

Supporting Information

Nafion-Mediated Liquid-Phase Exfoliation of Transition Metal Dichalcogenides and Direct Application in Hydrogen Evolution Reaction

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1. Supporting figures and table

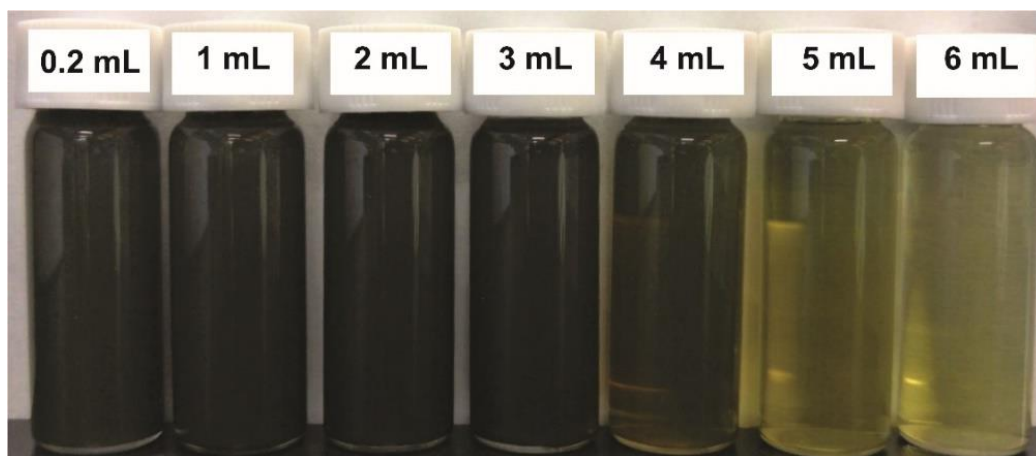


Figure S1. Photograph of the *N*-MoS₂ dispersion after 300 days of storage in ambient condition.

