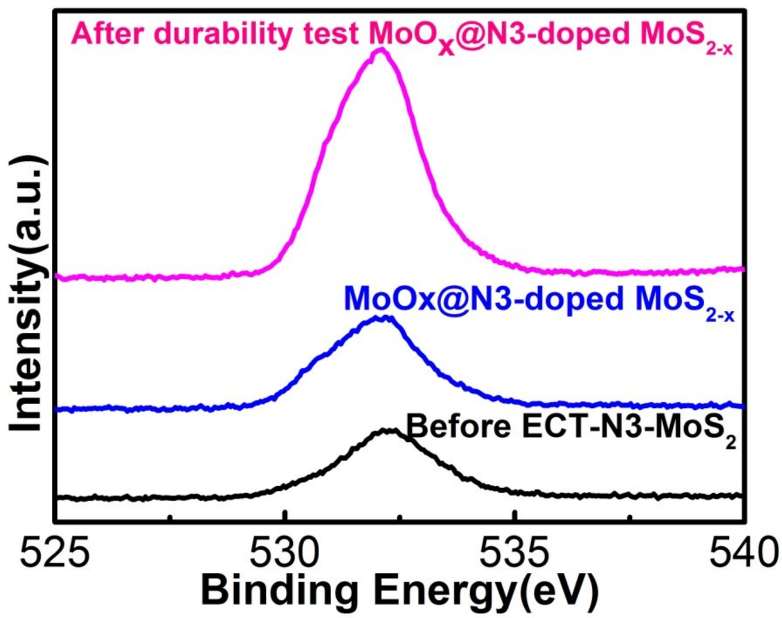

Fig. S13 The XPS spectra of O orbitals for Before ECT-N3-MoS_2, MoOx@N3-doped MoS_{2-x} and After durability test MoOx@N3-doped MoS_{2-x}

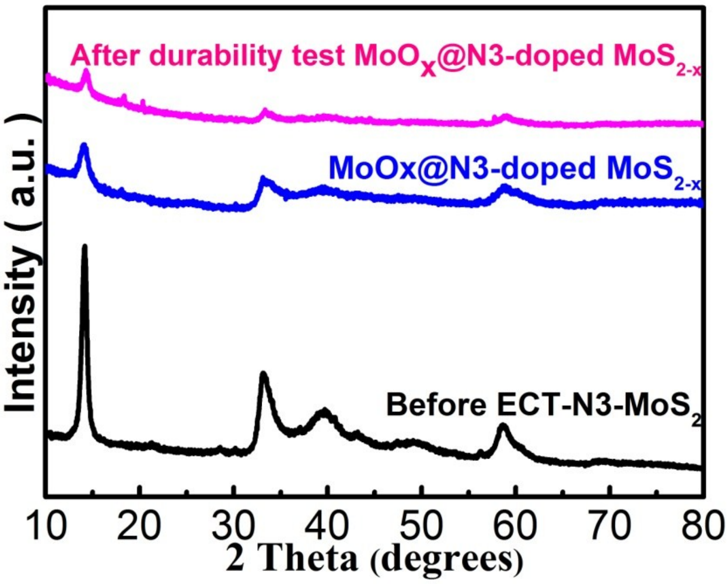

Fig. S14 XRD patterns of Before ECT-N3-MoS_2 , MoOx@N3-doped MoS_{2-x} and After durability test MoOx@N3-doped MoS_{2-x}

