

Supplementary materials

Polymorphic layered copper phosphonates: exfoliation and proton conductivity study

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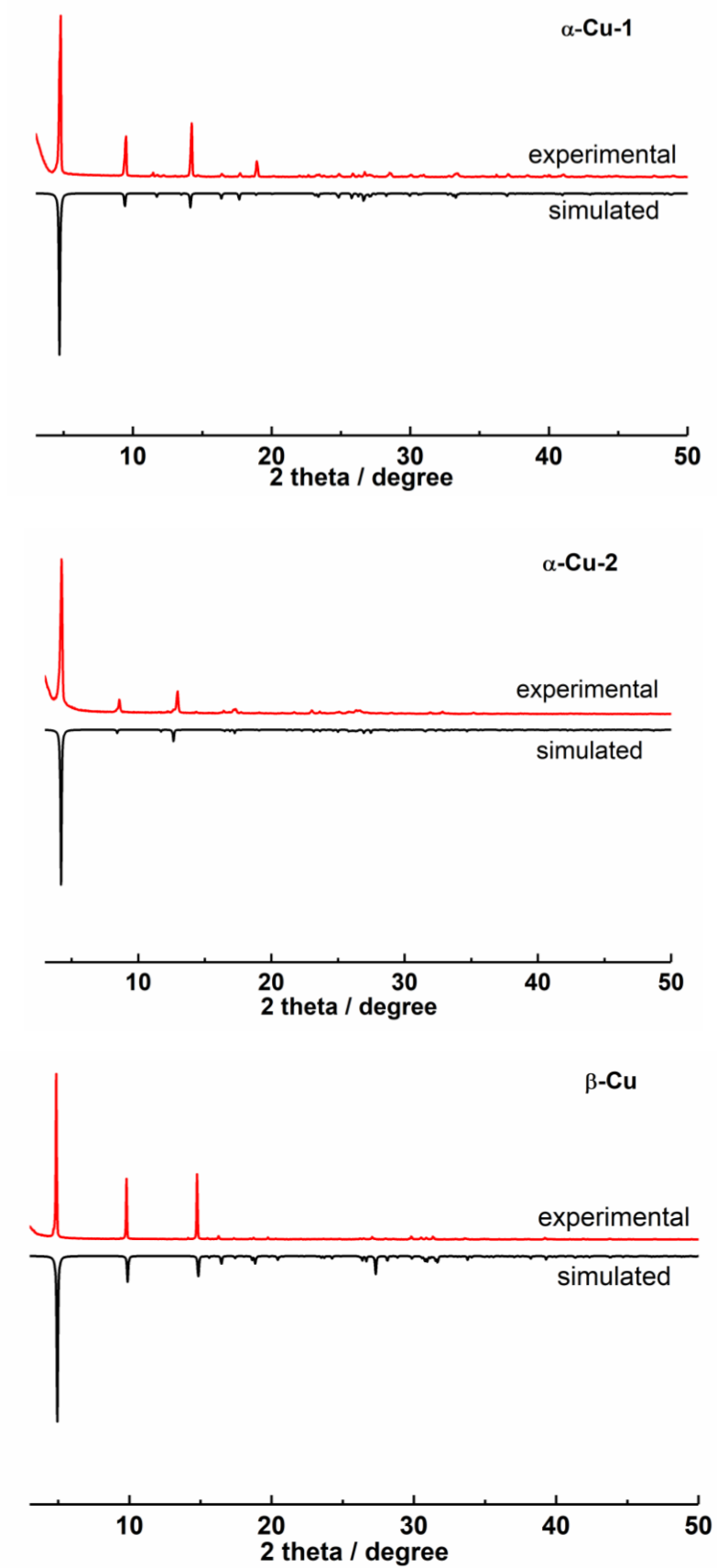


Fig. S1. Experimental and simulated XRD patterns of α -Cu-1, α -Cu-2 and β -Cu.

