Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

SUPPLEMENTARY INFORMATION FOR

Molybdenum Disulfide and Au Ultrasmall Nanohybrids as Highly Active Electrocatalysts for Hydrogen Evolution Reaction

Jinxuan Zhang, Tanyuan Wang, Lu Liu, Kuangzhou Du, Wanglian Liu, Zhiwei Zhu, and Meixian Li*

College of Chemistry and Molecular Engineering, Peking University, Beijing 100871, P.R.China

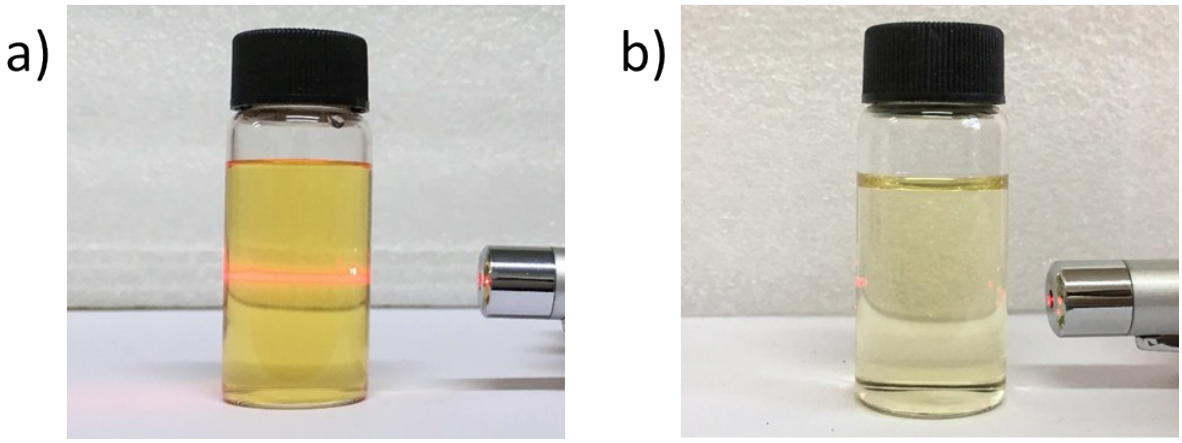

Fig. S1 Optical graphs of (a) MoS_2-Au nanohybrids aqueous solution and (b) AuNCs solution.

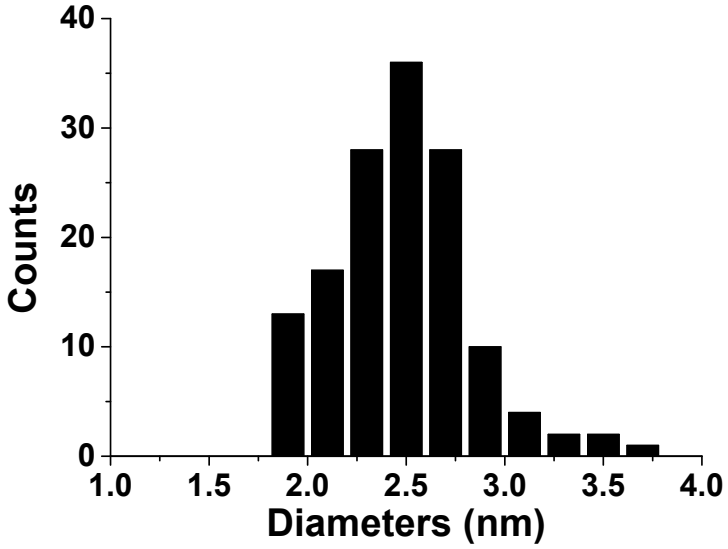

Fig. S2 Size distribution of MoS_2-Au nanohybrids measured by analyzing 141 nanoparticles from TEM image.

