*Supplementary Materials*

# Nitrogen-Doped CuO@CuS Core-Shell Structure for Highly Efficient catalytic OER Application

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## Supporting Figures

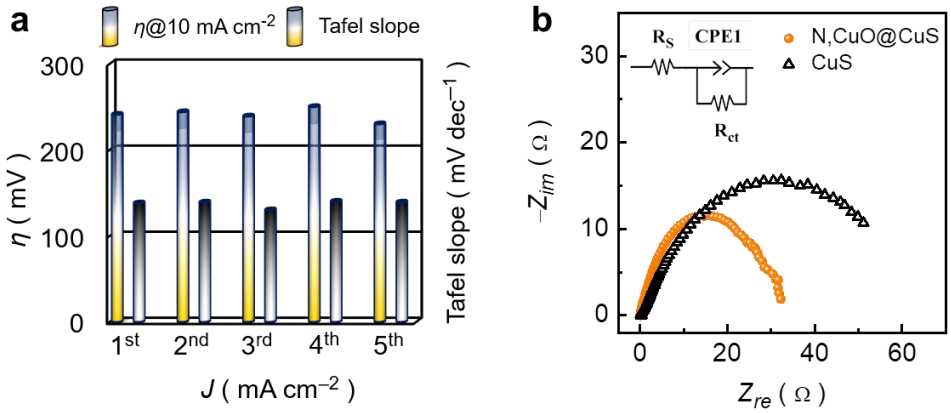


**Figure S1.** (a) Reliability of the OER activity for the N,CuO@CuS core-shell structure catalyst. (b) Nyquist impedance plots for CuS and N,CuO@CuS catalyst.

Nyquist impedance curves (EIS plots) were recorded to help understand the fundamental electron transfer kinetics of the CuS and N,CuO@CuS core-shell structure catalysts. Figure S1b shows the Nyquist impedance curves for both catalysts along with the tank circuit that was used to fit the semicircle curves (i.e., charge transfer resistance; Rct). The point at which the semicircles meet the X-axis illustrates the internal resistance of the electrodes (i.e., Rs). This resistance encompasses both the substrate's intrinsic resistance and the electrolyte resistance within the electrochemical system. The N,CuO@CuS possesses a smaller Rct curve compared to pure CuS catalyst, indicating that the conductivity of the catalyst material has increased after nitrogen treatment.

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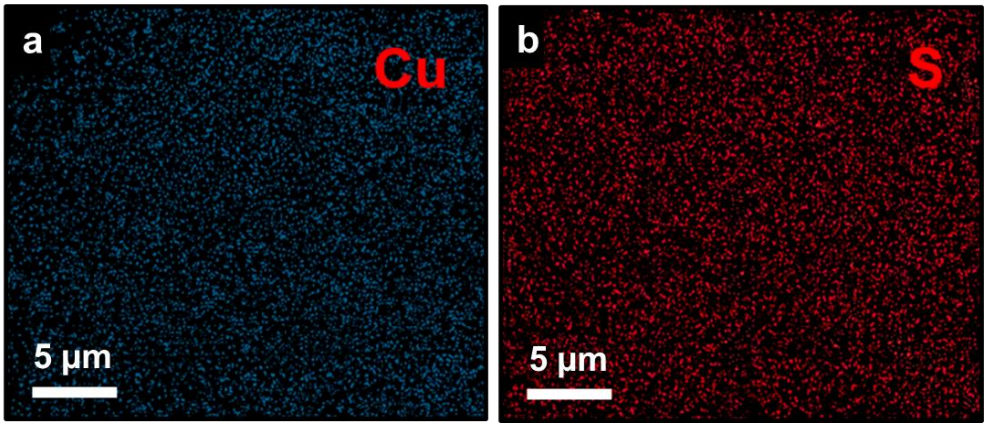


