

## Supporting Materials

### Aligned and Stable Metallic MoS<sub>2</sub> on Plasma Treated Mass Transfer

### Channels for Hydrogen Evolution Reaction

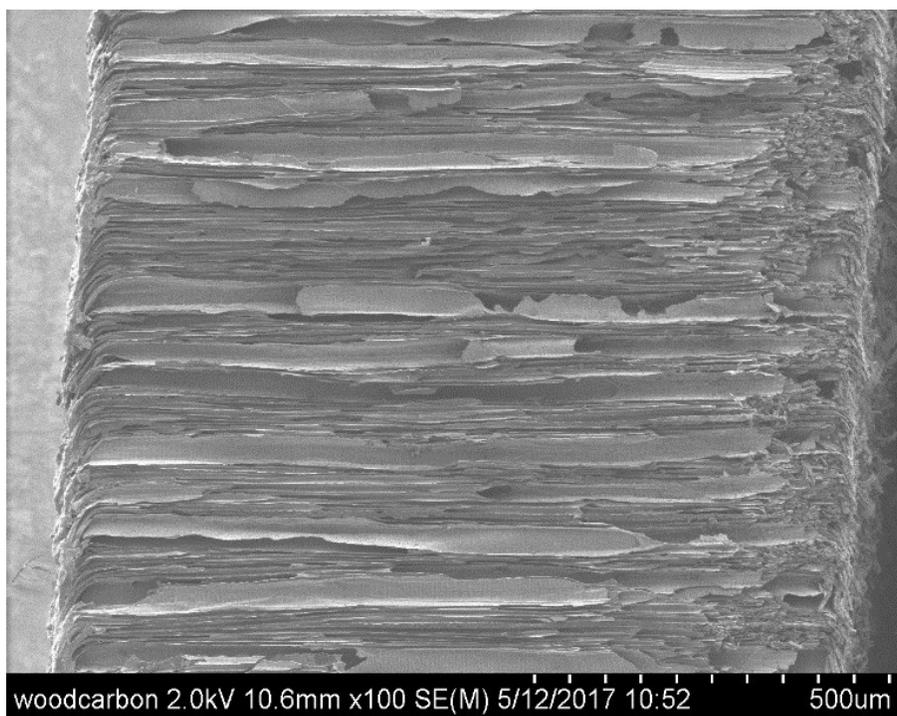
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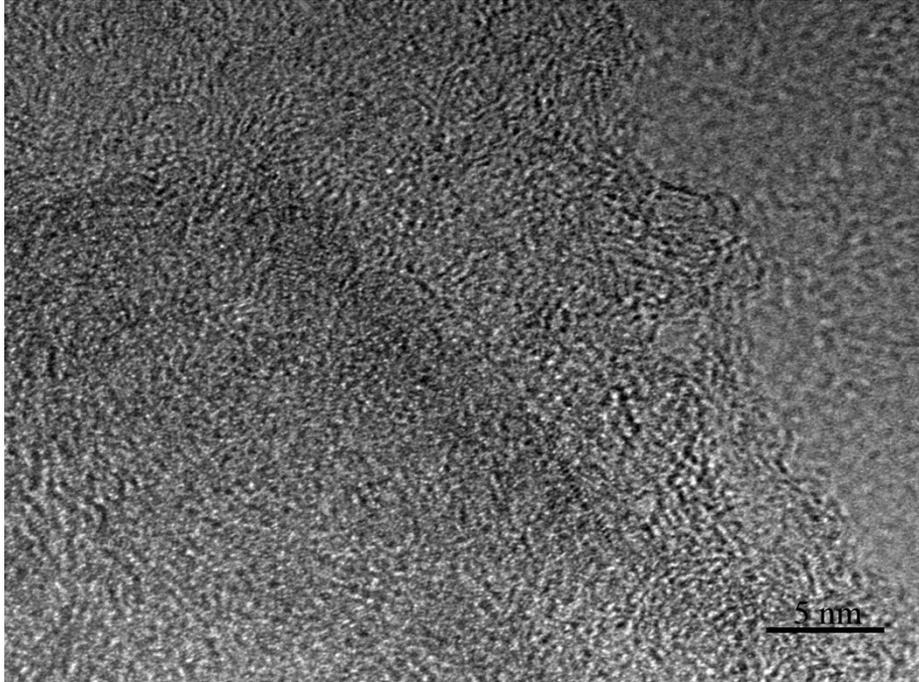
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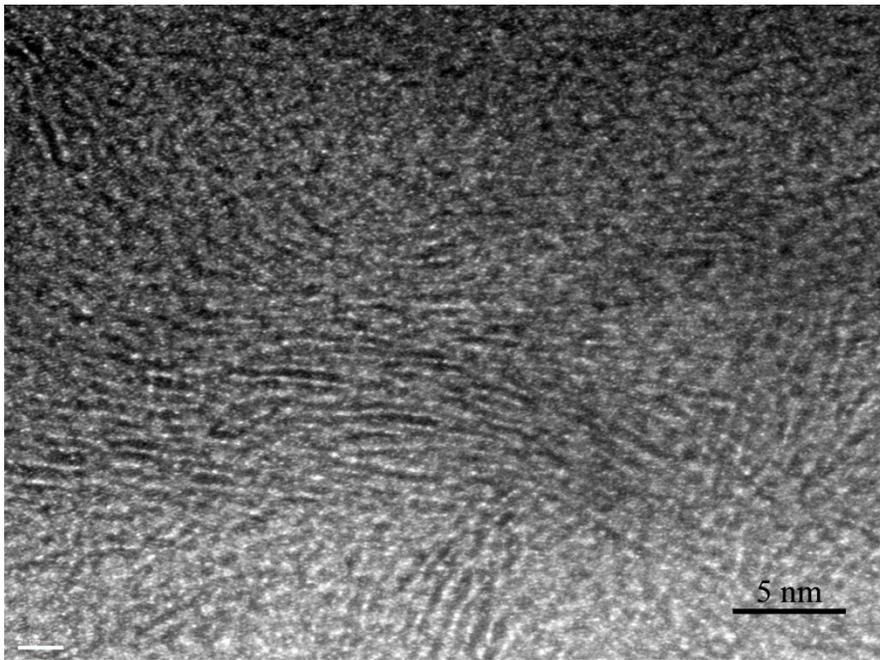
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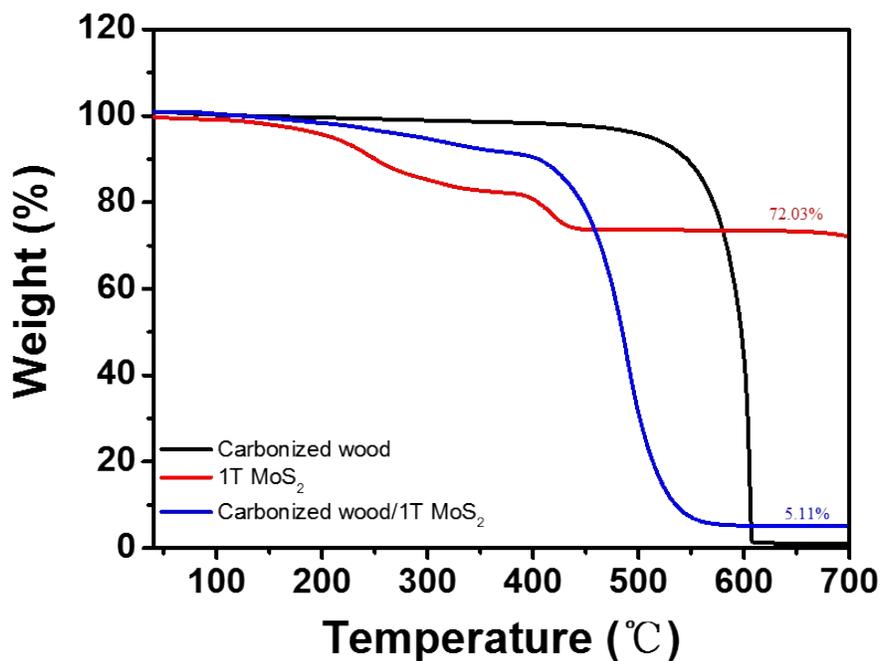
**Figure S1:** SEM image of CW/IT MoS<sub>2</sub> for measurement of the thickness ~1000 μm.