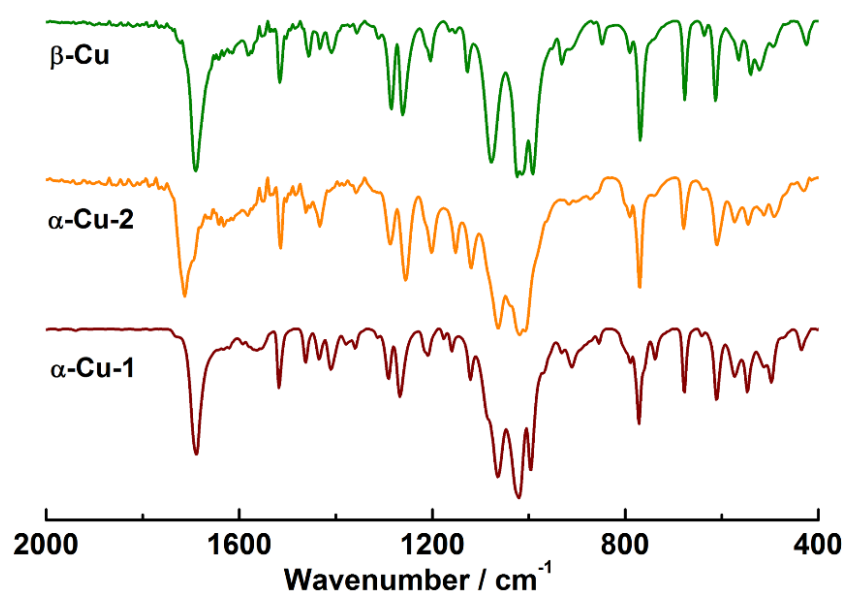
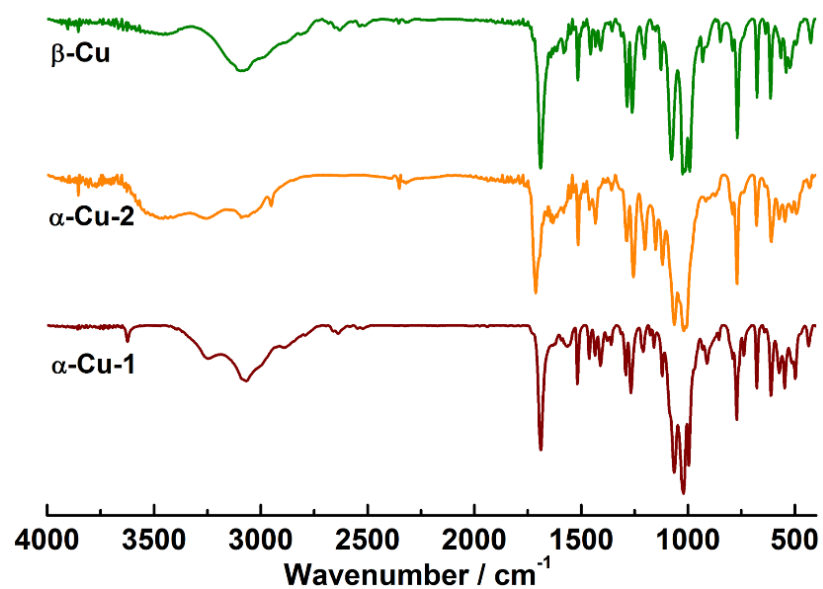


Fig. S2. FTIR spectra of compounds α -Cu-1, α -Cu-2 and β -Cu. Up: 4000-400 cm⁻¹; Bottom: The enlarged view of the range of 2000-400 cm⁻¹.

