Supplementary Information

Piezotronic-Enhanced Oxygen Evolution Reaction Enabled by a Au/MoS_2 Nanosheet Catalyst

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Table S1. ICP data of the contents of different elements.

Elements	The tested mass content (wt. %)
Au	0.2668
Mo	46.0310
S	26.1795

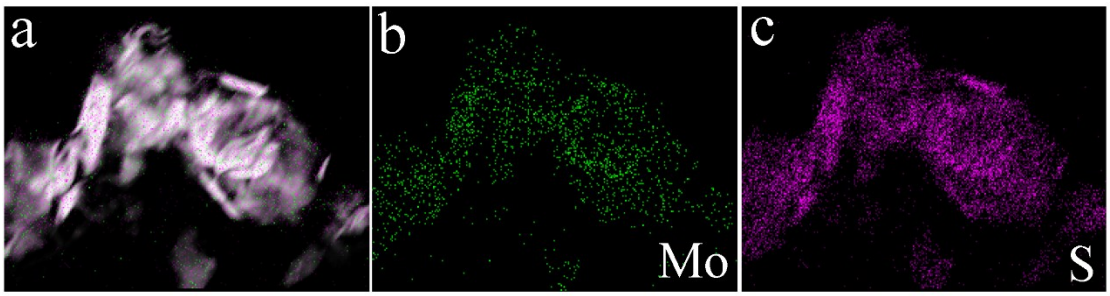

Fig. S1 (a) ADF STEM image of MoS_2 nanosheets. (b,c) The corresponding elemental mappings of Mo and S of the MoS_2 nanosheets.

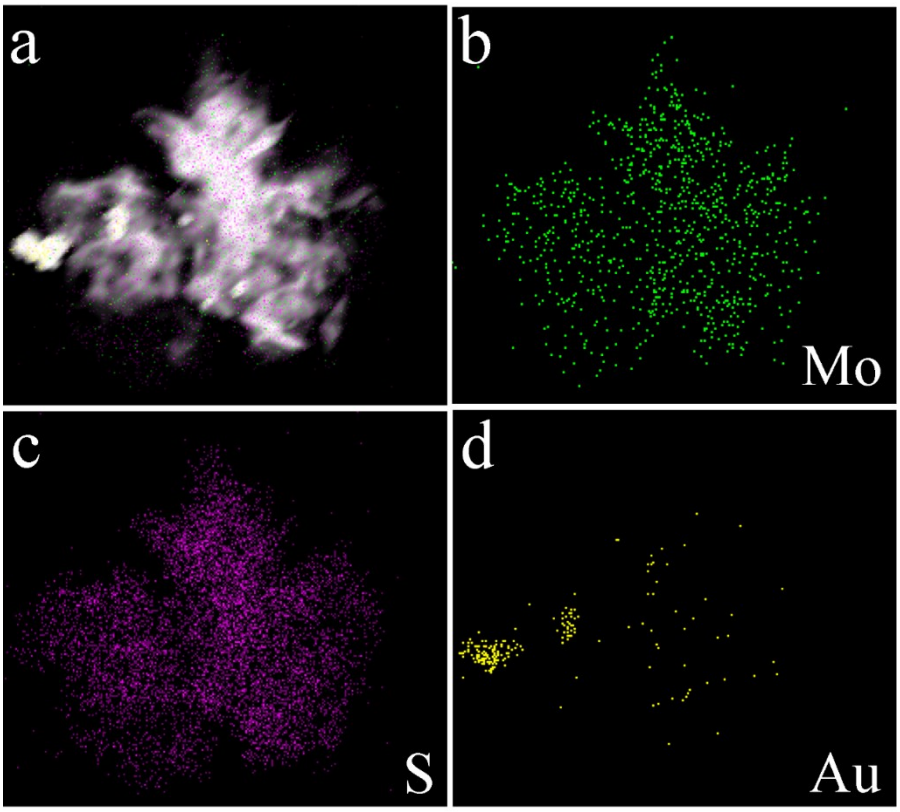

Fig. S2 (a) ADF STEM image of Au-MoS_2 nanosheets. (b-d) The corresponding elemental mappings of Mo, S and Au of the Au-MoS_2 nanosheets.