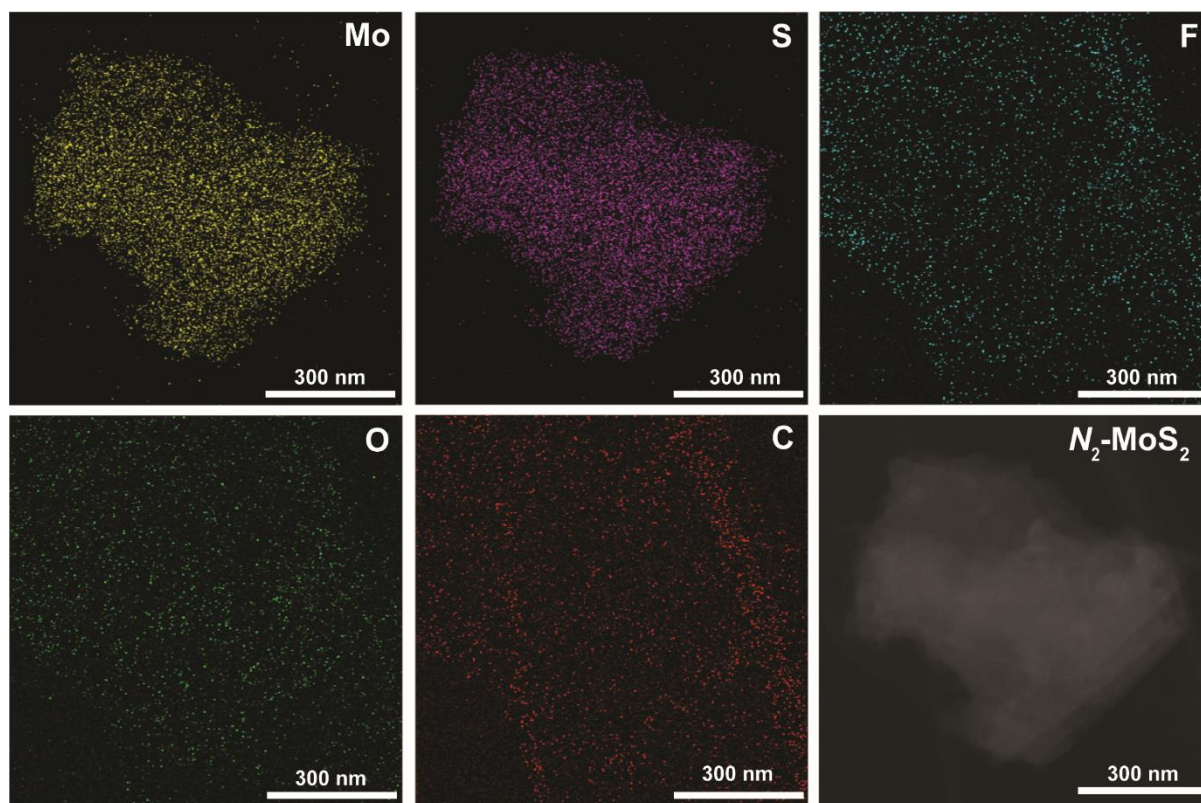


Figure S2. STEM-EDS Elemental mapping images of Mo, S, F, O, and C from N_2 -MoS₂.