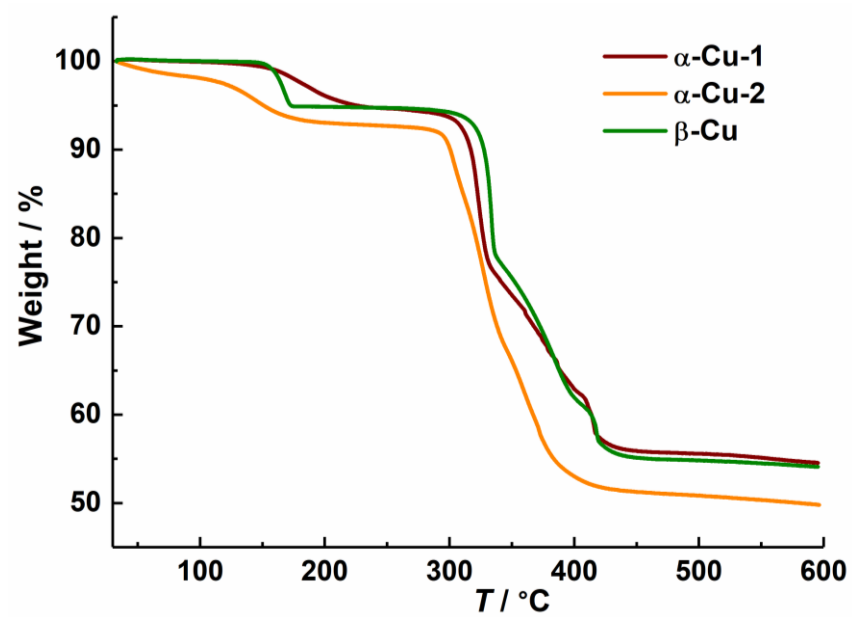


Fig. S3. TG curves for compounds α -Cu-1, α -Cu-2 and β -Cu

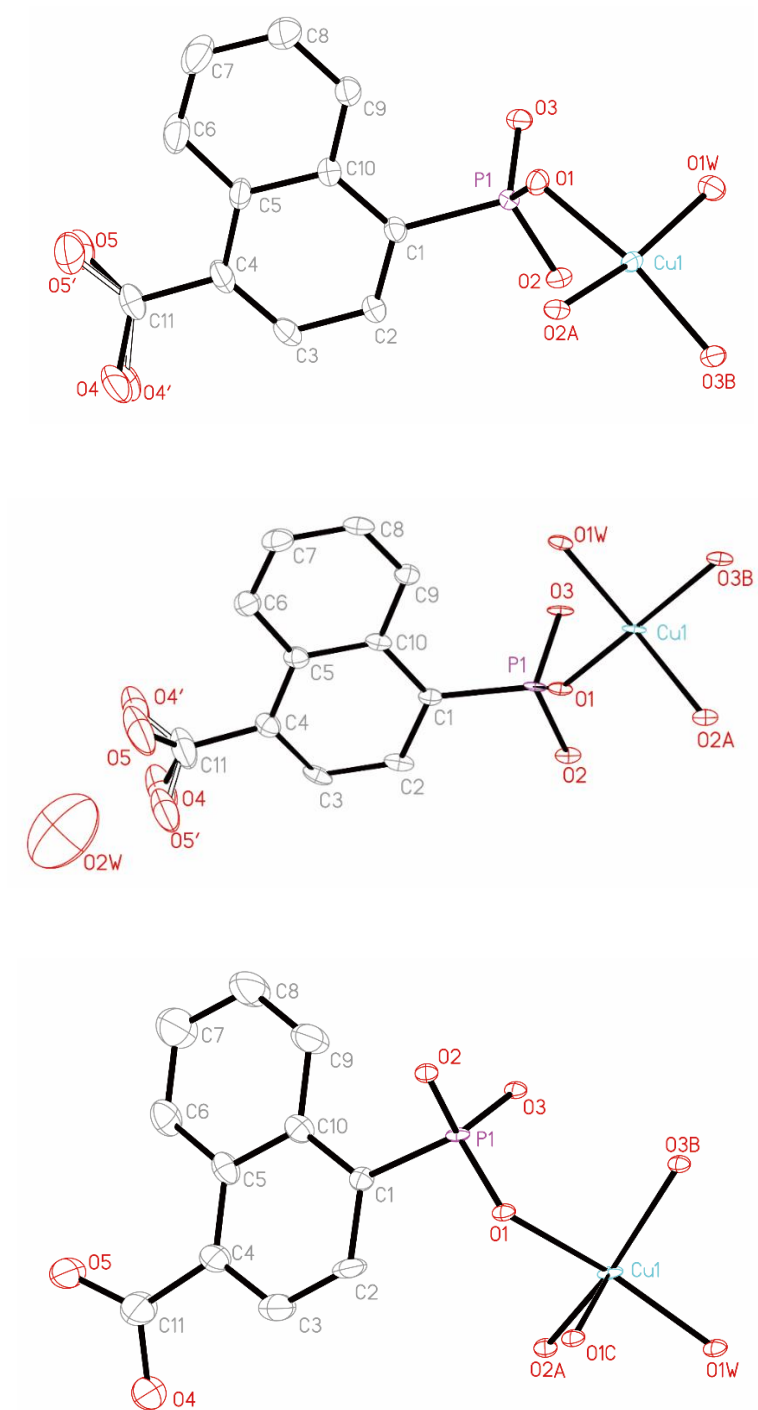


Fig. S4 Building unit of compounds α -Cu-1 (top), α -Cu-2 (middle) and β -Cu (bottom) with atomic labeling scheme (50% probability).

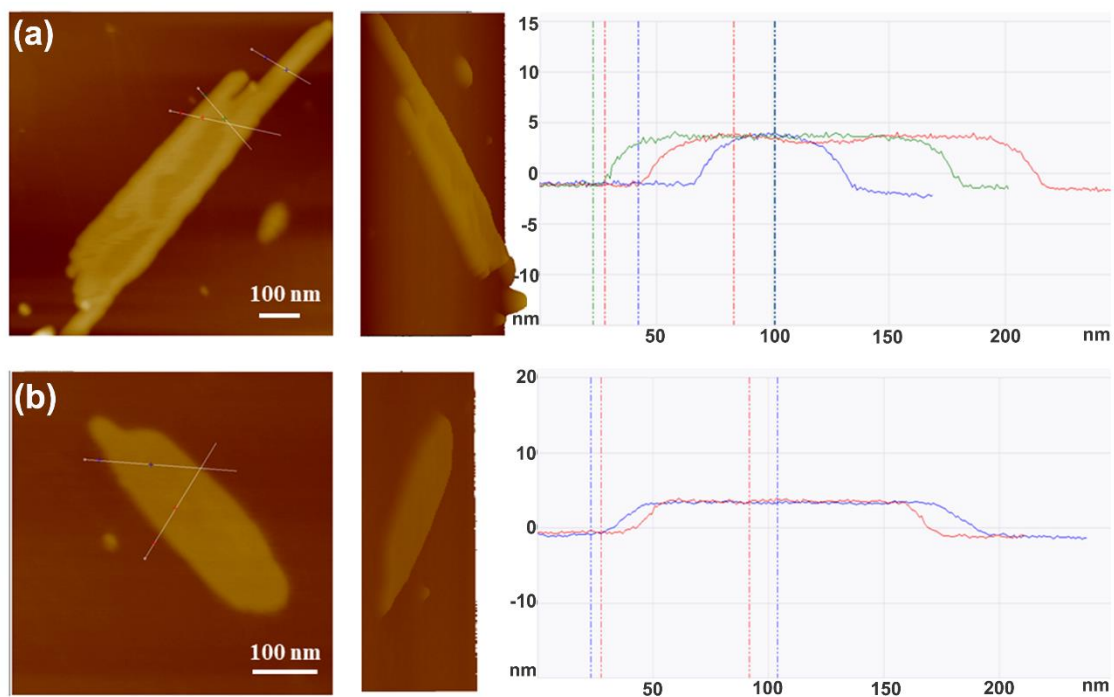


Fig. S5. AFM images, 3D visual graphs and the thickness plots of α -Cu-1 (a) and β -Cu (b) exfoliated in THF.