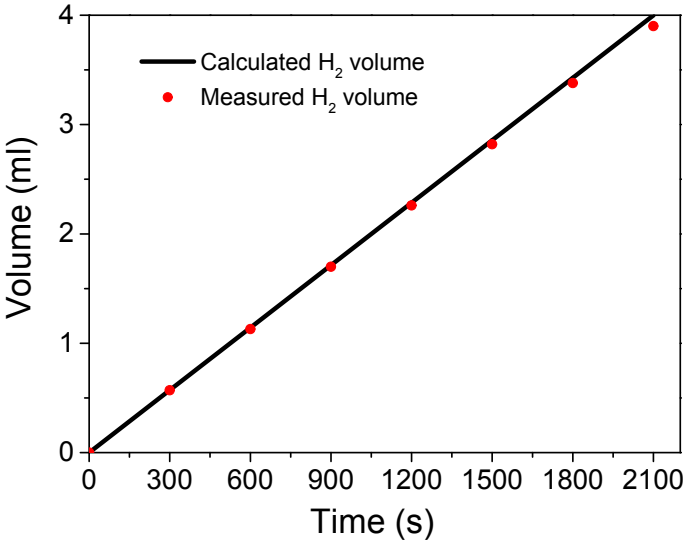

Fig. S3 The experimental and theoretical volumes of H_2 that evolved from the working electrode.

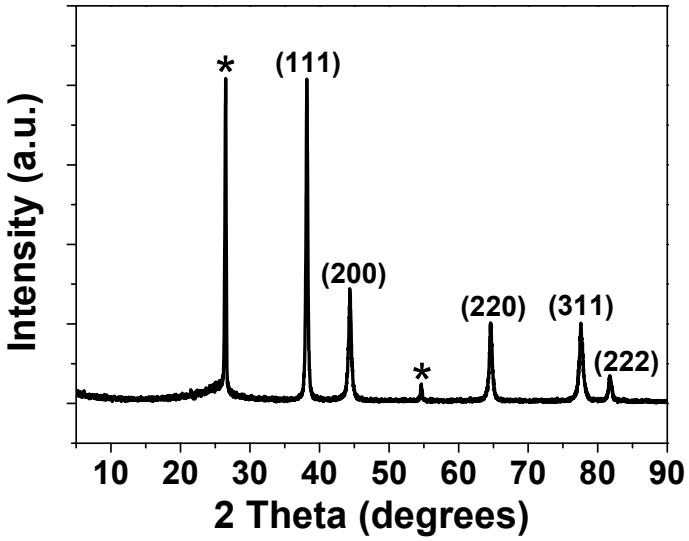

Fig. S4 XRD pattern of the AuNCs films on carbon fibre paper. (The symbols * represent the XRD patterns of carbon fibre paper)

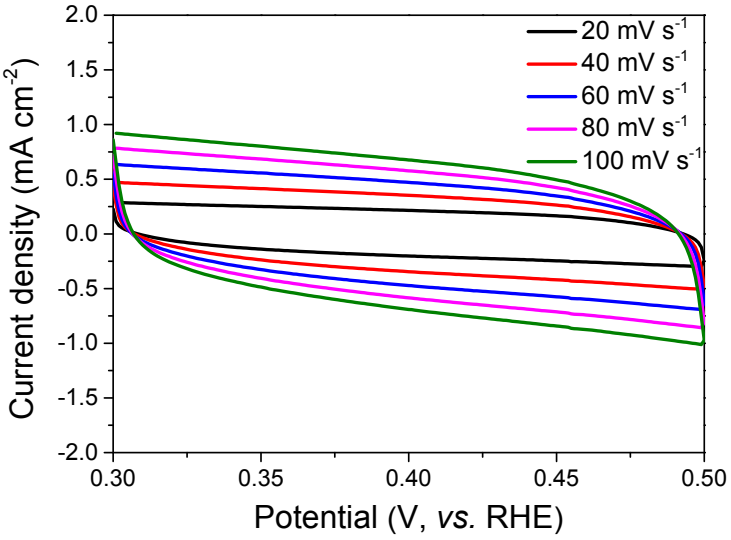

Fig. S5 Cyclic voltammograms of blank carbon fibre paper at various scan rates in 0.5 M H_2SO_4.

