

Electrodeposition of Cu-Mn Films as Precursor Alloys for Synthesis of Nanoporous Cu

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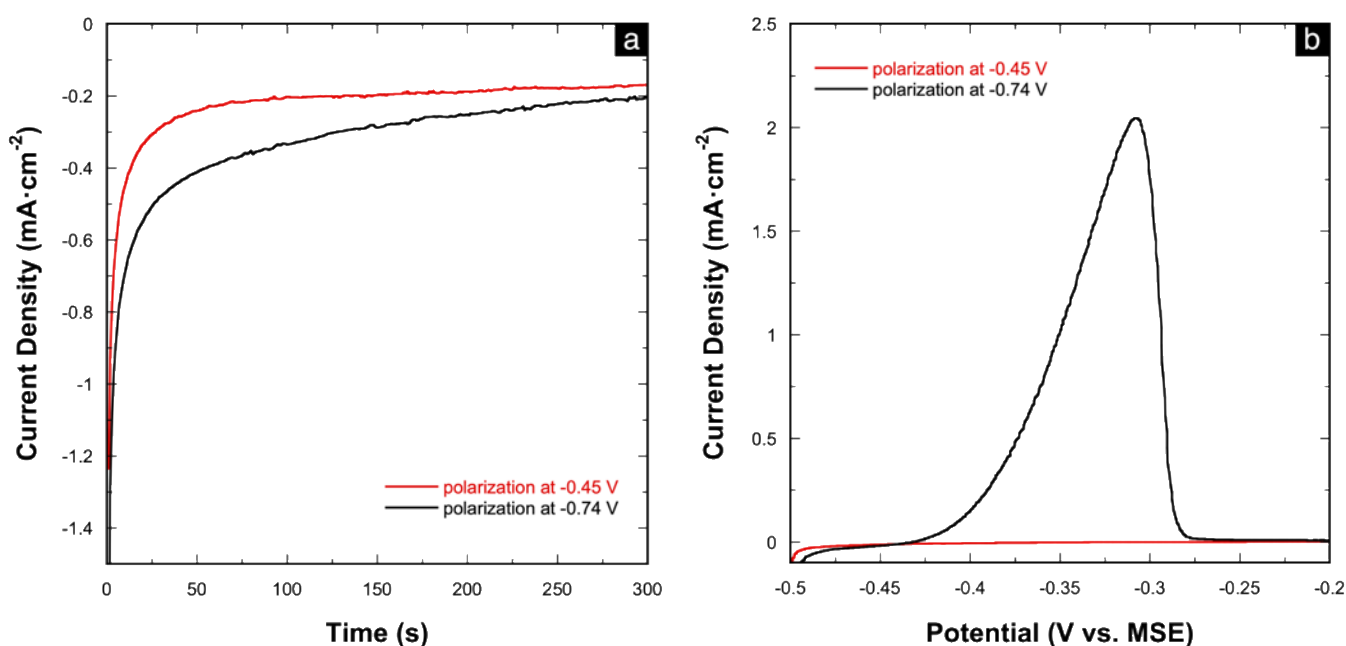


Figure S1. (a) Polarization curves at -0.45 V and -0.74 V on Au substrate in 10 mM CuSO_4 + 0.5 M $(\text{NH}_4)_2\text{SO}_4$ at pH 6.5; (b) linear scan voltammograms depicting the stripping after the respective polarizations.

To further study the cathodic behavior of the CuSO_4 solution in the presence of $(\text{NH}_4)_2\text{SO}_4$, independent polarization experiments were performed at the -0.45 V and -0.74 V vs. MSE, which are the peak potentials representing the two-step reduction of the Cu-ammine complex (Fig. 2a (blue curve) in the main text). Fig. S1a shows the polarization curves at these potentials. The charges collected were $66.5 \text{ mC} \cdot \text{cm}^{-2}$ (at -0.45 V) and $98.3 \text{ mC} \cdot \text{cm}^{-2}$ (at -0.74 V). Subsequent stripping analyses (Fig. S1b) were done to determine the amount of Cu that was reduced on the Au substrate at these potentials. The stripping curves reveal that there was no Cu that deposited on the substrate at -0.45 V. The charge collected at -0.45 V is likely due to the reduction of the $[\text{Cu}(\text{NH}_3)_n]^{2+}$ to an intermediate complex, $[\text{Cu}(\text{NH}_3)_2]^+$. Cu deposition only occurred -0.74 V (stripping charge of $60.0 \text{ mC} \cdot \text{cm}^{-2}$), which was due to the reduction of the aforementioned intermediate complex to metallic Cu, thus supporting the two-step reduction of the Cu-ammine complex.

