Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

The Effects of Varying Solvent for MoS_2 Treatment on its Catalytic Efficiencies for HER and ORR

Xing Juan Chua[†] *and Martin Pumera**[†]

†Division of Chemistry & Biological Chemistry, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore 637371, Singapore and

*Email: pumera@ntu.edu.sg

Supporting Information

Contents

1. **Scanning electron micrograph showing the surface morphologies of the deposited MoS_2 dispersed in various solvents.**

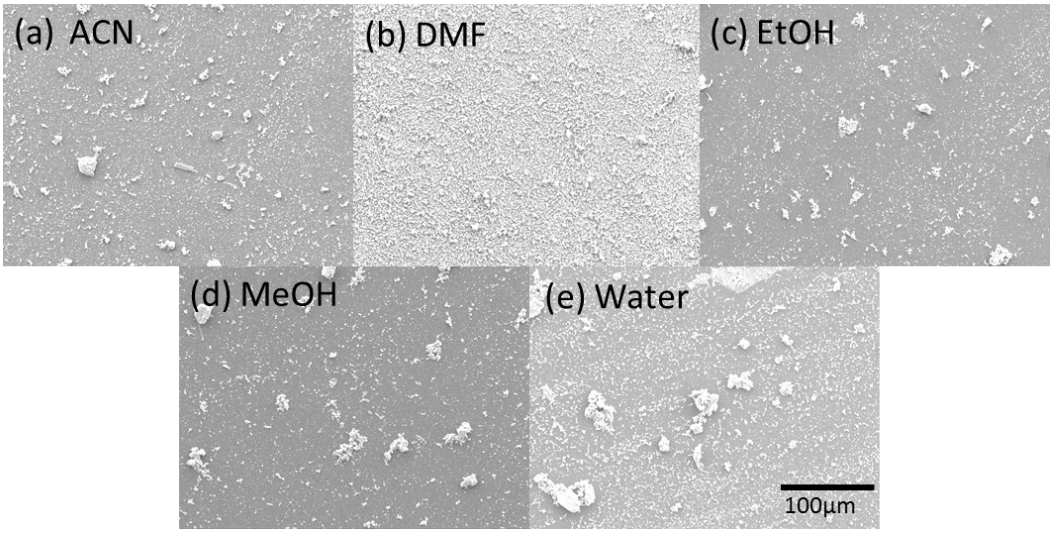

Figure S1: SEM images of MoS_2 drop-casted on the silicon oxide wafer. The aliquots were taken from MoS_2 dispersed in various solvents: (a) ACN (5mg/mL; 1µL), (b) DMF (5mg/mL; 1µL), (c) EtOH (5mg/mL; 1µL), (d) MeOH (5mg/mL; 1µL) and (e) water (1mg/mL; 5µL). Scale bars represent 100 µm. Legend: (*X* mg/mL, *Y* µL), *X* refers to the concentration of the dispersion and *Y* refers to the volume used for drop-casting, with the final MoS_2 loading being constant.

2. **Values of the observed heterogeneous electron transfer (HET) rates, k^0_{obs}, of MoS_2 dispersed in various solvent**.

Table S1: Calculated observed heterogeneous electron transfer rate constant k^0_{obs} for the $Fe(CN)_6^{3-/4-}$ redox probe when MoS_2 is dispersed in various solvents. Bare glassy carbon electrode (GCE) is also shown for reference.

Solvent	k^0_{obs} (cm s^{-1})
ACN	2.99×10^{-3}
DMF	5.90×10^{-4}
EtOH	3.53×10^{-3}
MeOH	2.74×10^{-3}
Water	1.88×10^{-3}
Bare GCE	3.20×10^{-3}

3. Control Experiment using solvent-only modified GCE for HER

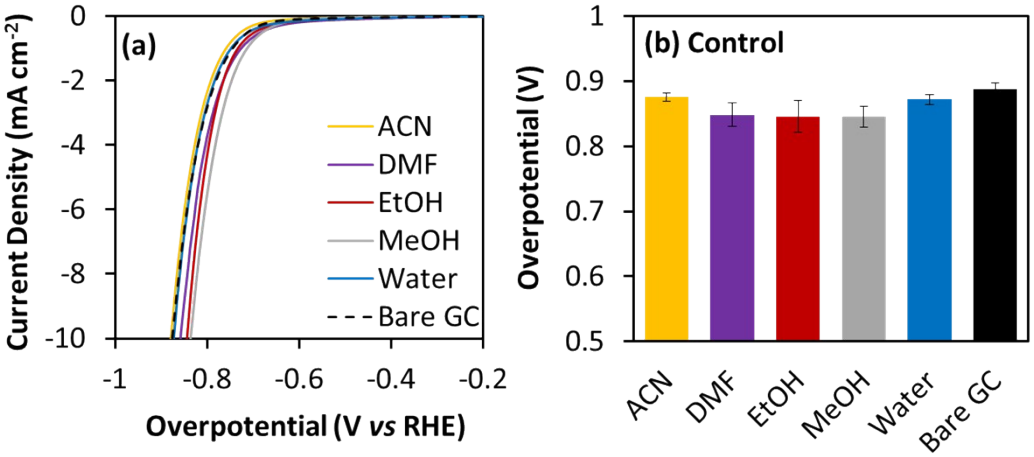

Figure S2: The control experiment for the HER where only solvents (without any material suspended) were drop-casted on bare GCE. (a) Polarization curve for HER and (b) the bar chart shows the overpotential required to reach the specific current density of −10 mA cm^{-2}. Conditions: 0.5 M H_2SO_4; scan rate: 2 mV s^{-1}. Error bars correspond to standard deviations based on triplicate measurements. Potentials are with respect to RHE.

4. Tafel Plots of the Freshly-Prepared MoS_2-Dispersion.

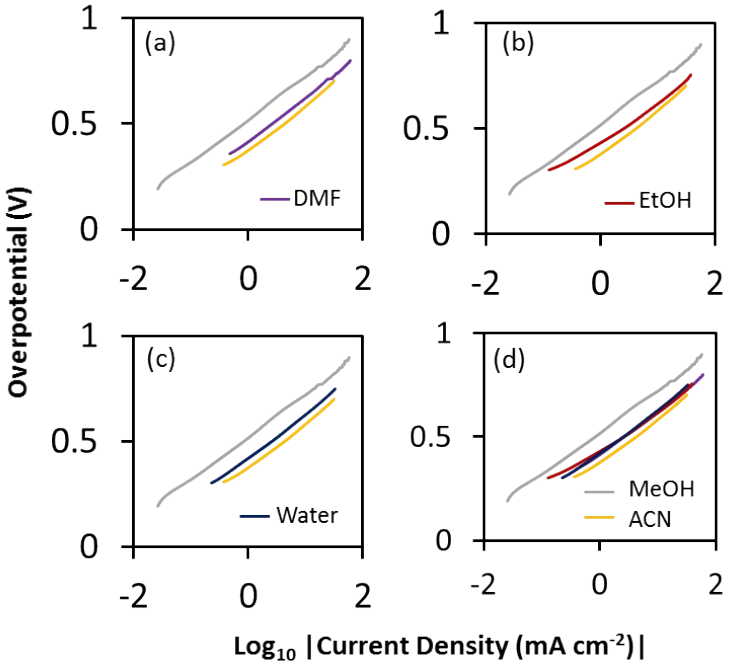

Figure S3. The Tafel plots of the freshly prepared dispersions of MoS_2 in the five solvents. DMF, EtOH and water were separated to ensure clarity.