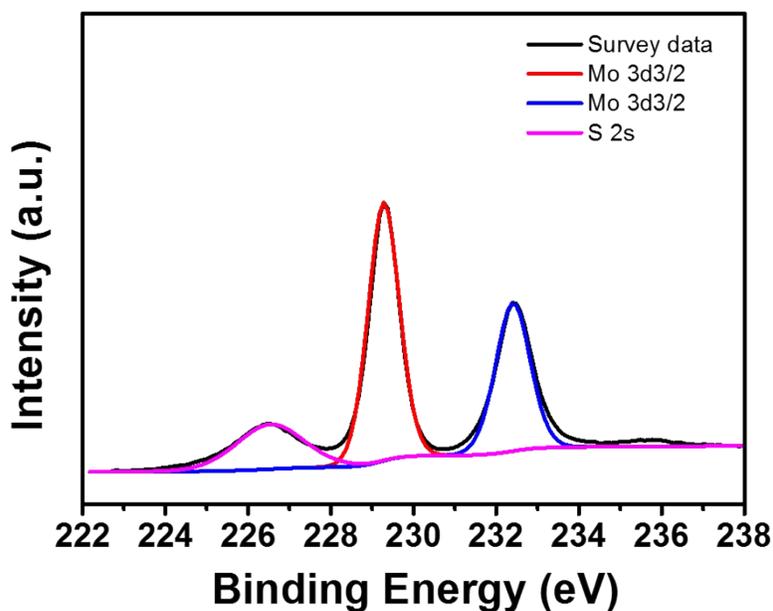
**Figure S2:** HRTEM image of various regions of carbonized wood.



