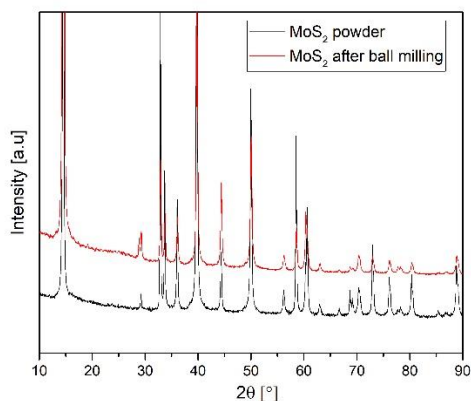
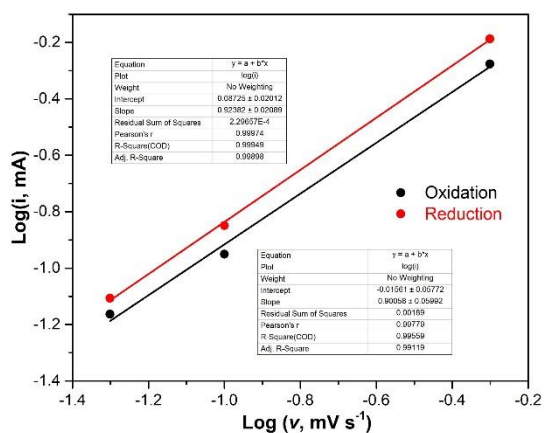
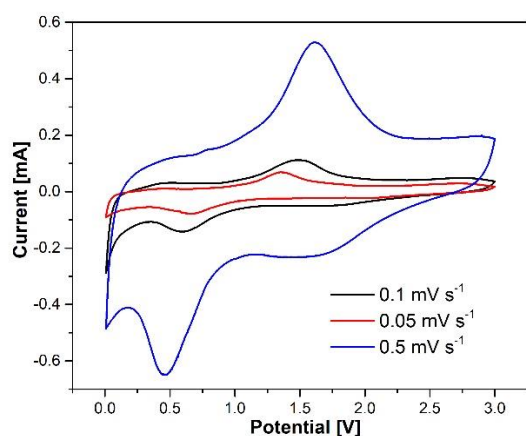


## SUPPORTING INFORMATION



**Figure S1.** XRD pattern of commercial MoS<sub>2</sub> powder (black line) and MoS<sub>2</sub> after ball milling with C45 carbon additive, Na-CMC binder and water solvent (red line). The pattern of MoS<sub>2</sub> is in line with what reported in literature [C. P. Veeramalai, F. Li, Y. Liu, Z. Xu, T. Guo, T. W. Kim, *Appl. Surf. Sci.* 2016, **389**, 1017-1022]. The MoS<sub>2</sub> structure is retained after ball milling.



**Figure S2.** (a) Cyclic voltammogram at different scan rate obtained with a T-cell configuration, using potassium metal foil as counter and reference electrodes, MoS<sub>2</sub> as working electrode and KPF<sub>6</sub> in EC:DEC 1:1 as the electrolyte. (b) Fitted lines calculated from CV curves. The slope equal to 0.90 (oxidative scan) and 0.92 (reductive scan) suggests a surface capacitive process.

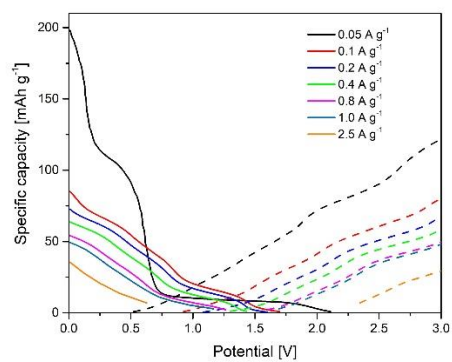


Figure S3. Charge-discharge profiles at different current densities.

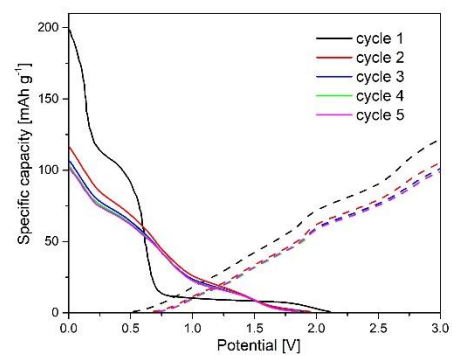


Figure S4. Charge-discharge profiles in the first 5 cycles, obtained at  $0.05 \text{ A g}^{-1}$ .