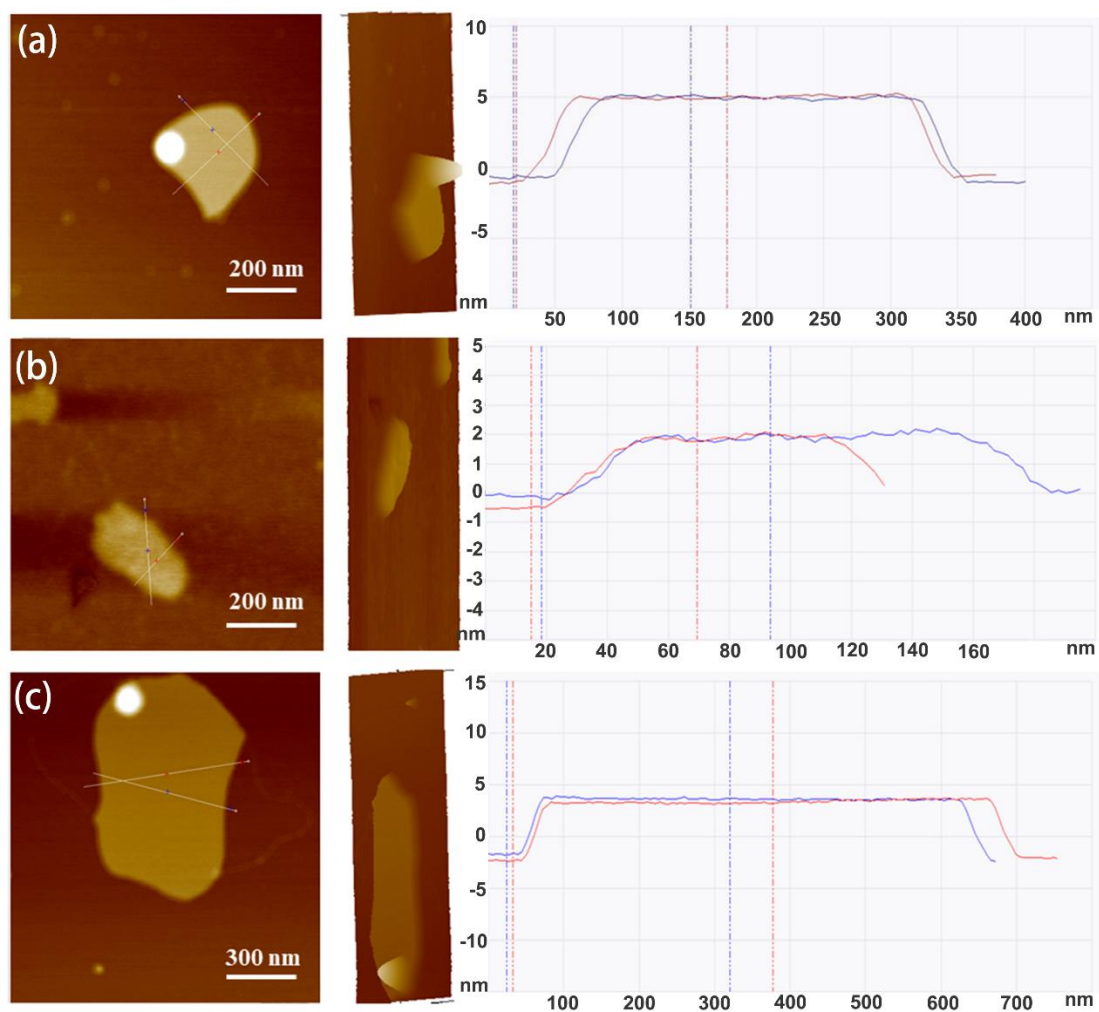


Fig. S6. AFM images, 3D visual graphs and the thickness plots of α -Cu-1 (a), α -Cu-2 (b) and β -Cu (c) exfoliated in acetone.