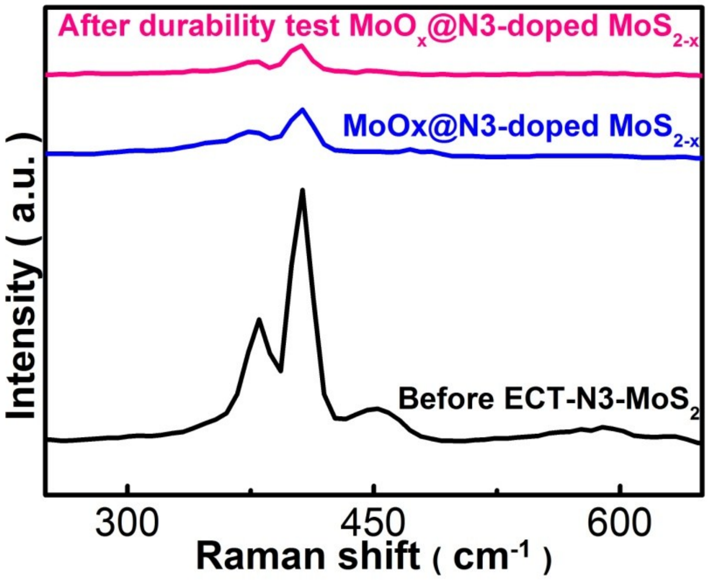

Fig. S15 Raman spectra of Before ECT-N3-MoS$_2$, MoOx@N3-doped MoS$_{2-x}$ and After durability test MoOx@N3-doped MoS$_{2-x}$

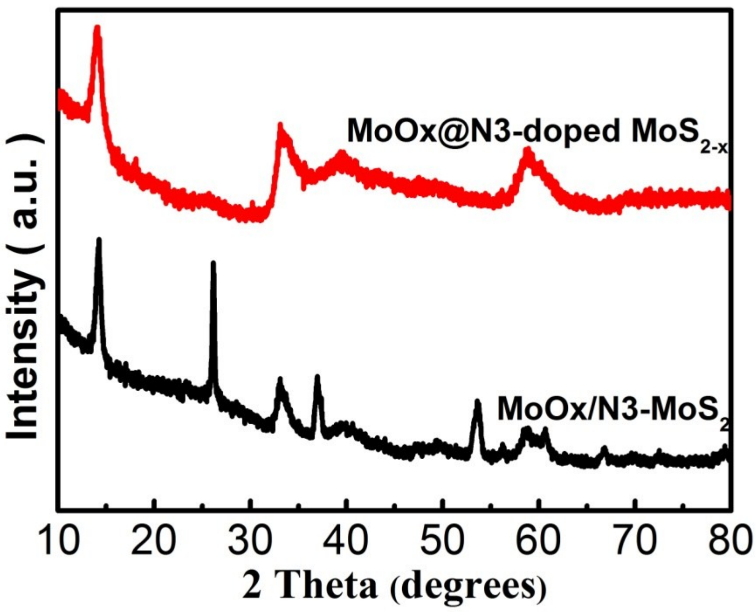

Fig. S16 XRD patterns of MoOx/N3-MoS_2 and MoOx@N3-doped MoS_{2-x}

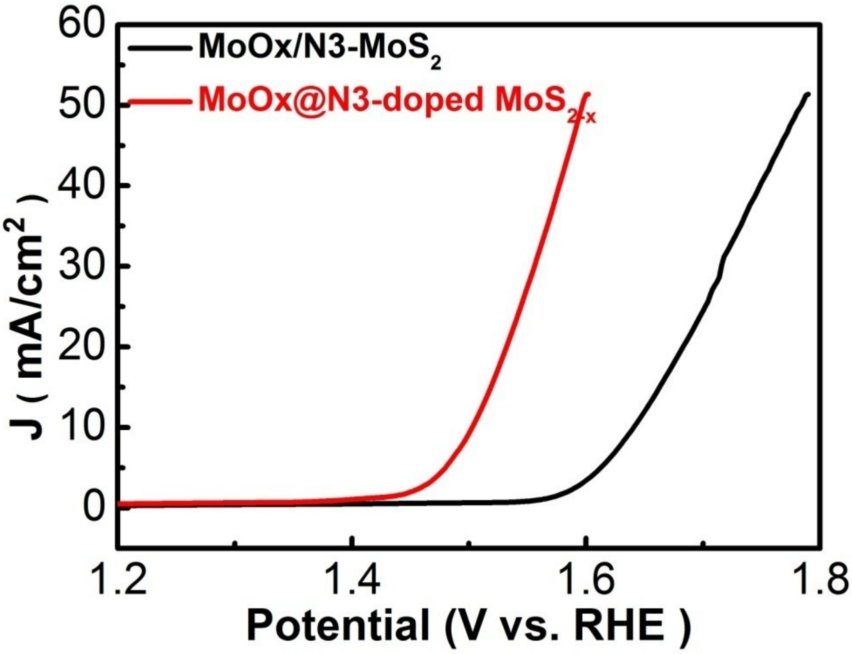

Fig. S17 Polarization curves of MoOx/N3-MoS_2 and MoOx@N3-doped MoS_{2-x} nanosheets

