Electrochemical Study of Crednerite $CuMnO_2$ for Symmetric Supercapacitor Applications

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1. XRD analysis of $CuMnO_2$ electrode

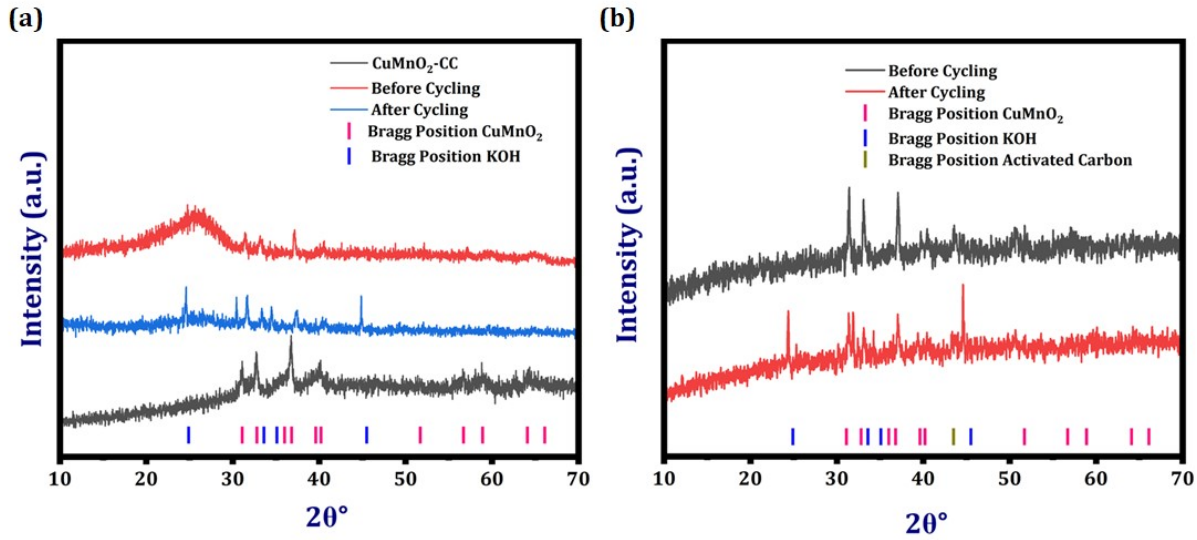
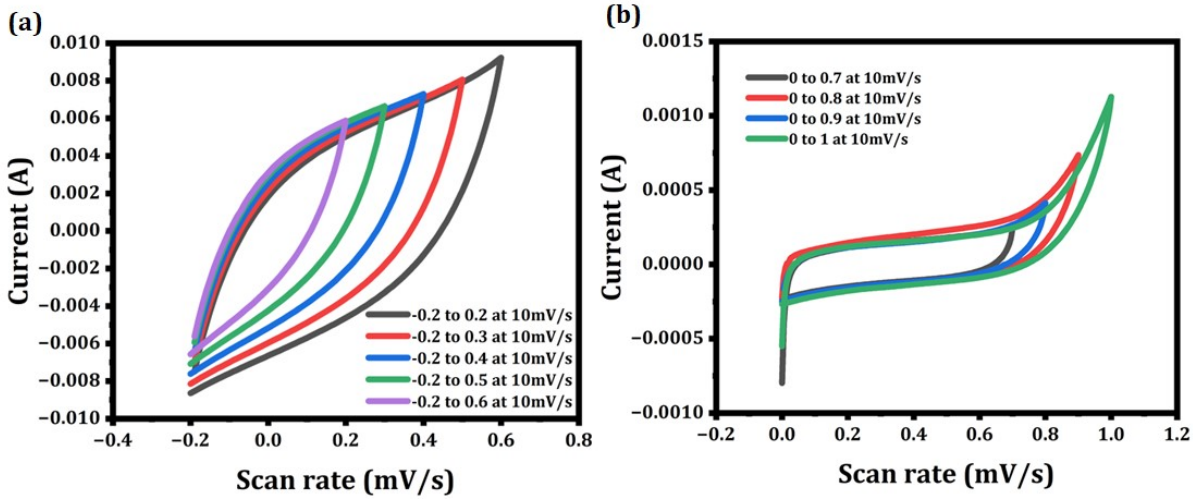


Figure S1. (a) XRD patterns of $CuMnO_2$ electrode, before and after 3000 cycles, (b) XRD patterns of Symmetric $CuMnO_2$ electrodes, before and after 5000 cycles.

Figure S1(a) depicts the X-ray diffraction (XRD) patterns of the $CuMnO_2$ electrode, recorded before and after 3000 charge-discharge cycles in a three-electrode system. While doing the XRD study of the $CuMnO_2$ electrode after 3000 cycling, it is seen that there are 2 extra peaks found of KOH located at 2θ angles of 24.9˚ and 44.8˚, which arise due to the presence of KOH residue on the surface of carbon cloth (CC) fibers. All the other peaks are

consistent with the standard Bragg position, indicating the material's stability over 3000 charge-discharge cycles.

The X-ray diffraction analysis (Fig. S1(b)) was performed on the electrode material both before and after 5000 charge-discharge cycles. The pattern of pristine electrode confirms the initial phase purity of the electrode material, however, the XRD pattern of the used electrode depicts additional diffraction peaks along with the original reflections of $CuMnO_2$. The identified new peaks correspond to the KOH and activated carbon. The emergence of a new peak arises due to the presence of PVA-KOH residue on the surface of the SS electrode. Likewise, the appearance of activated carbon is due to the prolonged cycling of the electrode material.



2. Cyclic voltammetry of the prepared $CuMnO_2$ electrode

Figure S2. (a) CV patterns of CuMnO2 taken at different voltage windows, (b) CV patterns of symmetric CuMnO2 taken at different voltage windows.

Figure S2(a) demonstrates the cyclic voltammogram (CV) of the $CuMnO_2$ electrode taken in different potential windows and a fixed scan rate of 10 mV/s. The data reveal that the electrode has a stable working window between -0.2 to 0.5V in 1M aqueous KOH electrolyte. The performance of the electrode material is further limited by electrochemical polarization as the potential window increases.

Figure S2(b) displays the CV curves of symmetric $CuMnO_2$, which indicate that the device can operate smoothly up to 0 to 0.8V, further increase in potential range is restricted by electrochemical polarization.