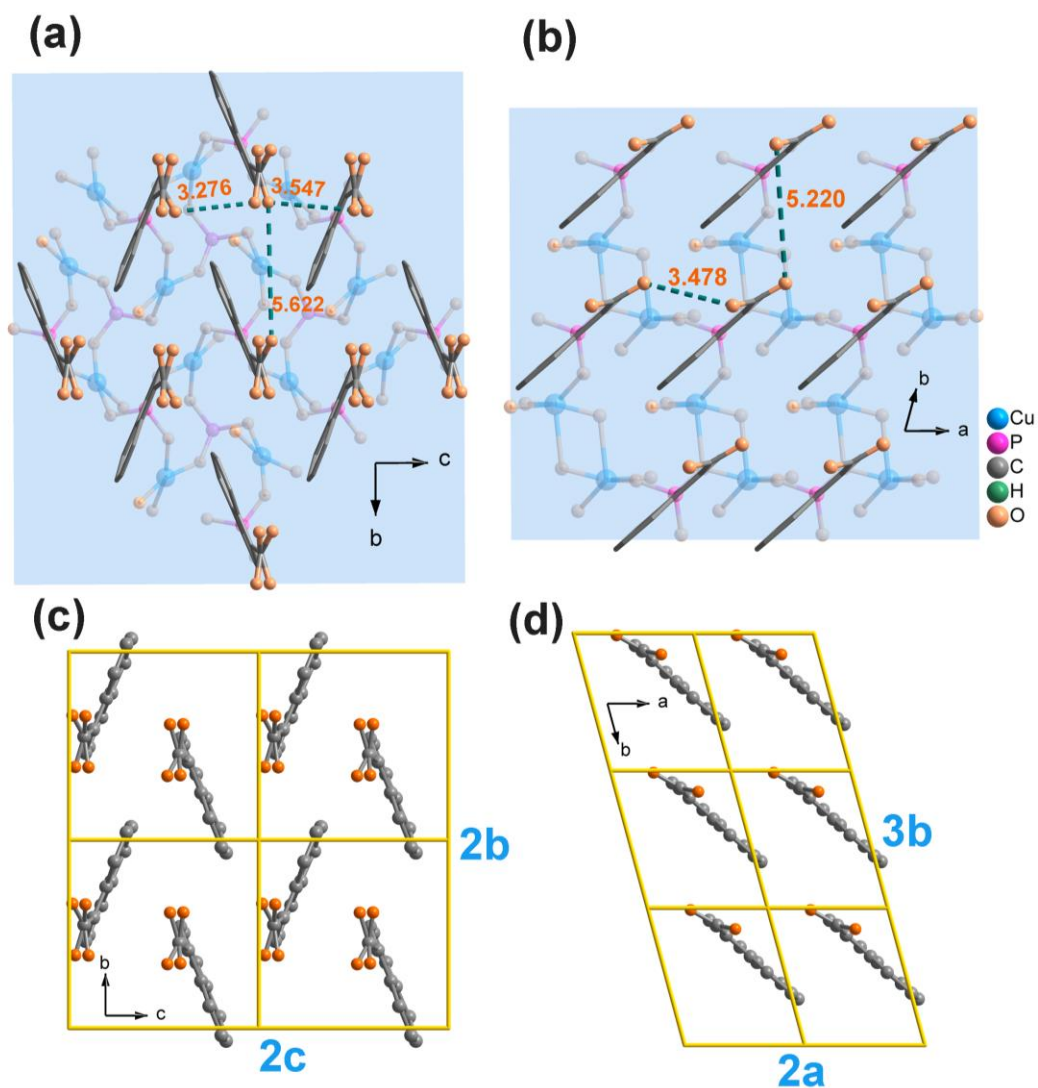


Fig. S7 The calculation of the packing density of the aryl groups on each side of one layer for α -Cu-1 (a, c) and β -Cu (b, d). The packing density is 3.3 aryl groups /nm² for α -Cu-1 and 3.2 aryl groups /nm² for β -Cu, respectively.

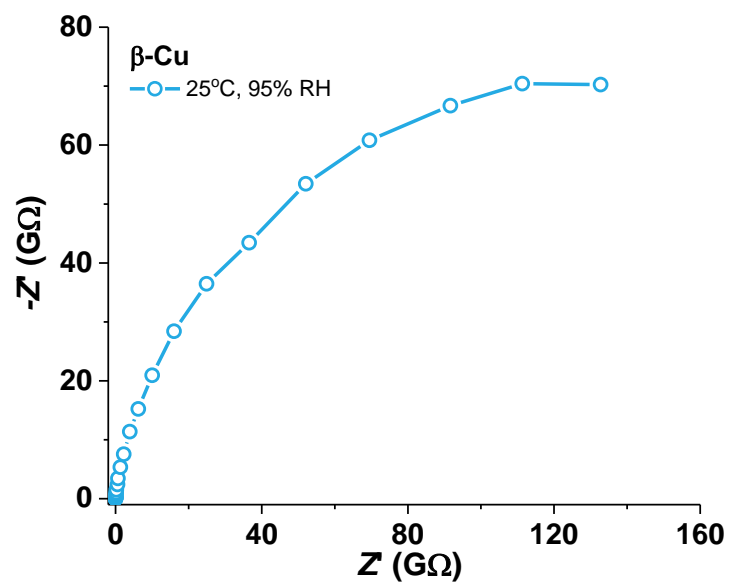


Fig. S8. The Nyquist plot for β -Cu at 25 °C, 95%RH.