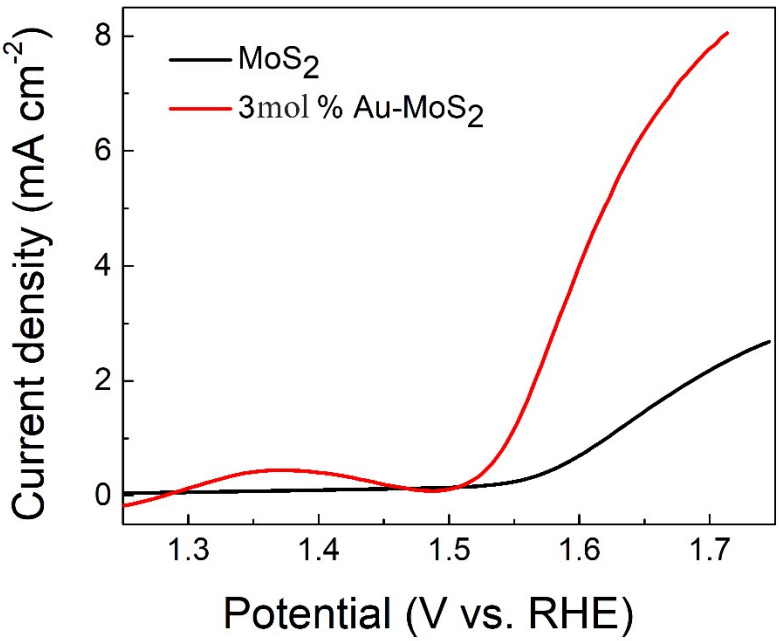

Fig. S3 Comparison of OER performances of the pure MoS_2 and 3mol % Au-MoS_2 catalysts.

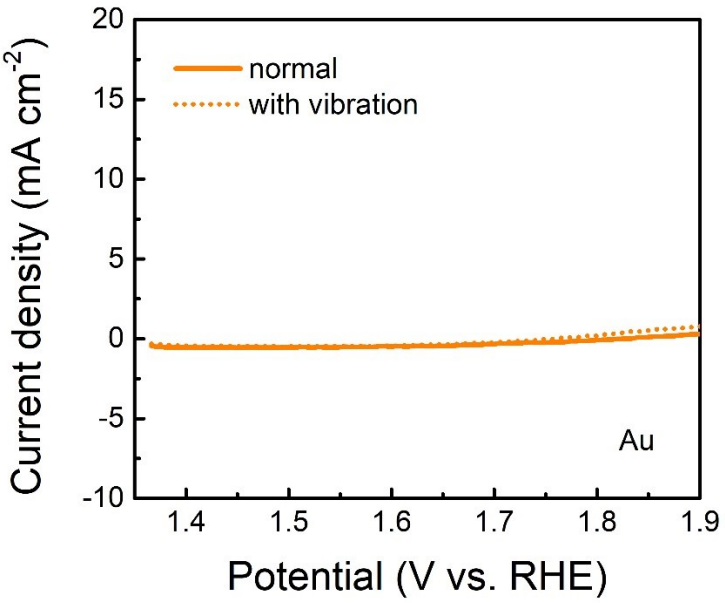

Fig. S4 LSV curves of the Au nanoparticles tested under normal condition and with ultrasonic condition.