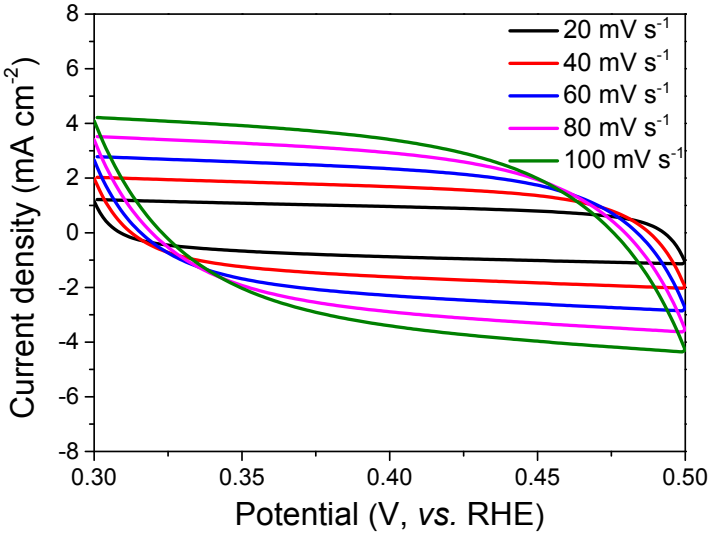

Fig. S6 Cyclic voltammograms of MoS_2-Au nanohybrids modified carbon fibre paper at various scan rates in 0.5 M H_2SO_4.

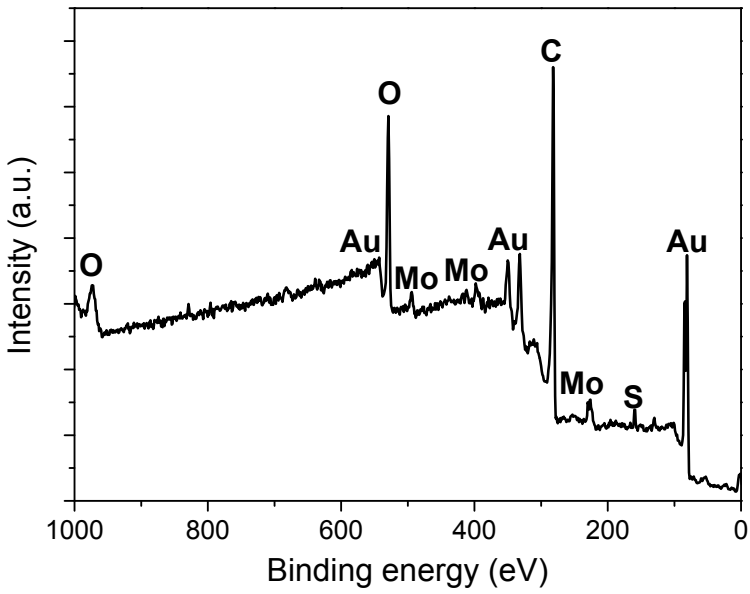

Fig. S7 XPS survey spectrum of MoS_2-Au nanohybrids.