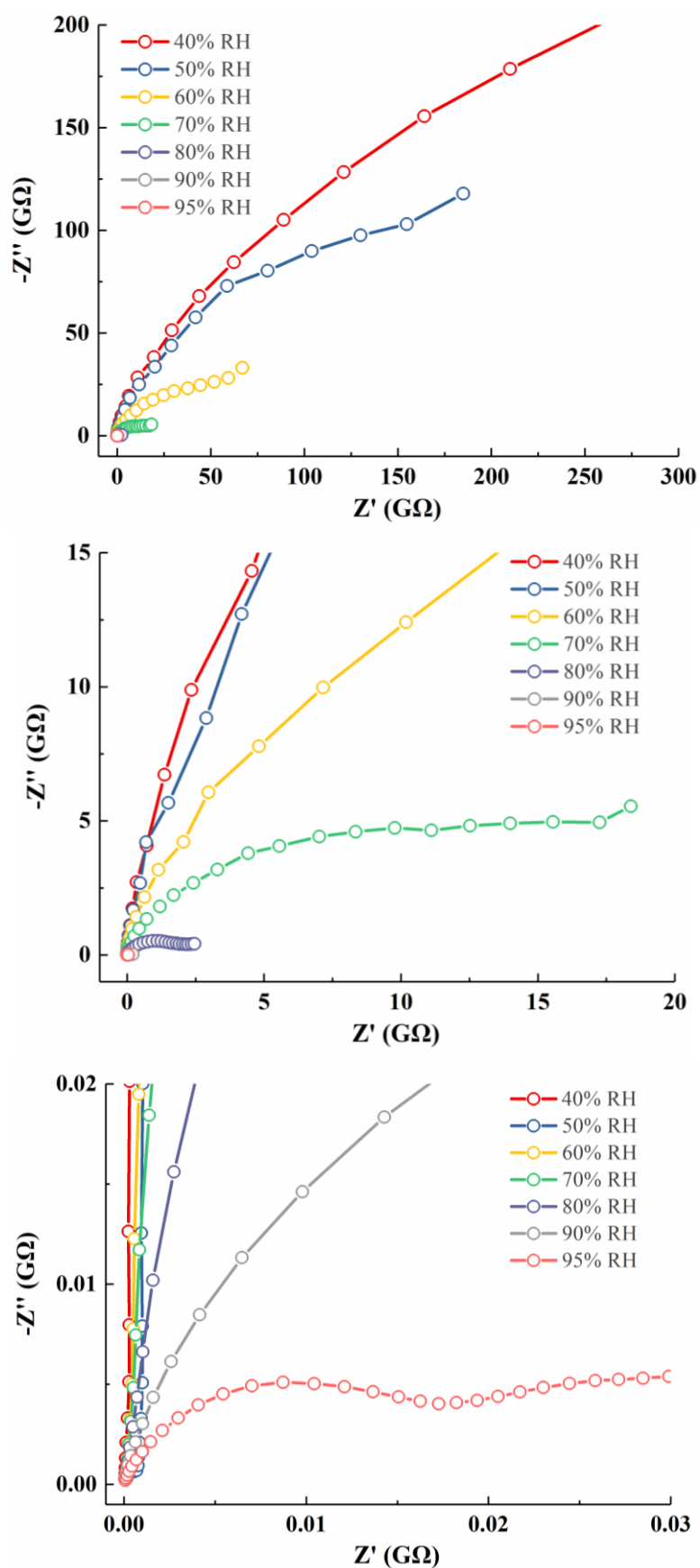


Fig. S9. Nyquist plots for the pellet of α -Cu-1 at 25 °C and various RH. Up: RH increases from 40 to 95%; Middle and Bottom: The enlarged view of graph.

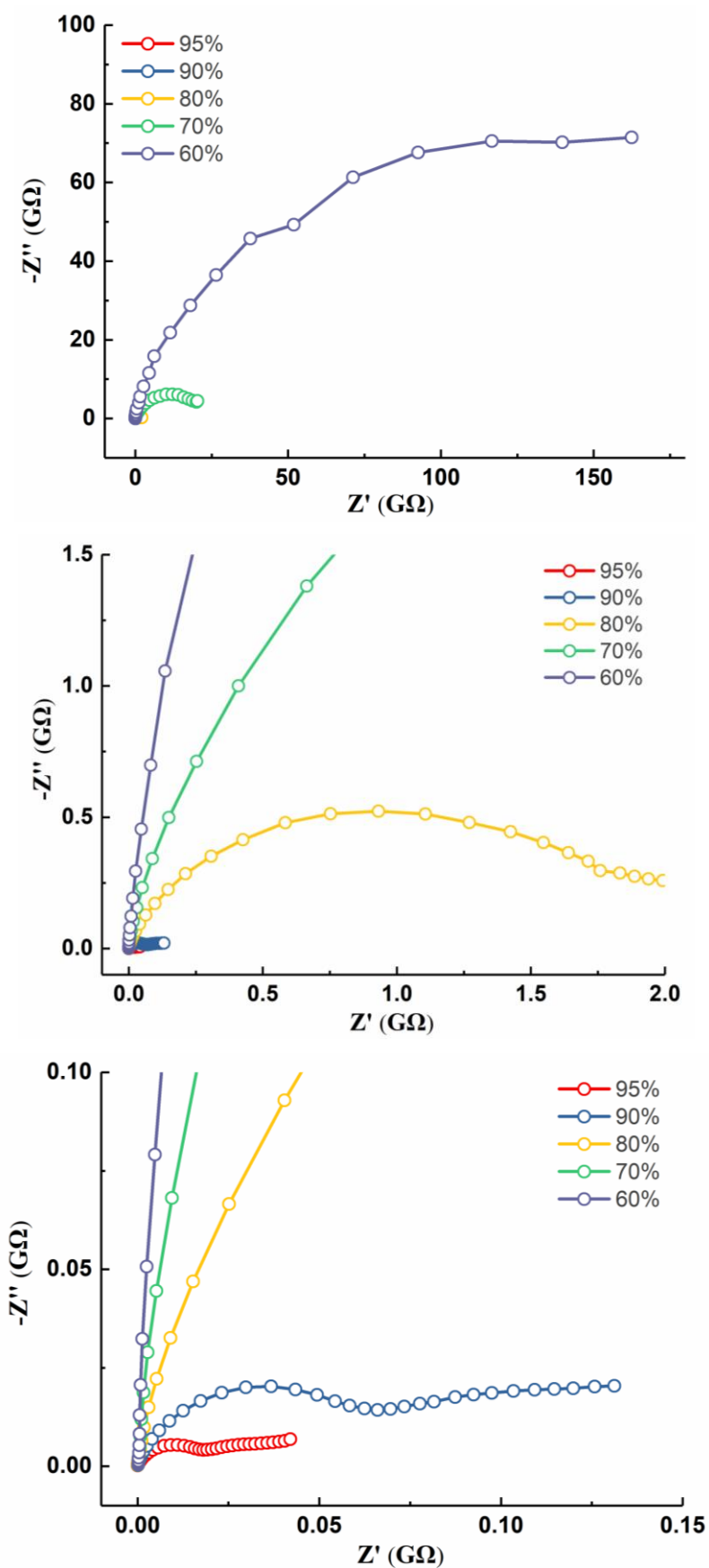


Fig. S10. Nyquist plots for the pellet of α -Cu-1 at 25 °C and various RH. Up: RH decreases from 95 to 60%; Middle and Bottom: The enlarged view of graph.

