

## Supporting information

### **Electrochemical and SECM investigation of MoS<sub>2</sub>/GO and MoS<sub>2</sub>/rGO nano composite materials for HER electrocatalysis**

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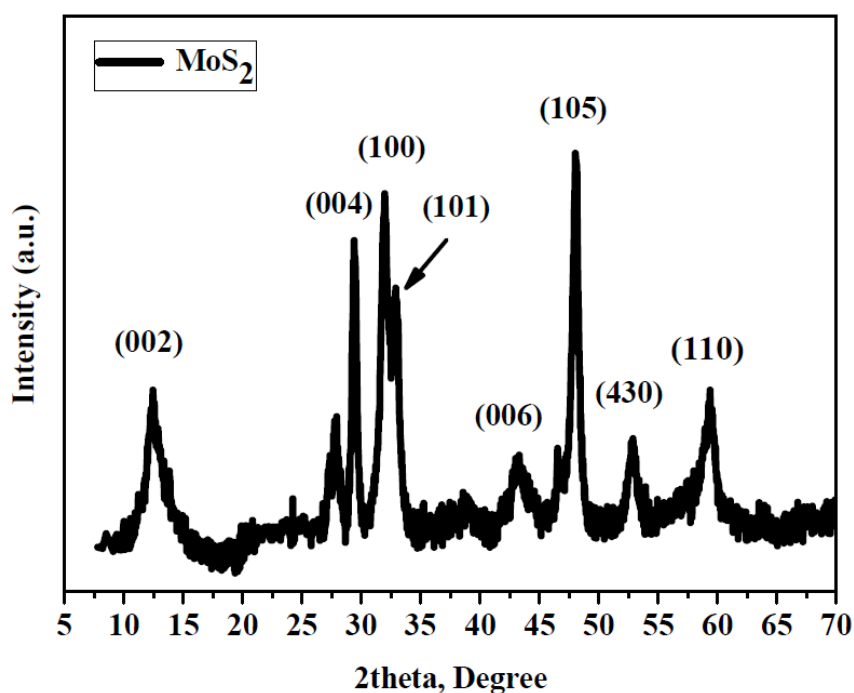
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India