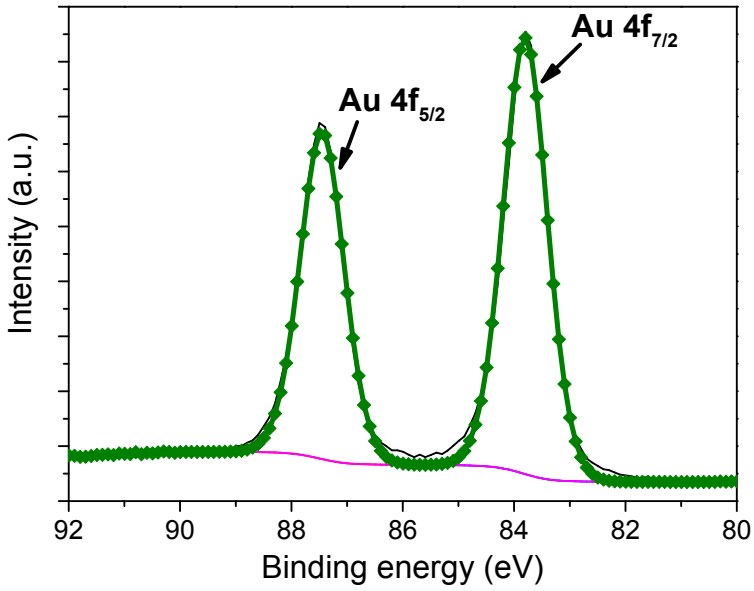

Fig. S8 XPS spectrum of Au 4f region for AuNCs

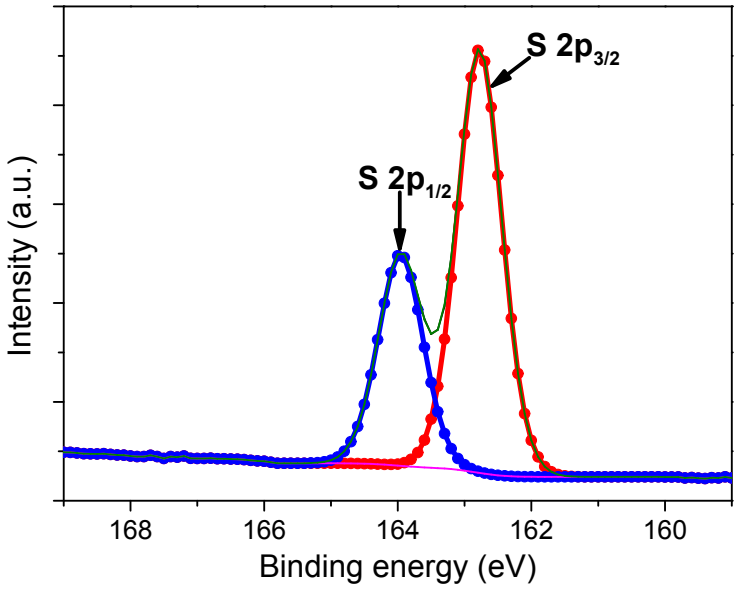

Fig. S9 XPS spectrum of S 2p region for MoS_2 nanoparticles.

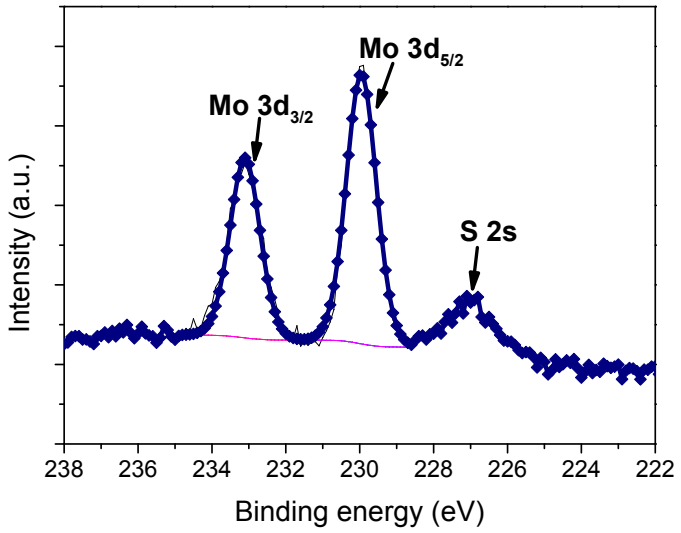

Fig. S10 XPS spectrum of Mo 3d region for MoS_2-Au nanohybrids.