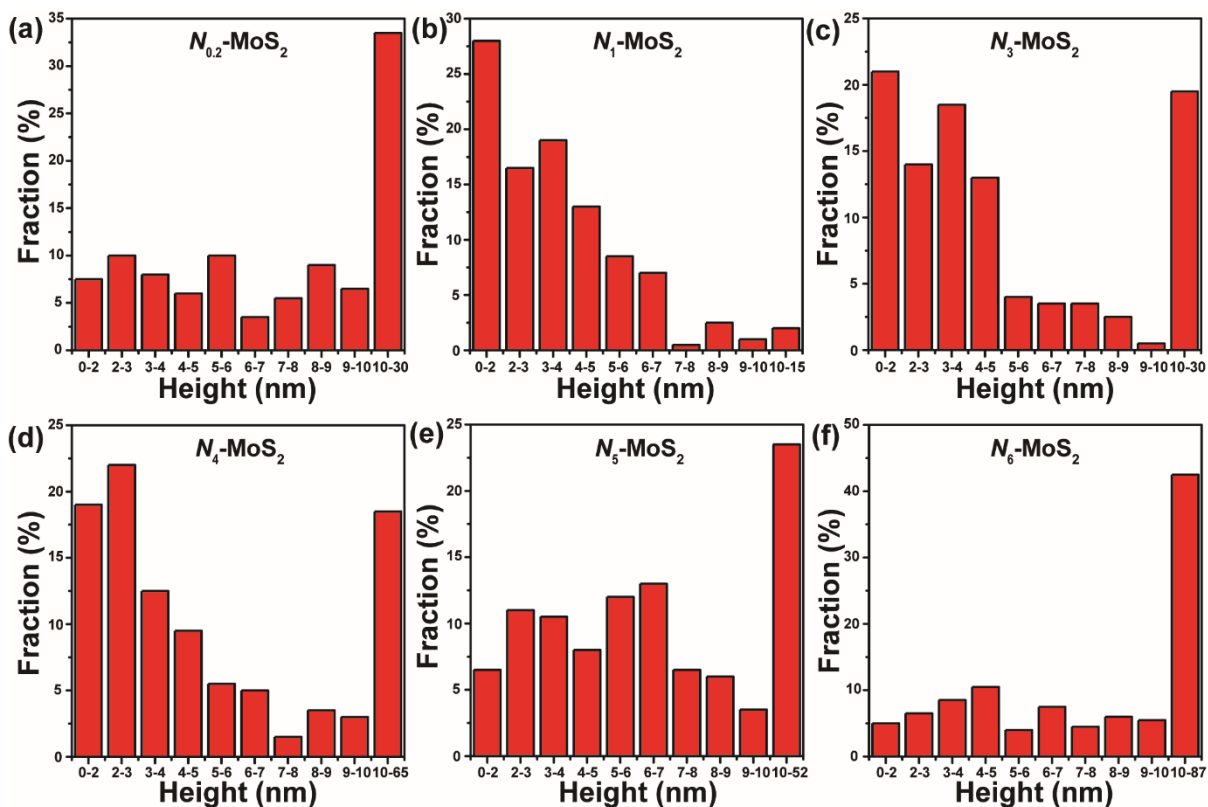


Figure S3. Histograms of thickness distribution in $N_x\text{-MoS}_2$ (x = volume of Nafion in mL) measured from over 200 individual flakes with varying Nafion concentrations ((a) x = 0.2, (b) x = 1, (c) x = 3, (d) x = 4, (e) x = 5, and (f) x = 6 mL).

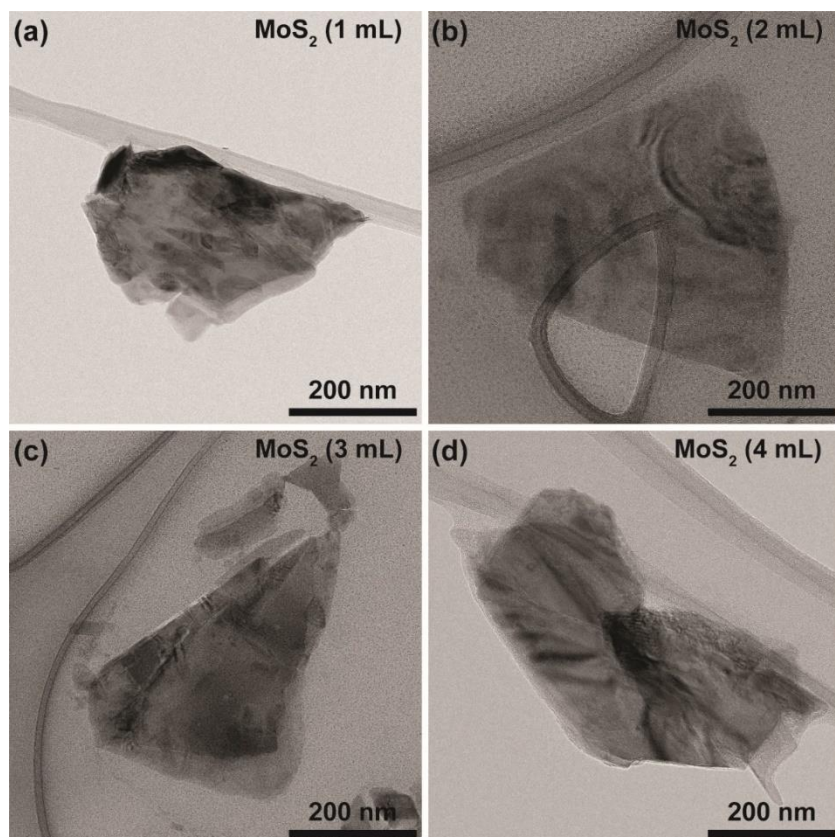


Figure S4. TEM images of N_x -MoS₂ flakes with various Nafion concentrations ((a) $x = 1$, (b) $x = 2$, (c) $x = 3$, and (d) $x = 4$ mL) showing exfoliated MoS₂ flakes in lateral size of several hundred-nanometer with thickness of few-layer range.