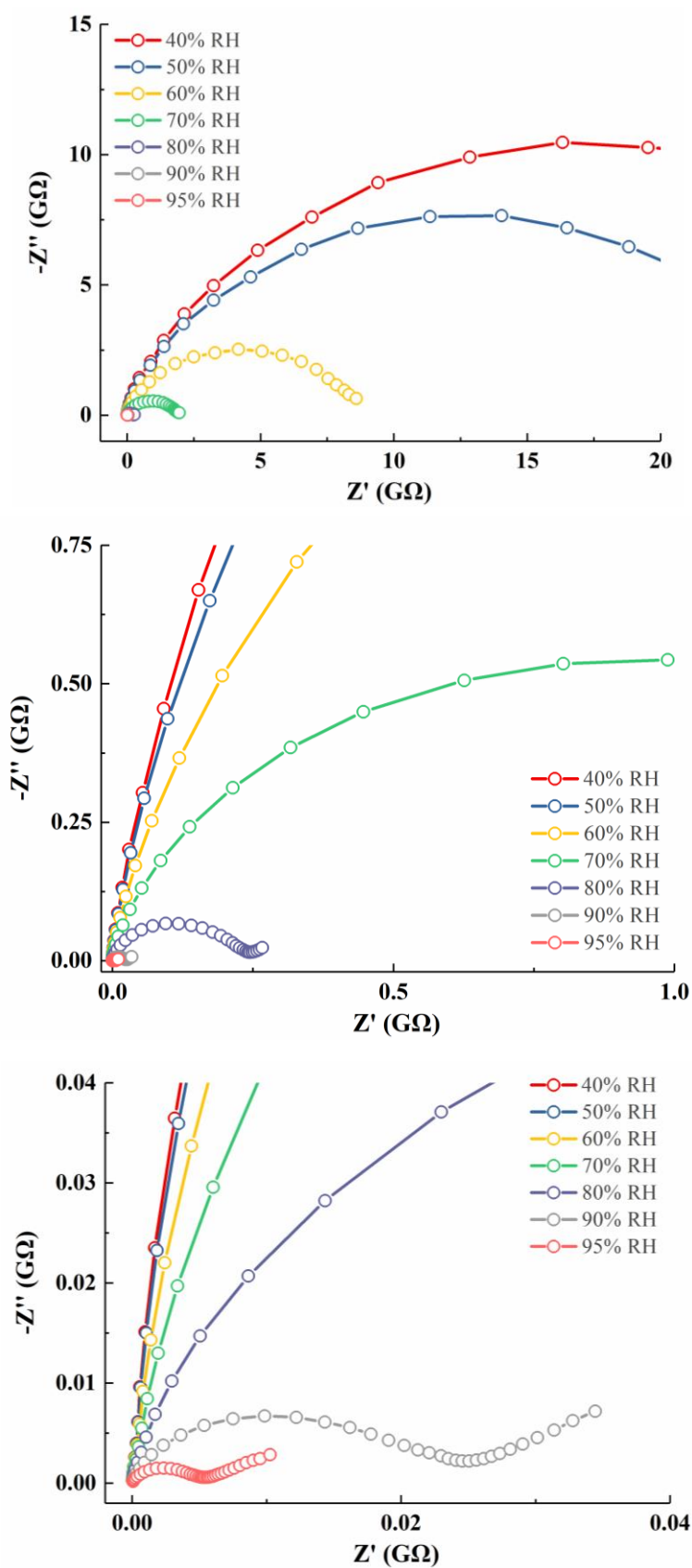


Fig. S11. Nyquist plots for the pellet of α -Cu-2 at 25 °C and various RH. Up: RH increases from 40 to 95%; Middle and Bottom: The enlarged view of graph.