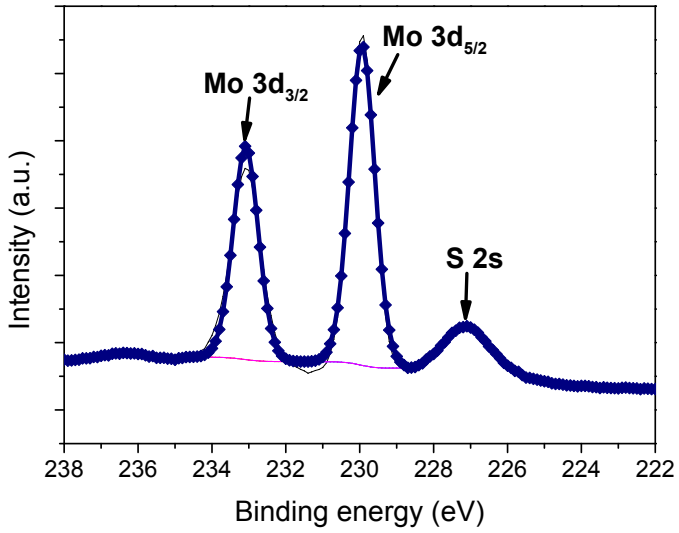

Fig. S11 XPS spectrum of Mo 3d region for MoS_2 nanoparticles.

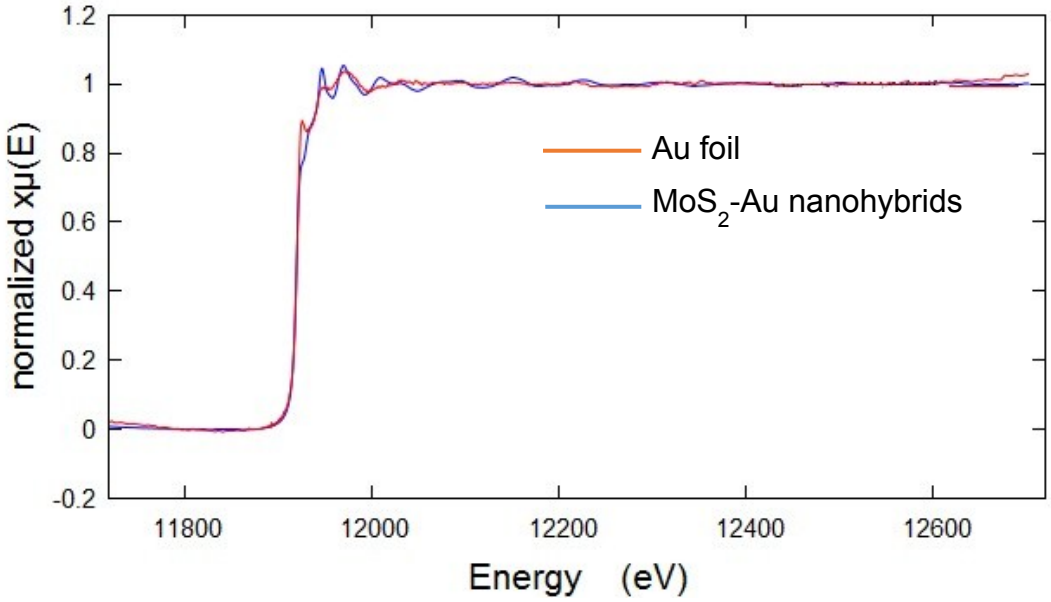

Fig. S12 Normalized Au L3 edge XANES spectra of MoS_2-Au nanohybrids and Au foil.