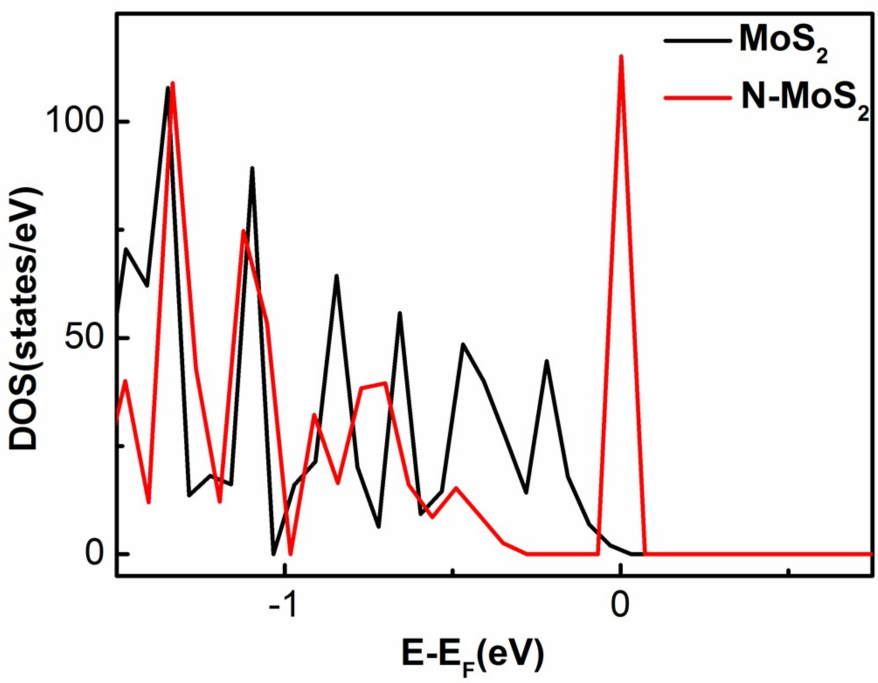

Fig.S18 Density of states (DOS) plots of as-prepared MoS_2 nanosheets.