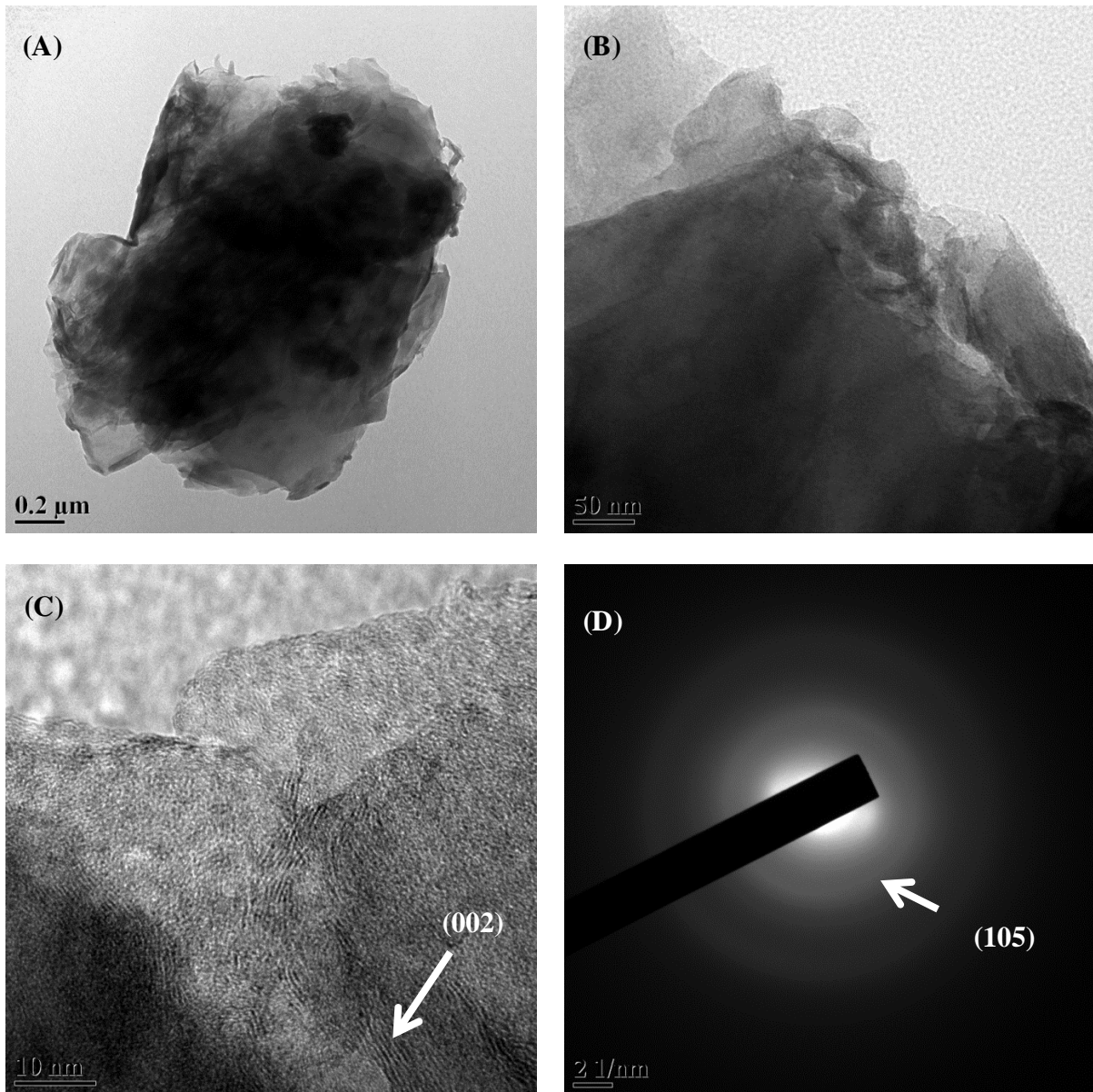
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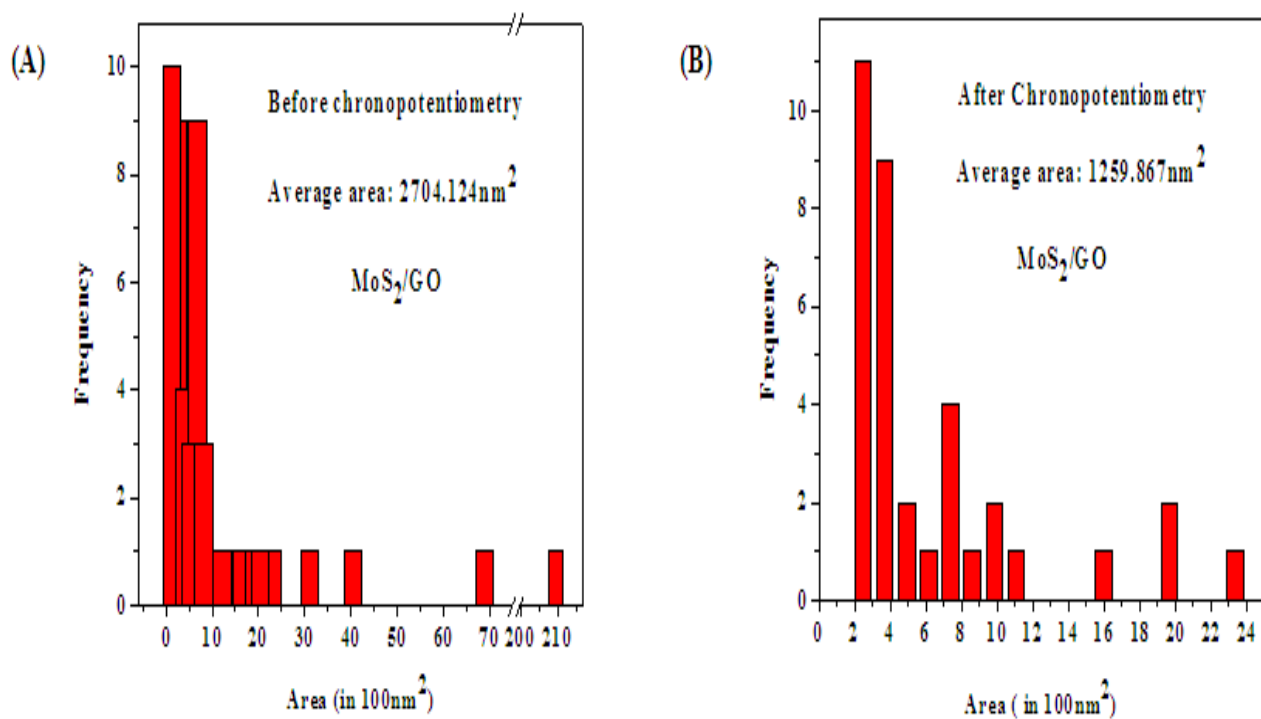
Bhubaneswar 751030, Odisha, India