**Figure S3:** HRTEM image of various regions of 1T MoS<sub>2</sub> nanosheets.

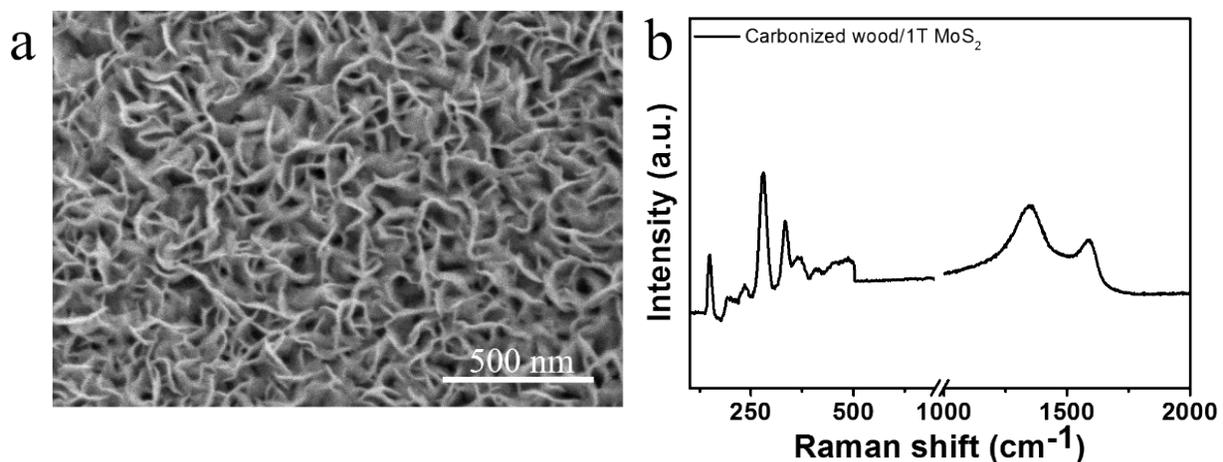


**Figure S4:** TGA curves of carbonized wood, 1T MoS<sub>2</sub> and CW/1T MoS<sub>2</sub> at a heating speed of 10°C/min in air. The weight percentage of 1T MoS<sub>2</sub> in the CW/1T MoS<sub>2</sub> was presumed to be  $x$ . Assuming the carbonized wood was completely removed after combustion,  $0.7203x=0.0511$ , therefore  $x=7.1\%$ .