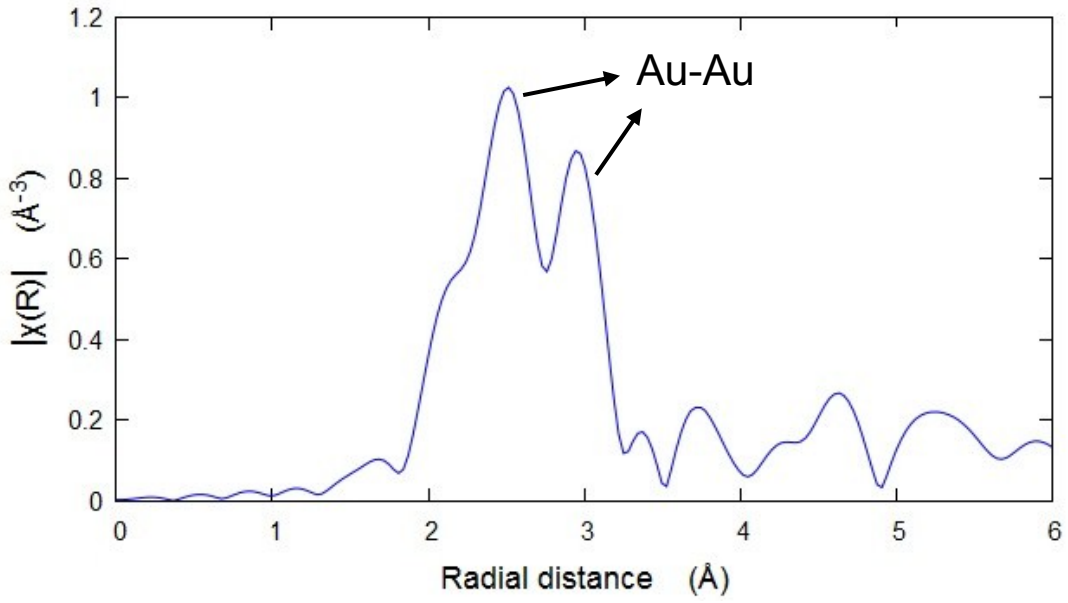

Fig. S13 FT-EXAFS of Au foil in R space.

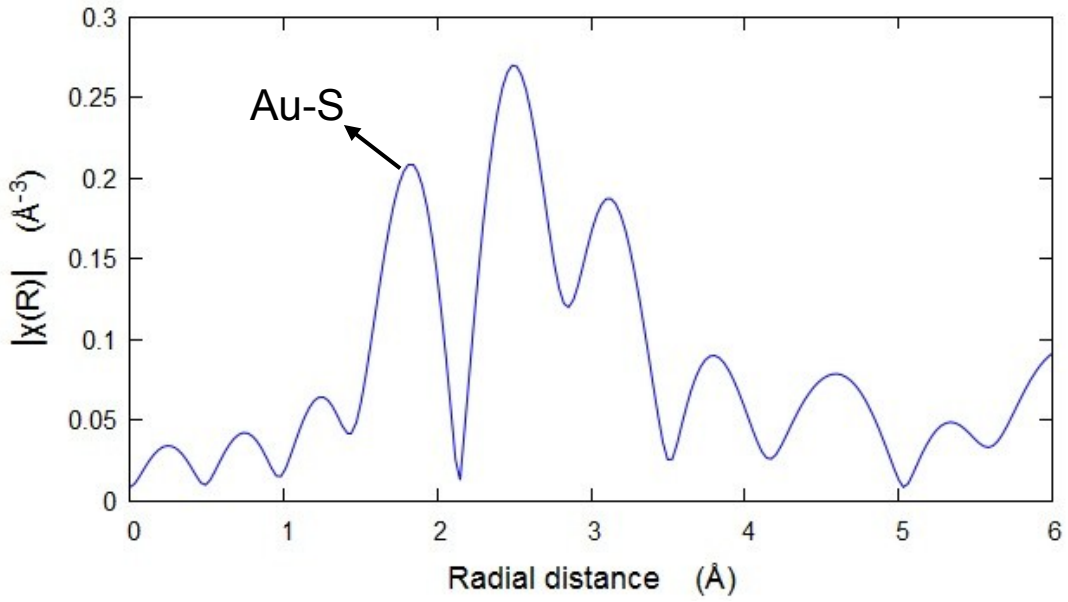

Fig. S14 FT-EXAFS of MoS_2-Au nanohybrids in R space.