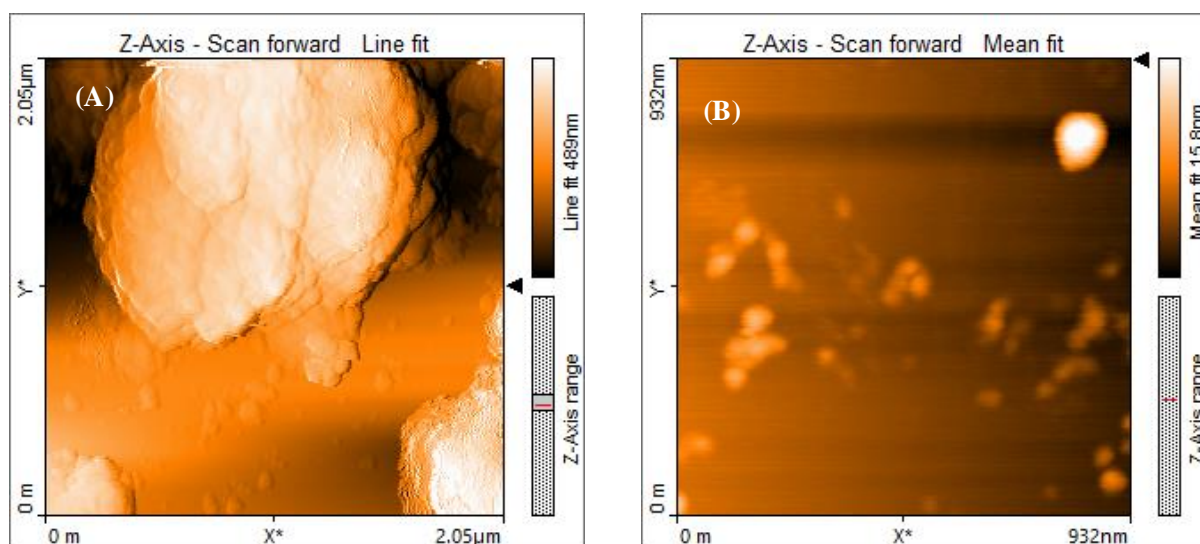
**Figure S1.** XRD pattern of the pristine MoS<sub>2</sub>.