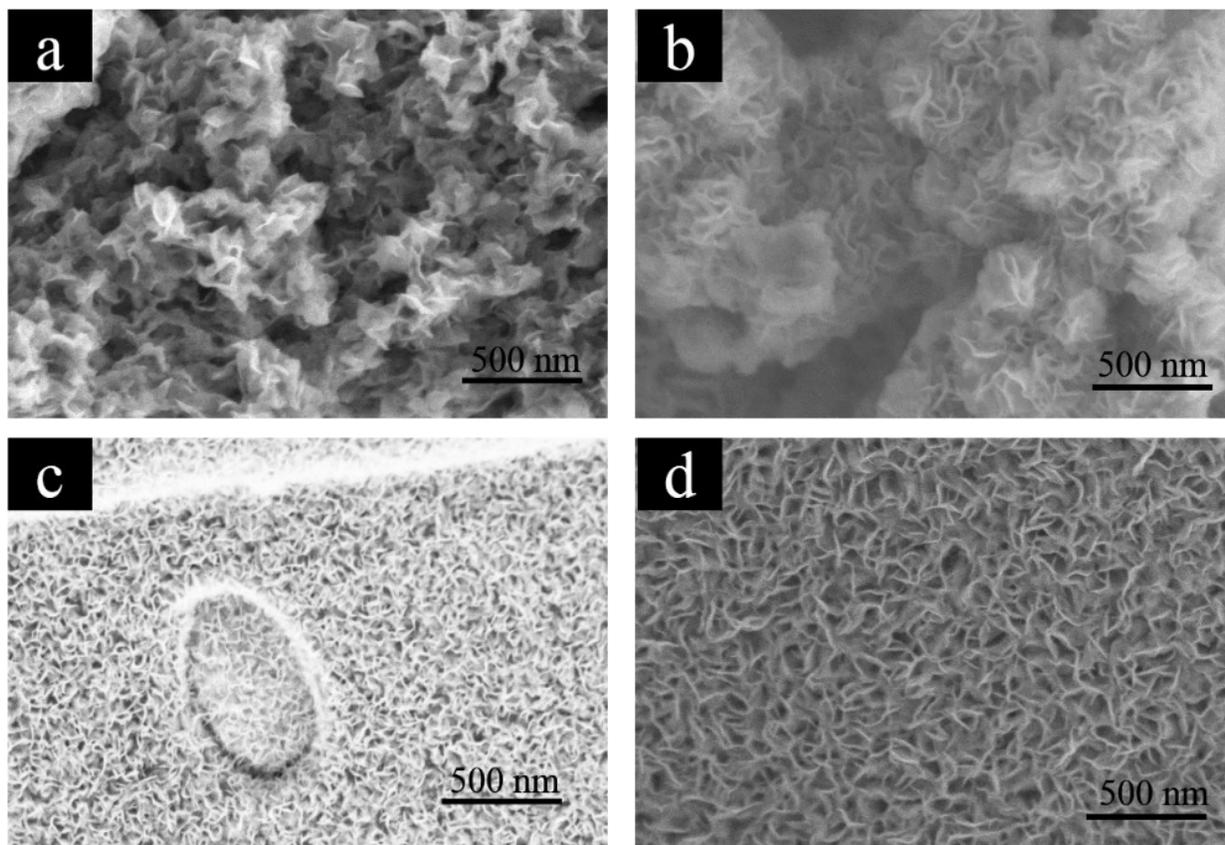


**Figure S5:** High-resolution XPS spectra of the Mo element in pure 1T MoS<sub>2</sub>.

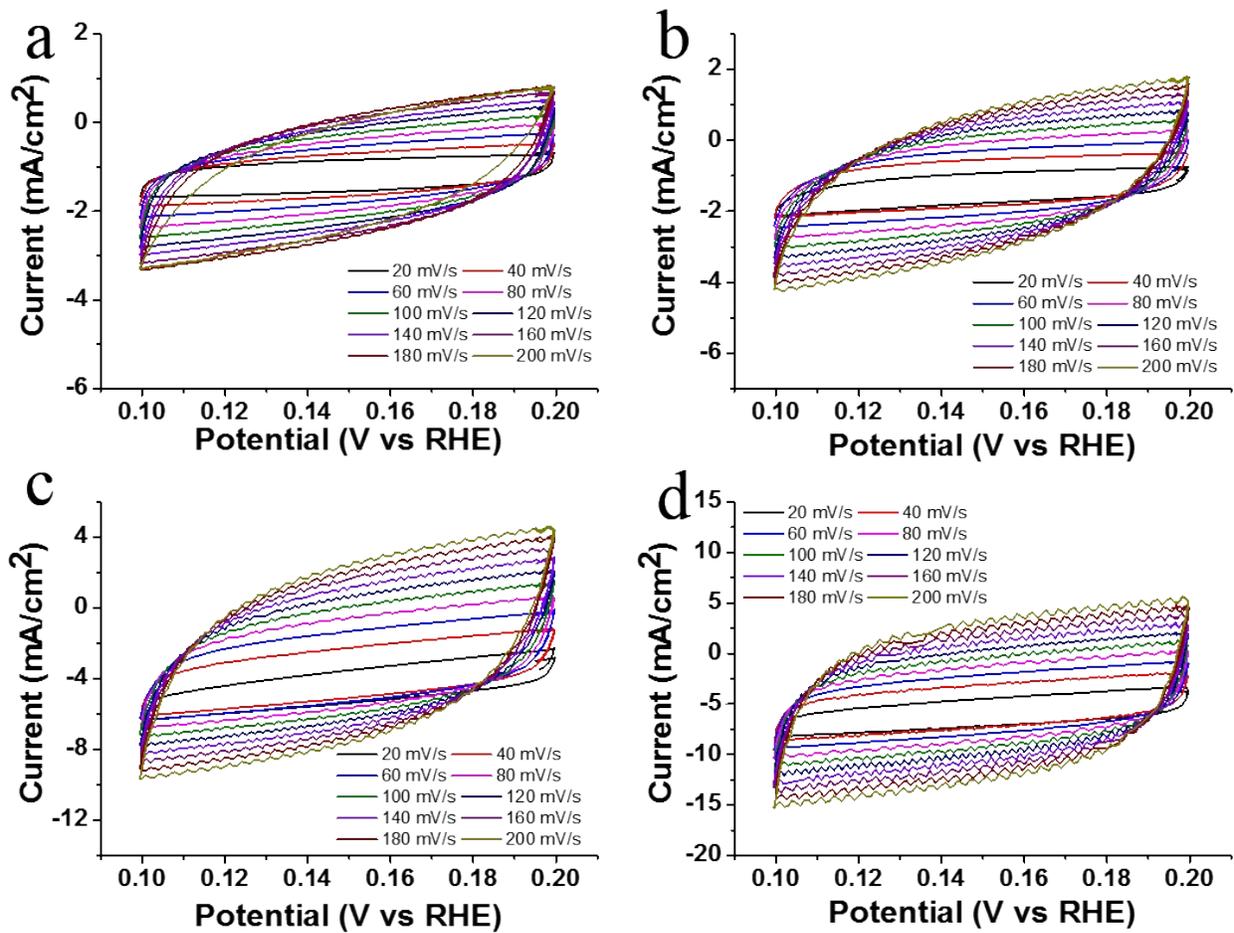
We further add the SEM and Raman spectra of CW/1T MoS<sub>2</sub> after HER test, as shown in Fig. S6. Fig. S6(a) shown that the morphology of 1T MoS<sub>2</sub> in the CW/1T MoS<sub>2</sub> sample after HER test, which shows the similar morphology with 1T MoS<sub>2</sub> in the CW/1T MoS<sub>2</sub> sample before HER test. The Raman spectra for 1T MoS<sub>2</sub> in the CW/MoS<sub>2</sub> after