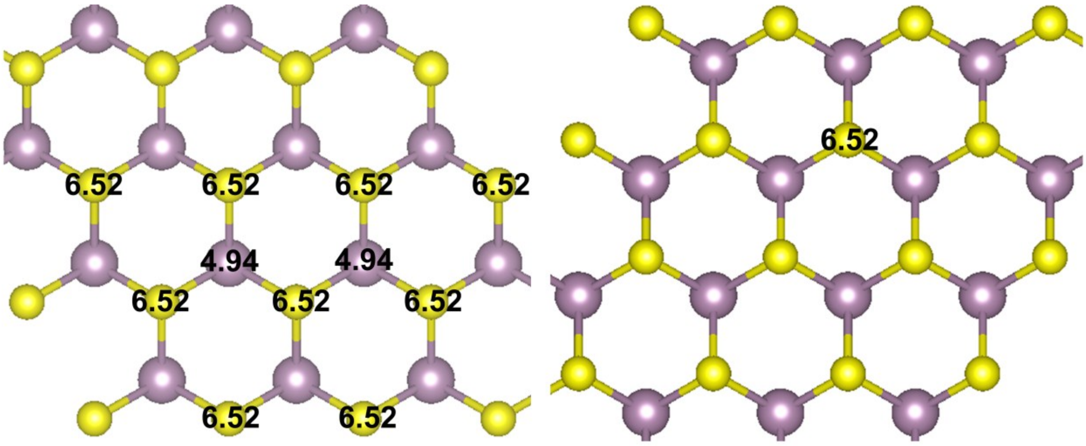

Fig. S19 Bader charge of different atoms for pristine MoS2

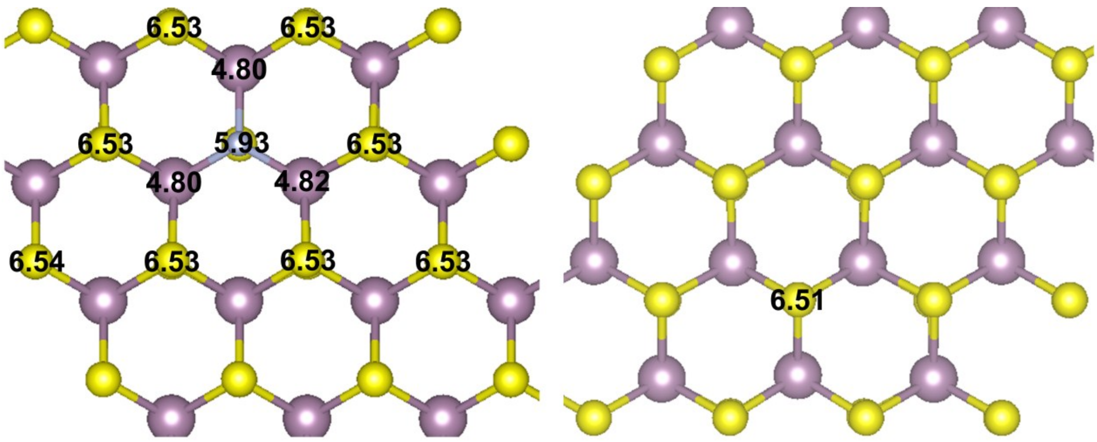

Fig. S20 Bader charge of different atoms for N-MoS2

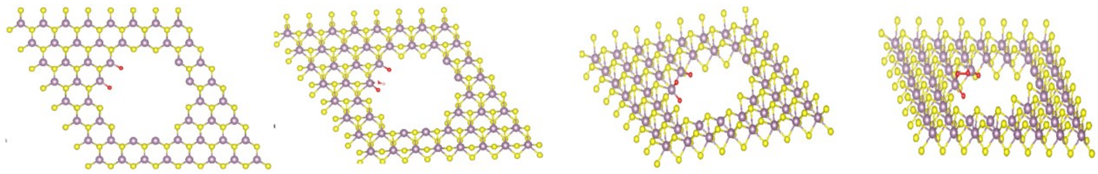

Fig.S21 the corresponding atomic configurations of the intermediate adsorption for pristine MoS2

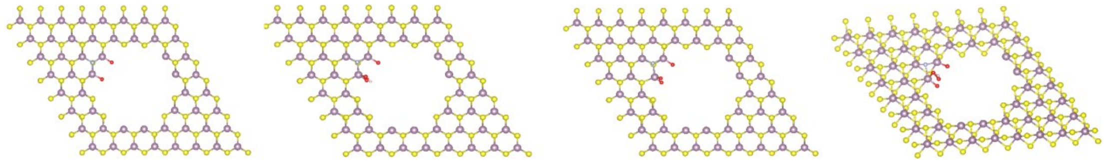

Fig.S22 the corresponding atomic configurations of the intermediate adsorption for N-MoS2

Table S3. Comparison of the OER activity for several recently reported highly activenoble metal-free catalysts supported on different substrates.

Catalyst	Potential @ 10.0mA cm-1 (Vvs. RHE)	Tafel slope (mV dec^{-1})	Electrolyte	Substrate	Reference
Benchmarking RuO2	1.53	70	1 M KOH	Glassy carbon	This work
N3-MoS2-ECT	1.50	61	1 M KOH	Glassy carbon	This work
single-unit-cell thick CoSe2 sheets	～1.6	64	1 M KOH	Glassy carbon	[1]
NCNT/Co$_x$Mn$_{1-x}$O	1.57	40	1 M KOH	Glassy carbon	[2]
Co3O4/N-rmGO	1.54	67	1 M KOH	Glassy carbon	[3]
A-CoS4.6O0.6 PNCs	1.52	62	1 M KOH	Glassy carbon	[4]
N-CoFe LDHs	1.511	40.03	1 M KOH	Glassy carbon	[5]
Co@CoOx	1.519	68.9	1 M KOH	Glassy carbon	[6]
N-CoS2	1.47	98	1 M KOH	Glassy carbon	[7]
N-NiS2	1.5	none	1 M KOH	Glassy carbon	[8]
FeV	1.48	36.7	1 M KOH	Glassy carbon	[9]
FeCoMo	1.507	27.74	1 M KOH	Glassy carbon	[10]

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