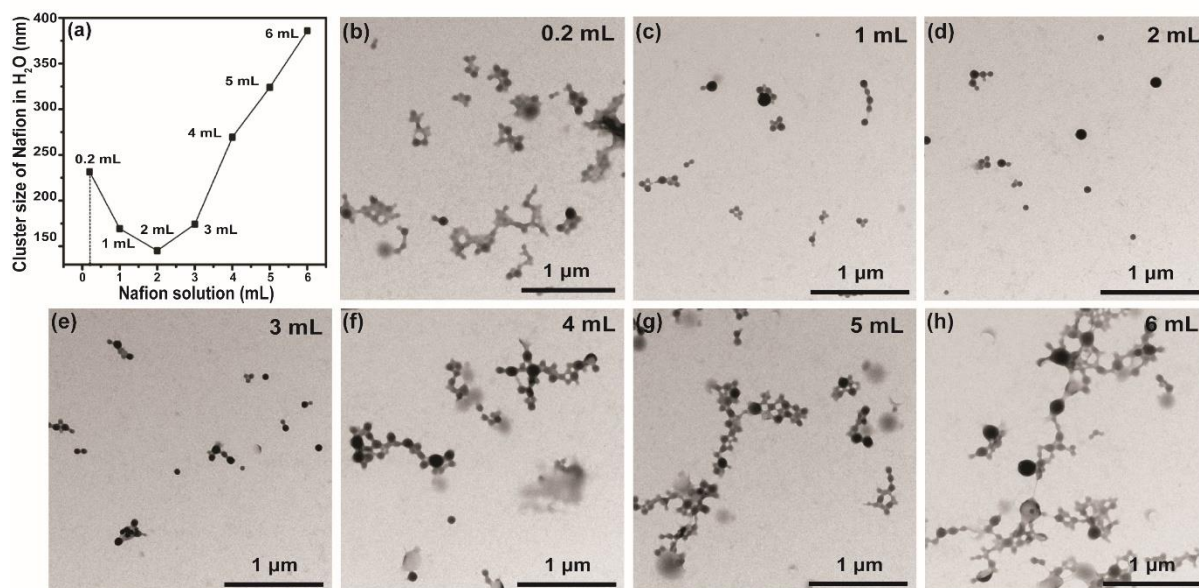


Figure S5. Distribution of Nafion cluster size with varying Nafion concentrations. (a) Average size of Nafion clusters obtained from DLS analysis and corresponding (b-h) FETEM images.