HER test is shown in Fig. S6(b). From the existence of the characteristic peaks located at 145, 213, 283 and 321 cm<sup>-1</sup> in the 145, 213, and 321 cm<sup>-1</sup>, we concluded that the metallic phase MoS<sub>2</sub> is stable during the HER test. The peaks at 1358 cm<sup>-1</sup> and 1586 cm<sup>-1</sup> are attributed to the D and G bands of carbonized wood, respectively.



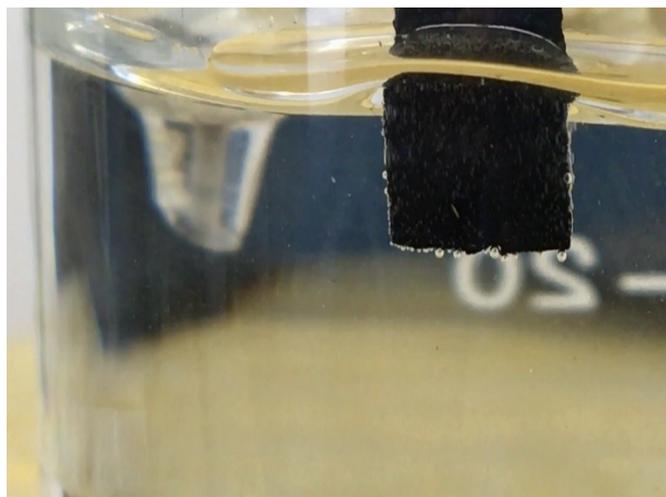
**Figure S6:** SEM images of (a) CW/1T MoS<sub>2</sub> after HER test. (b) Raman spectra of CW/1T MoS<sub>2</sub> after HER test.