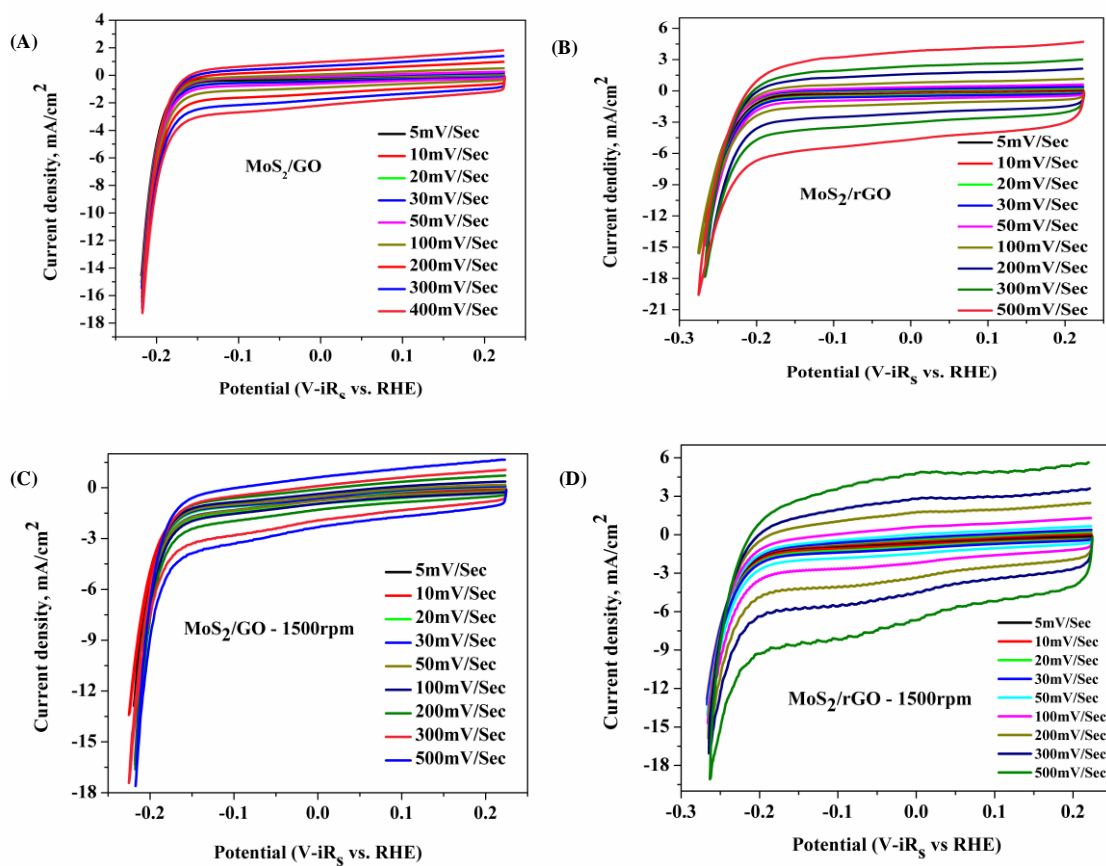
**Figure S2.** (A), (B) and (C) are HRTEM images and (D) is SAED pattern of the MoS<sub>2</sub>/GO nano composite materials.