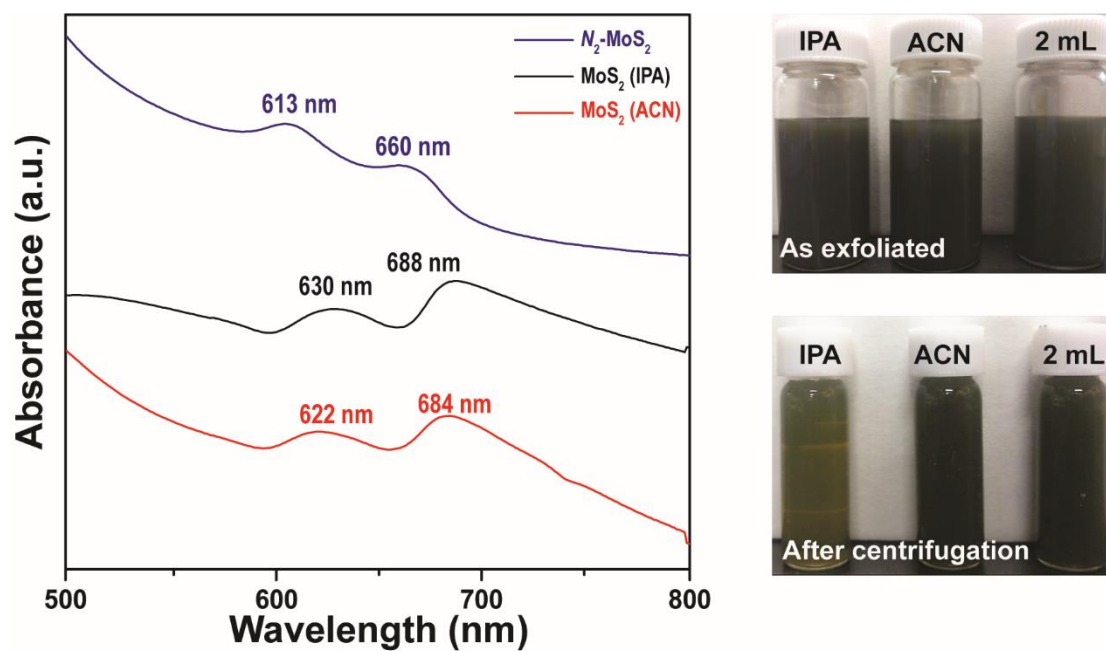


Figure S6. Optical absorption spectra of MoS₂ flakes exfoliated from IPA and ACN solutions compared with that of N_2 -MoS₂, and digital images of the corresponding MoS₂ dispersion before and after the centrifugation.

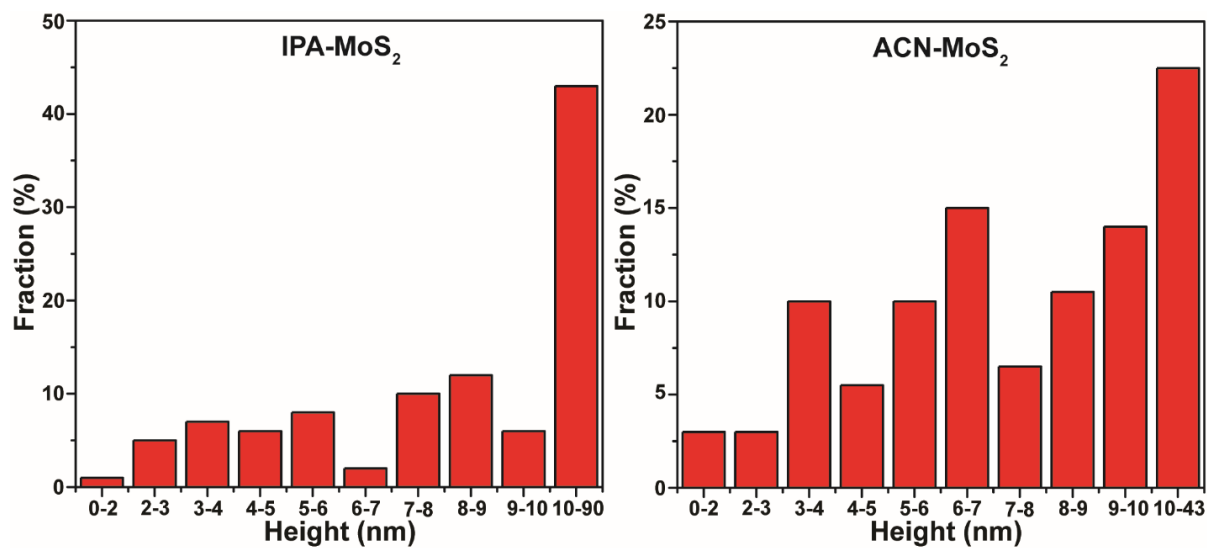


Figure S7. Histograms of thickness distribution in MoS₂ flakes exfoliated from IPA and ACN solutions, which is measured from over 200 individual flakes.

Table S1. Summary of overpotential and Tafel slope of N_x -MoS₂ from Figure 6. ‘–’ denotes the overpotential which cannot be defined for the given voltage range measurement.

Catalyst (N_x -MoS ₂)	Overpotential @ 10 mA cm ⁻² (mV, η_{10})	Tafel slope (mV/dec)
$N_{0.2}$ -MoS ₂	–	125
N_1 -MoS ₂	658	113
N_2 -MoS ₂	609	106
N_3 -MoS ₂	660	112
N_4 -MoS ₂	734	118
N_5 -MoS ₂	745	120
N_6 -MoS ₂	745	120
IPA-MoS ₂	–	183
ACN-MoS ₂	–	163
Pt/C	42	39