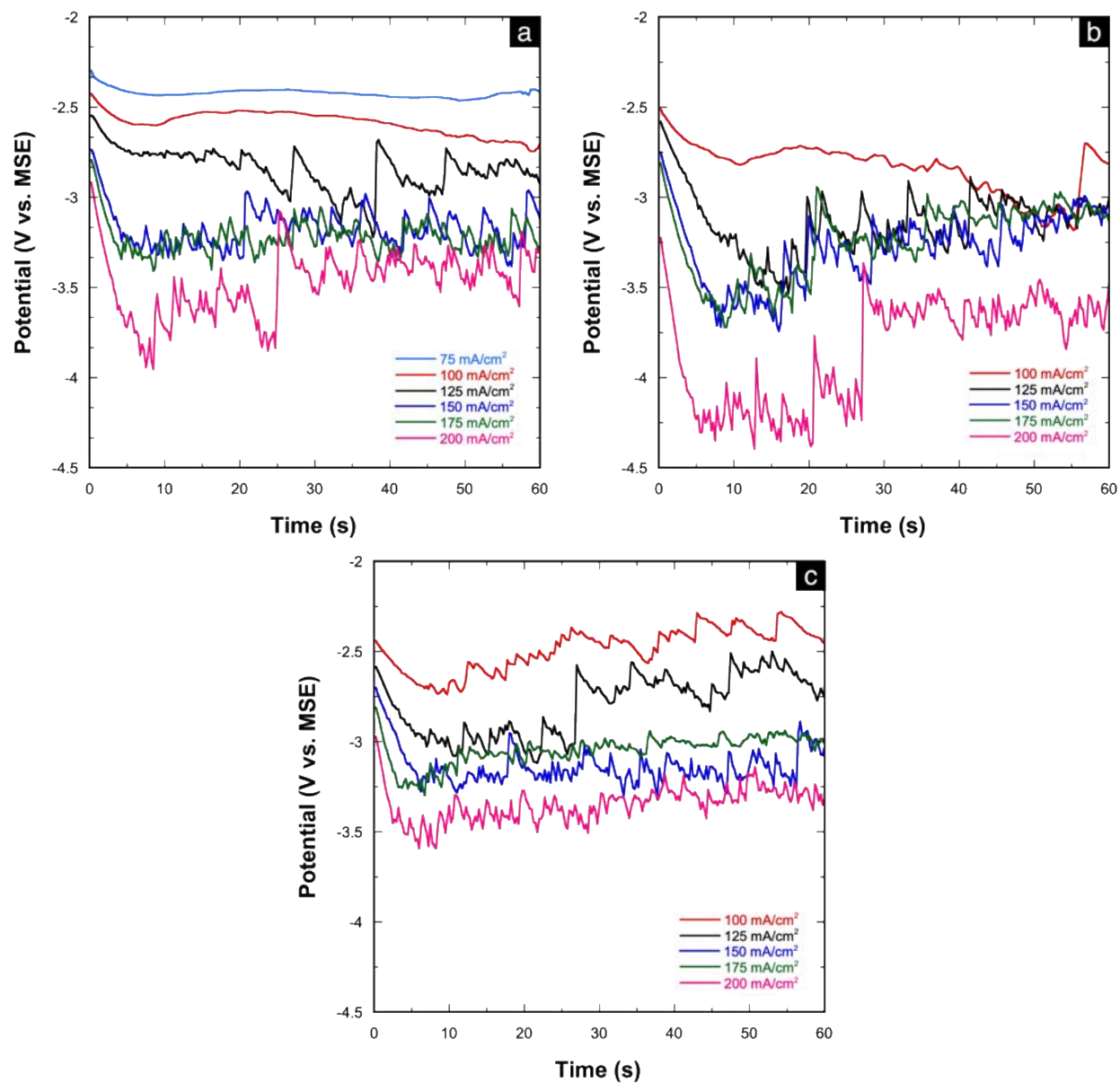


Figure S2. Potential-time curves obtained during the electrodeposition of Cu-Mn at different current densities using the (a) 1-9, (b) 1-6, and (c) 1-4 baths.