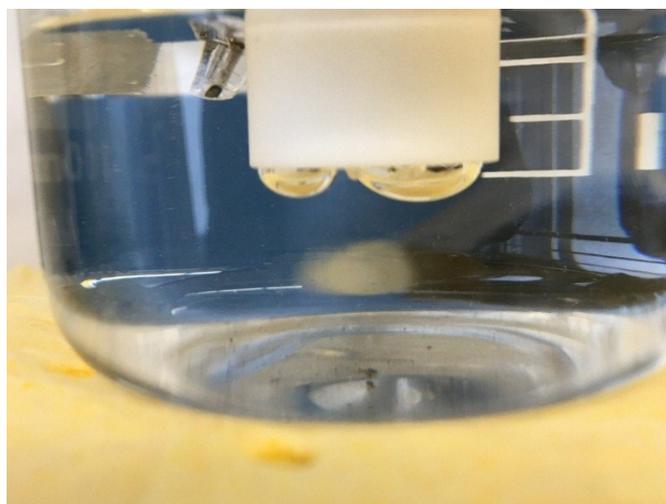
**Figure S7:** SEM images of (a) 2H MoS<sub>2</sub> after coating on glassy carbon, displaying the apparent aggregation of MoS<sub>2</sub> nanosheets. (b) 1T MoS<sub>2</sub> after coating on glassy carbon displaying nano-flower like morphology. SEM image of the unique arrangement of the 1T MoS<sub>2</sub> nanosheets perpendicular array on the (c) carbonized wood channel with a pit hole on the channel wall. (d) carbonized wood surface.



**Figure S8:** Cyclic voltammogram (CV) curves in the region of 0.1-0.2 V vs. RHE for (a) 2H MoS<sub>2</sub> (b) 1T MoS<sub>2</sub> (c) CW/2H MoS<sub>2</sub> (d) CW/1T MoS<sub>2</sub>.



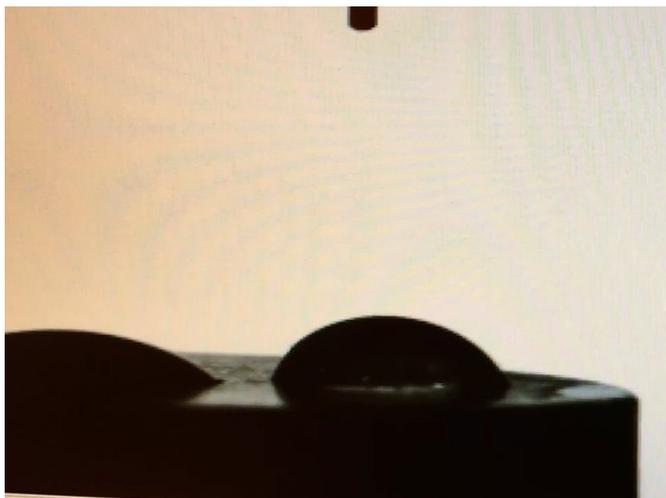
**Supplementary Video 1:** Snapshot from the video of the HER test using the freestanding CW/1T MoS<sub>2</sub> as the working electrode, where the H<sub>2</sub> bubbles were easily released from the surface of the working electrode benefiting H<sub>2</sub> production.



**Supplementary Video 2:** Snapshot from the video of the HER test using 1T MoS<sub>2</sub> coated on the glassy carbon as the working electrode showing huge H<sub>2</sub> bubbles strongly adsorbed on the surface of the glassy carbon hindering the interaction between active sites and electrolyte.



**Supplementary Video 3:** Snapshot from the video of contact angle measurement showing the wettability of CW/1T MoS<sub>2</sub>.



**Supplementary Video 4:** Snapshot from the video of contact angle measurement showing the wettability of the rotating disk electrode coated with 1T MoS<sub>2</sub>.