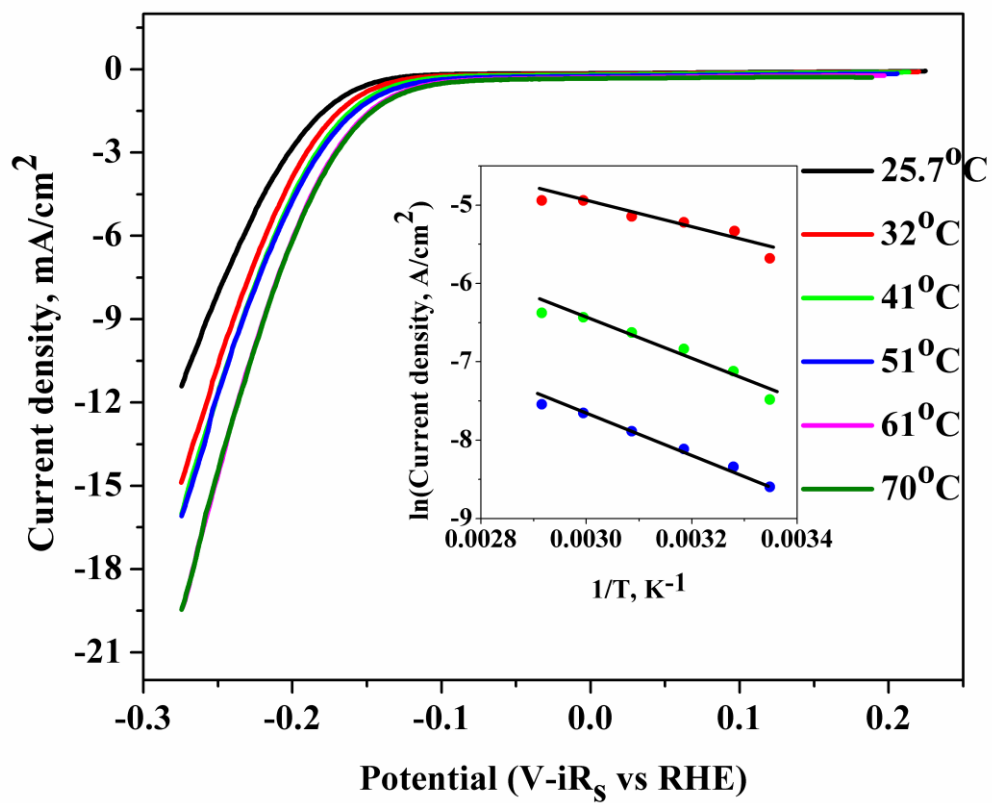
**Figure S3.** Histogram of AFM of MoS<sub>2</sub>/GO composite materials (A) before chronopotentiometry and (B) after chronopotentiometry test.



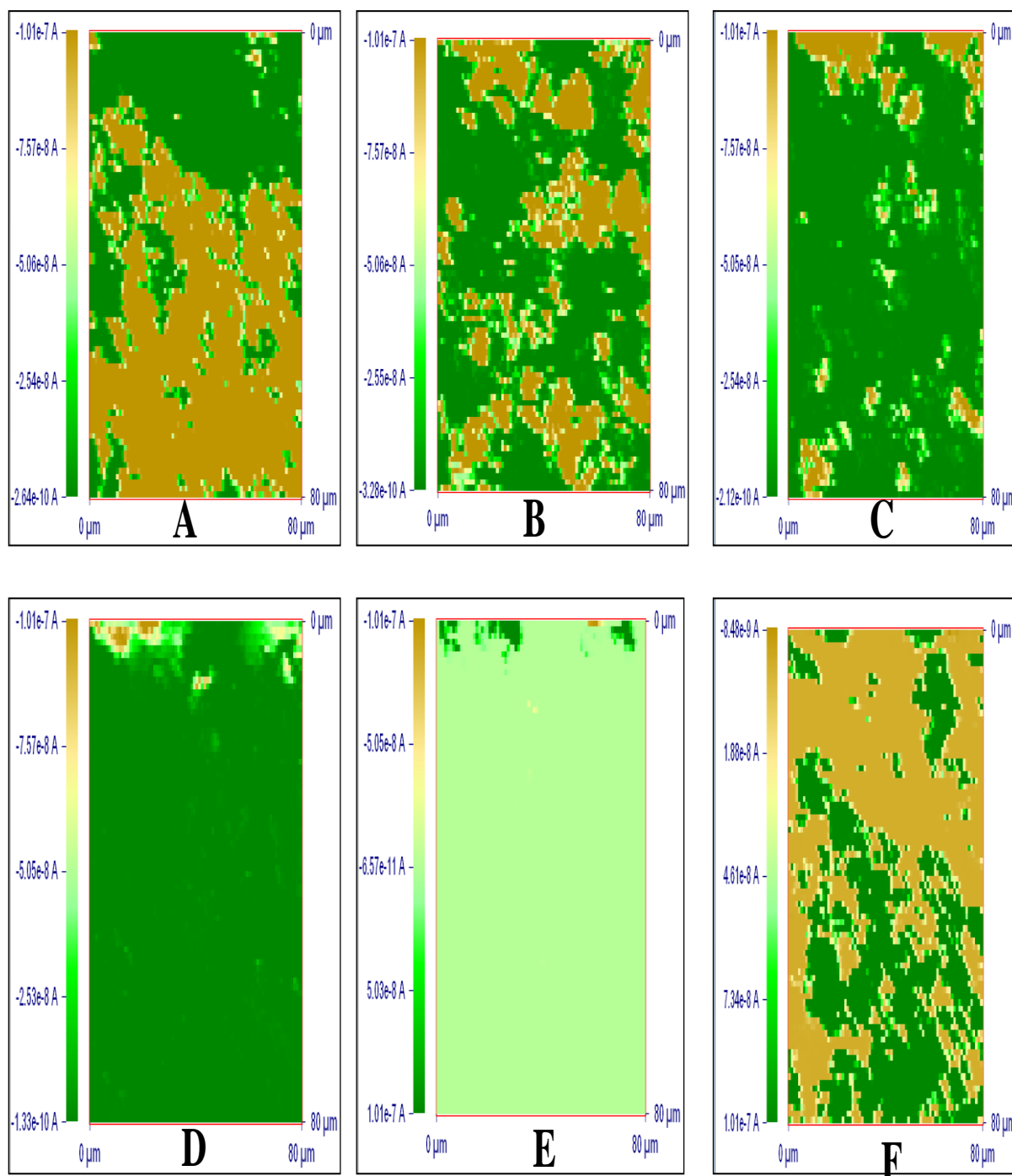
**Figure S4.** AFM images of MoS<sub>2</sub>/rGO at two different resolutions (A) at higher resolution and (B) lower resolution.