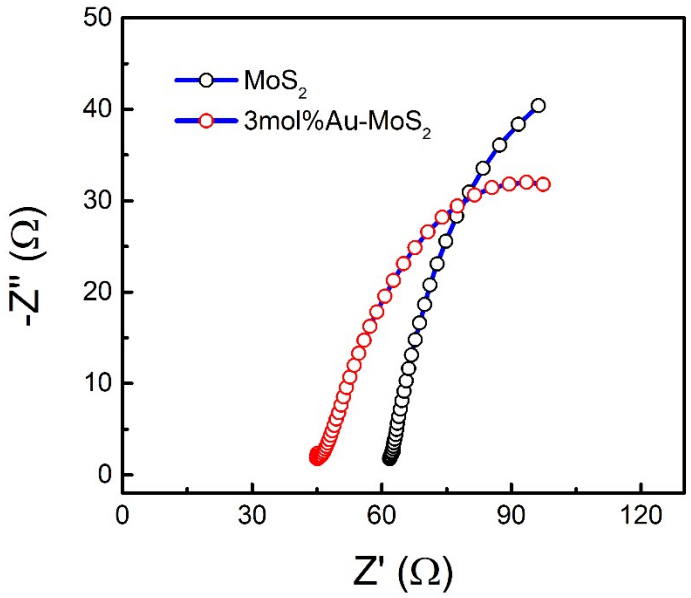

Fig. S5 The electrochemical impedance spectra of the pure MoS_2 and 3mol % Au-MoS_2 catalysts.

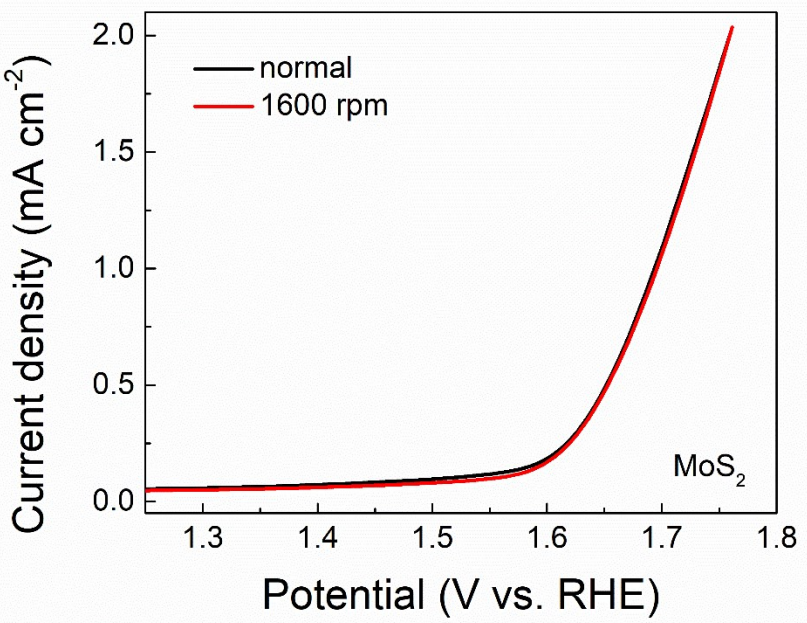

Fig. S6 Comparison of OER performance of the MoS_2 under normal condition and rotating condition at 1600 rpm.