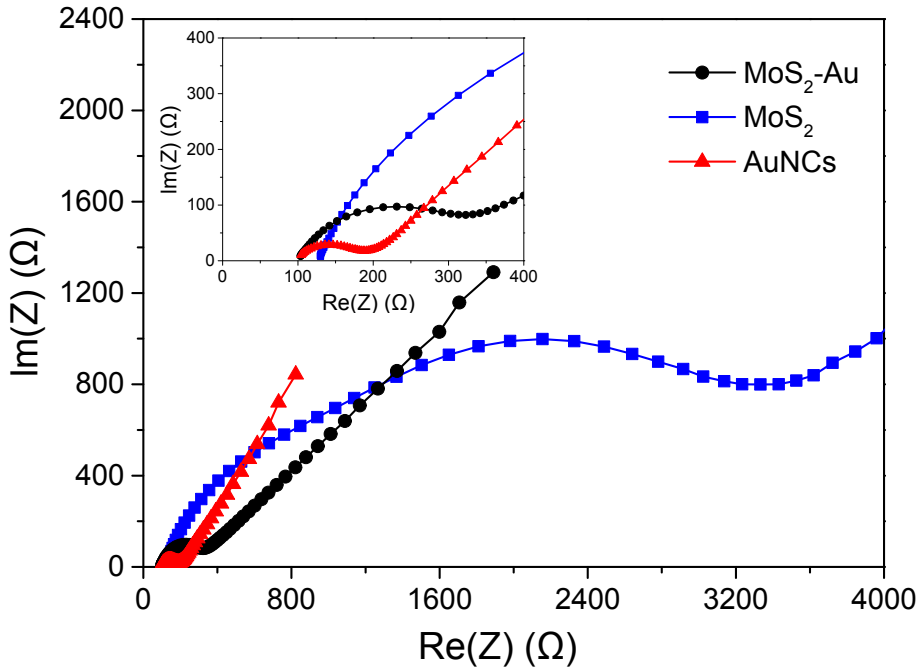

Fig. S15 Electrochemical impedance spectra of MoS_2-Au nanohybrids, MoS_2 nanoparticles and AuNCs modified electrode in 0.1 M KCl–0.01 M phosphate buffer solution (pH = 7.4) containing 2.5 mM $K_3Fe(CN)_6$ and 2.5 mM $K_4Fe(CN)_6$.

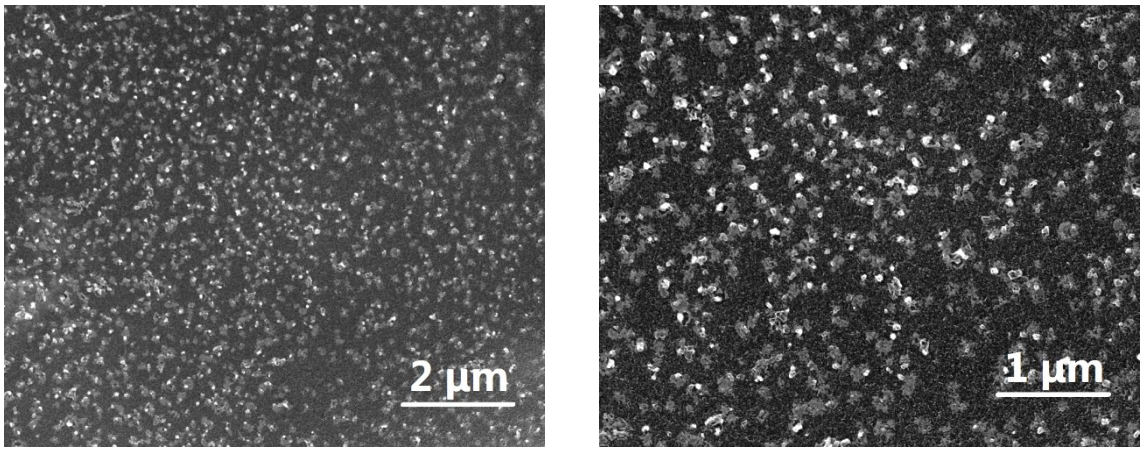

Fig. S16 SEM images of carbon fibre paper modified with MoS_2-Au nanohybrids after electrolysis for 12 h at -0.070 V vs. RHE.