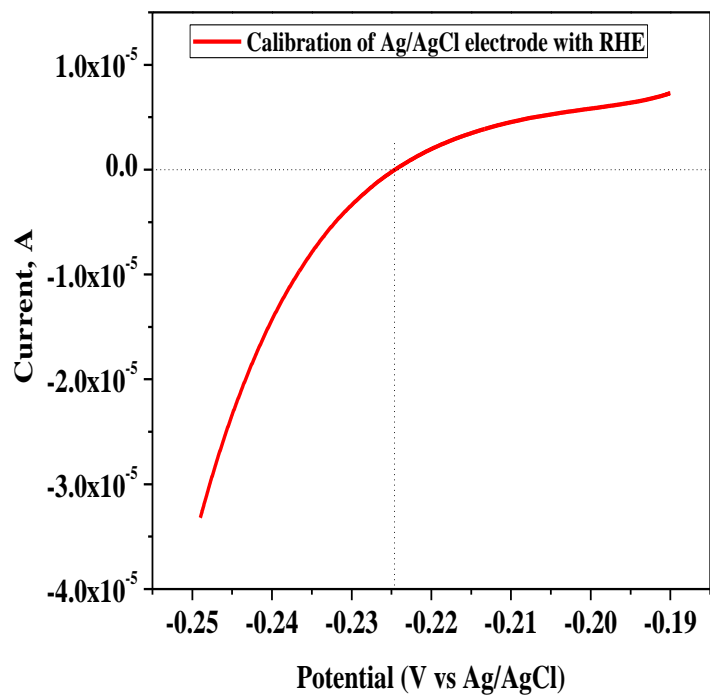
**Figure S5.** Cyclic voltammetry of (A) MoS<sub>2</sub>/GO and (B) MoS<sub>2</sub>/rGO at different scan rates. (C) and (D) are CV plots under hydrodynamic condition (at 1500rpm) of MoS<sub>2</sub>/GO and MoS<sub>2</sub>/rGO.



**Figure S6.** Effect of temperature on HER process for MoS<sub>2</sub>/rGO catalyst. Arrhenius plot for MoS<sub>2</sub>/rGO in inset.



**Figure S7.** Scanning electrochemical microscopy (SECM) images of MoS<sub>2</sub>/rGO catalyst at different substrate potentials (A) 0.2246V, (B) 0.125V, (C) 0.025V, (D) -0.075V, (E) -0.175V and (F) -0.225V



**Figure S8.** Linear sweep voltammetry (LSV) plot for calibration of Ag/AgCl reference electrode with the RHE.