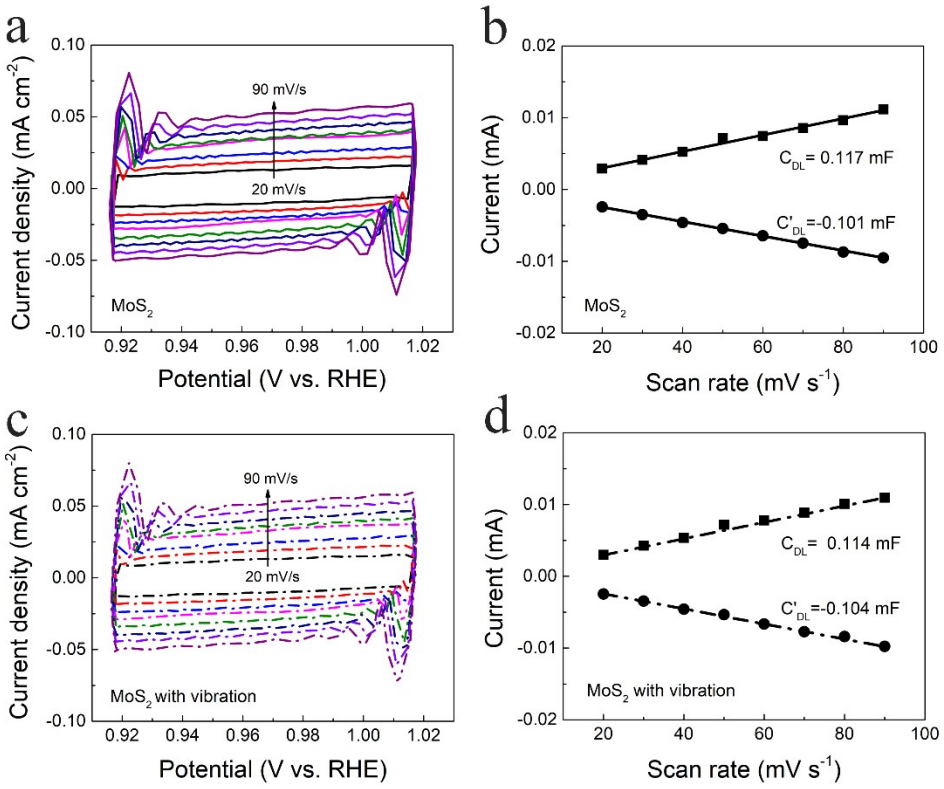

Fig. S7 The cyclic voltammetry (CV) curves in the non-faradaic region for MoS_2 catalyst (a) under normal condition and (c) with ultrasonic condition. Current-scan rates of MoS_2 catalyst (b) under normal condition and (d) with ultrasonic condition.

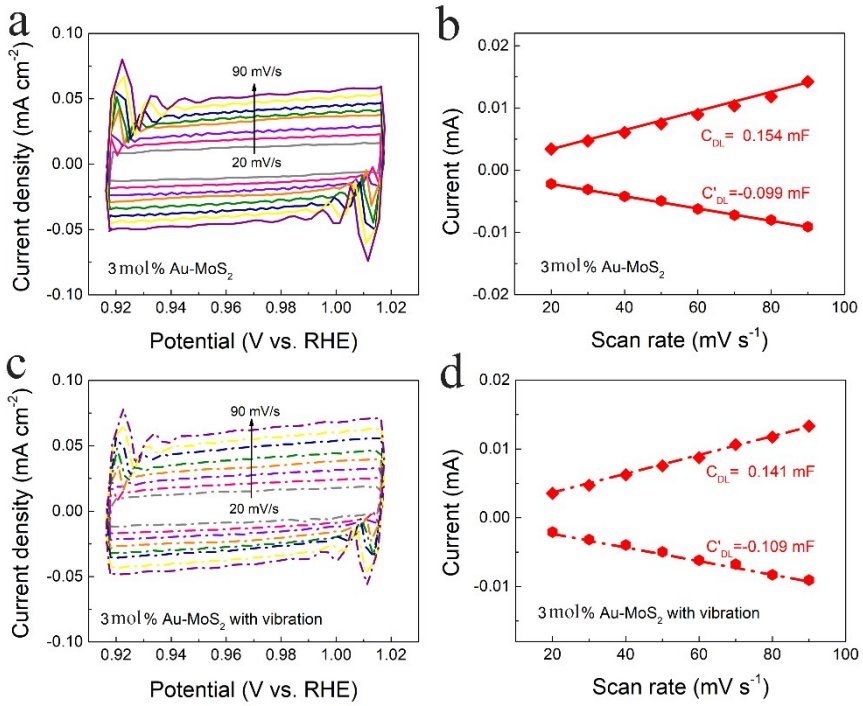

Fig. S8 The CV curves in the non-faradaic region at various scan rates for 3mol % Au-MoS_2 catalyst (a) under normal condition and (c) with ultrasonic condition. Current-scan rates of 3mol % Au-MoS_2 catalyst (b) under normal condition and (d) with ultrasonic condition.