**Figure S2.** (a) Cu and (b) S constituents EDS image mapping for the pure CuS electrode film.

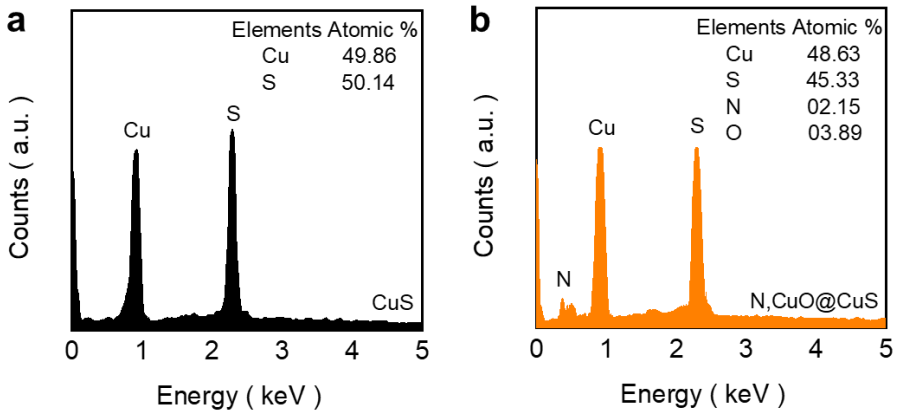


**Figure S3.** EDS spectra for the (a) CuS and (b) N,CuO@CuS electrode films.

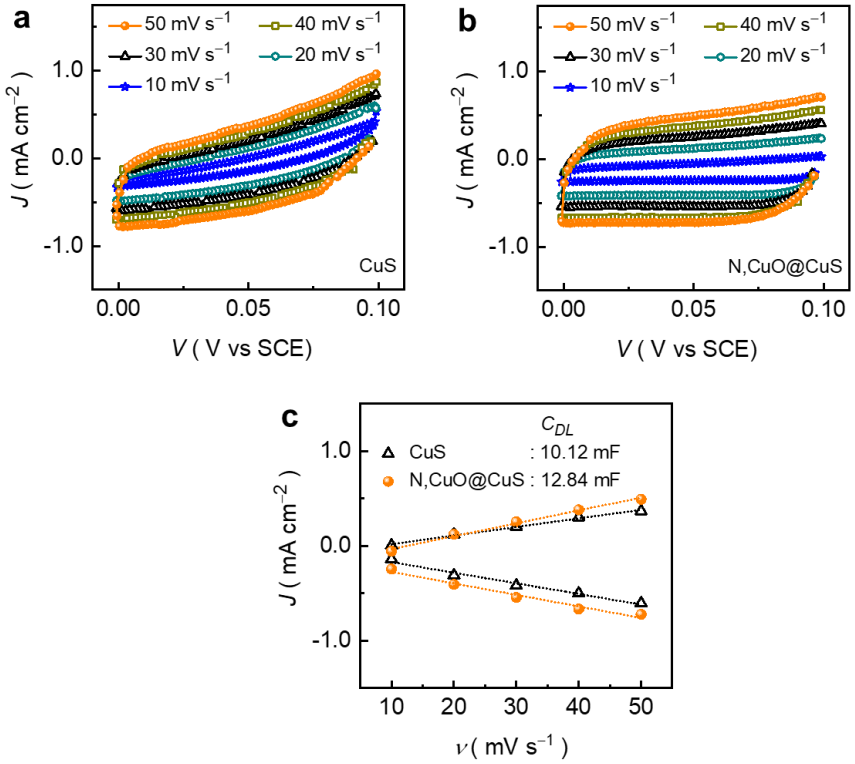


**Figure S4.** Non-Faradaic CV curves for (a) CuS and (b) N,CuO@CuS catalyst measured at various scan rates. (c) "*J* versus *v*" plots obtained at 0.05 V from non-Faradaic CV curves for the estimation of double-layer capacitance and ECSA.