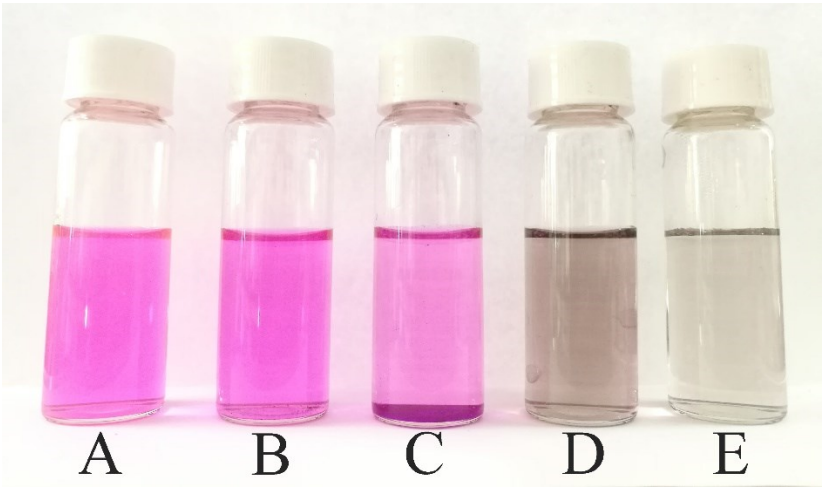

Fig. S9 The photo of the piezo-enhanced catalytic decomposition of RhB dye solution under different conditions. A case shows pure RhB dye reaction without catalyst. B and D cases represent RhB dye reactions for MoS_2 catalyst without and with vibration, respectively. C and E cases are the RhB dye reactions for 3mol % Au-MoS_2 catalyst without vibration and under ultrasonic vibration, respectively.

Table S2. Comparison of the electrochemical performance and dye degradation performance with different catalysts.

Catalyst	OER performance (onset potential)	Dye degradation performance	Refs.
Au-MoS_2	1.52 V	almost 100% after 30 minutes	This work
$BaTiO_{3-x}$	1.6 V	-	S1
MoS_2 nanosheets	-	86.9% under 20 min light irradiation	S2
$Bi_4Ti_3O_{12}$	-	62.1% after 4 h illumination	S3
NCNF-900	1.7 V	-	S4
Ag_2O-$BaTiO_3$	-	totally degraded within 1.5 h	S5
Co_3O_4	1.62 V	-	S6

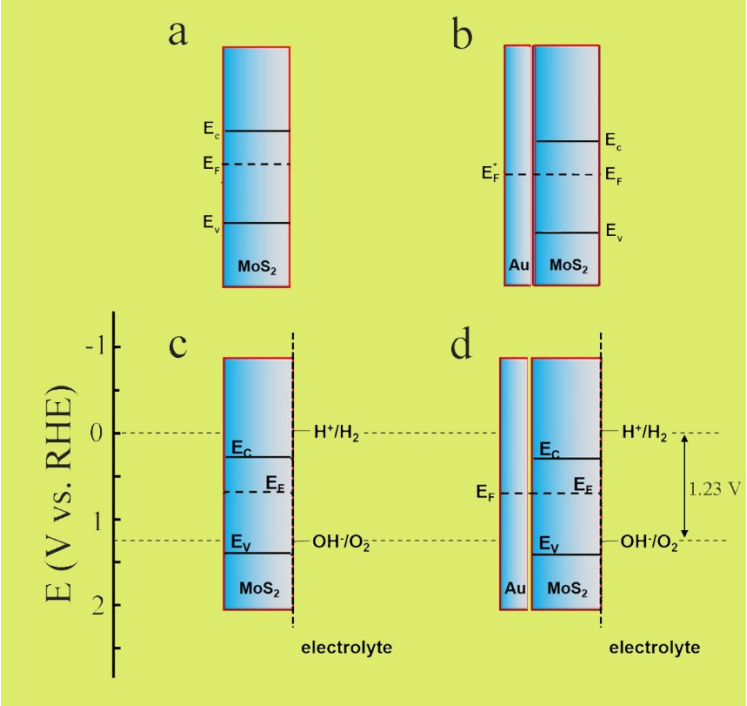

Fig. S10 The energy band potential diagrams. (a) The energy bands of bulk MoS_2 catalyst. (b) The energy bands of Au-MoS_2 catalyst under equilibrium. (c) The band potential with bulk MoS_2 piezo-catalyst immerging in electrolyte. (d) The band potential with Au-MoS_2 piezo-catalyst immerging in electrolyte.

References

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