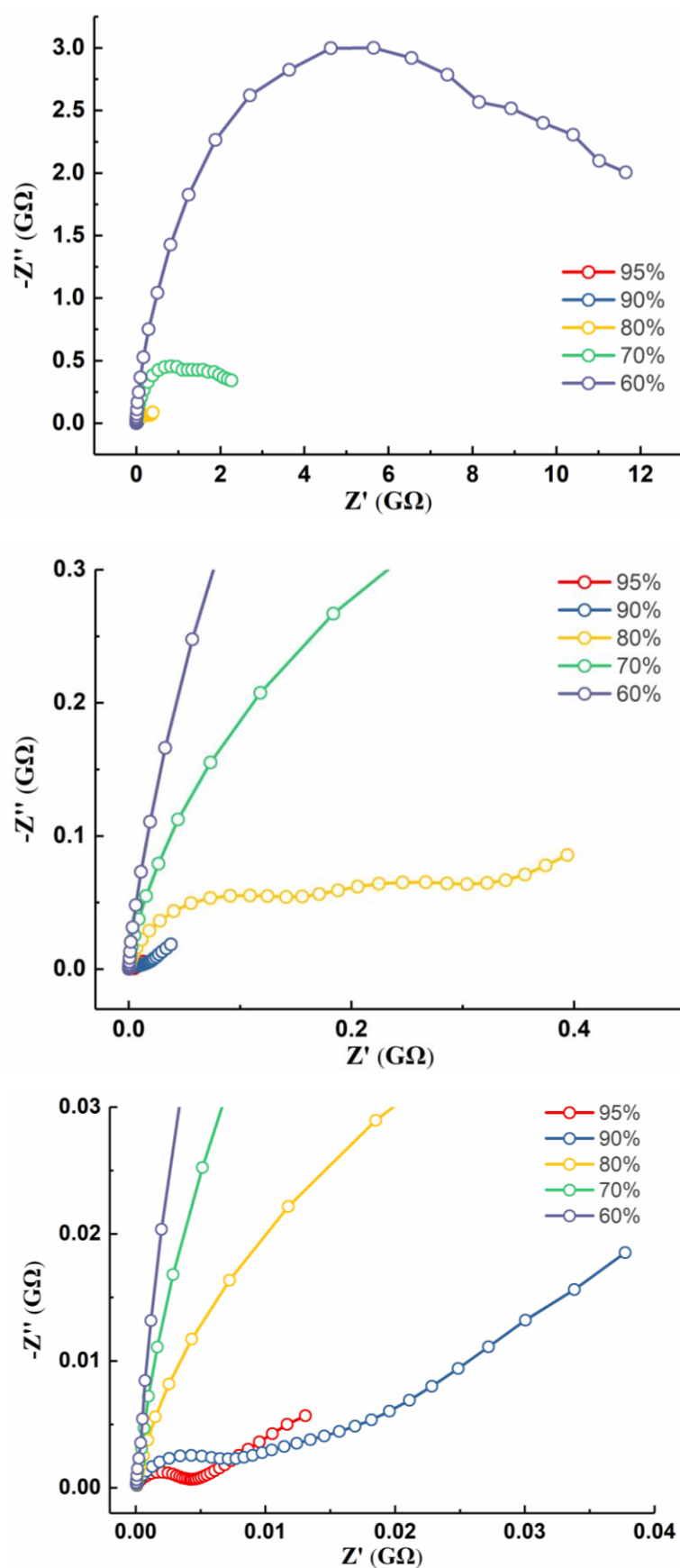


Fig. S12. Nyquist plots for the pellet of α -Cu-2 at 25 °C and various RH. Up: RH decreases from 95 to 60%; Middle and Bottom: The enlarged view of graph.

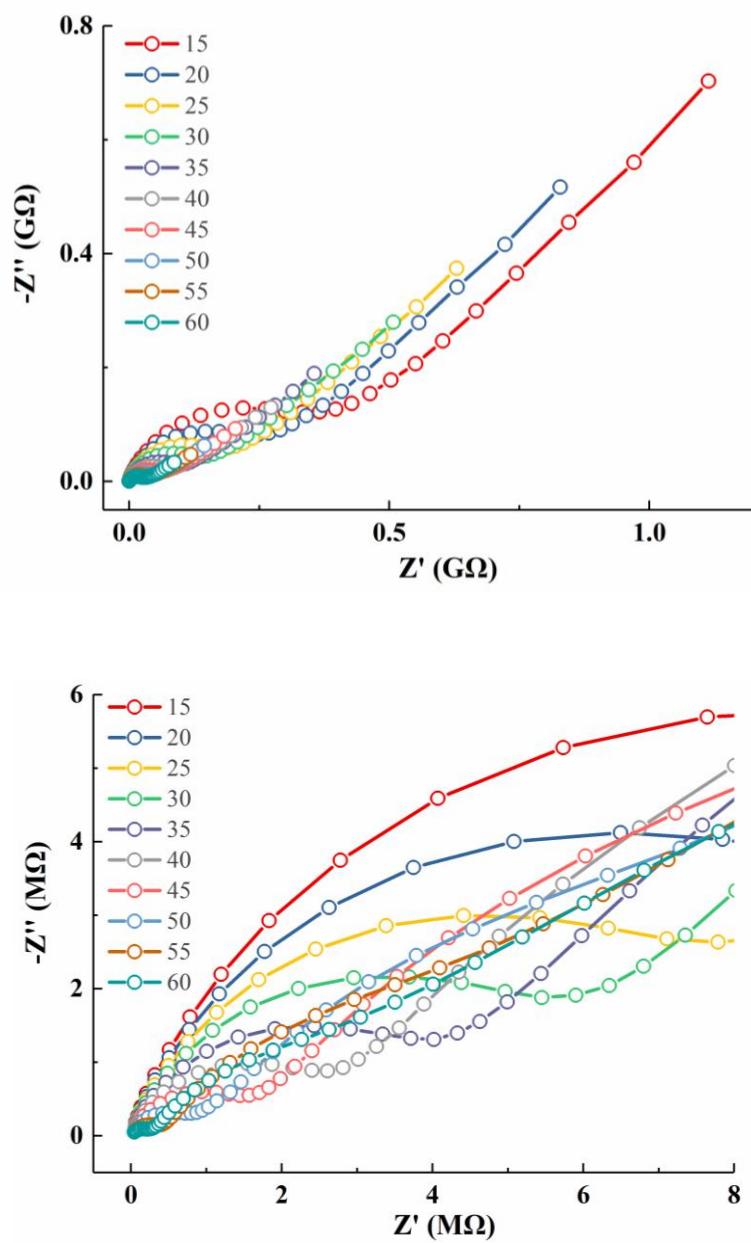


Fig. S13. Nyquist plots for α -Cu-1 at 95% RH and various temperatures. Bottom: The enlarged view of graph.

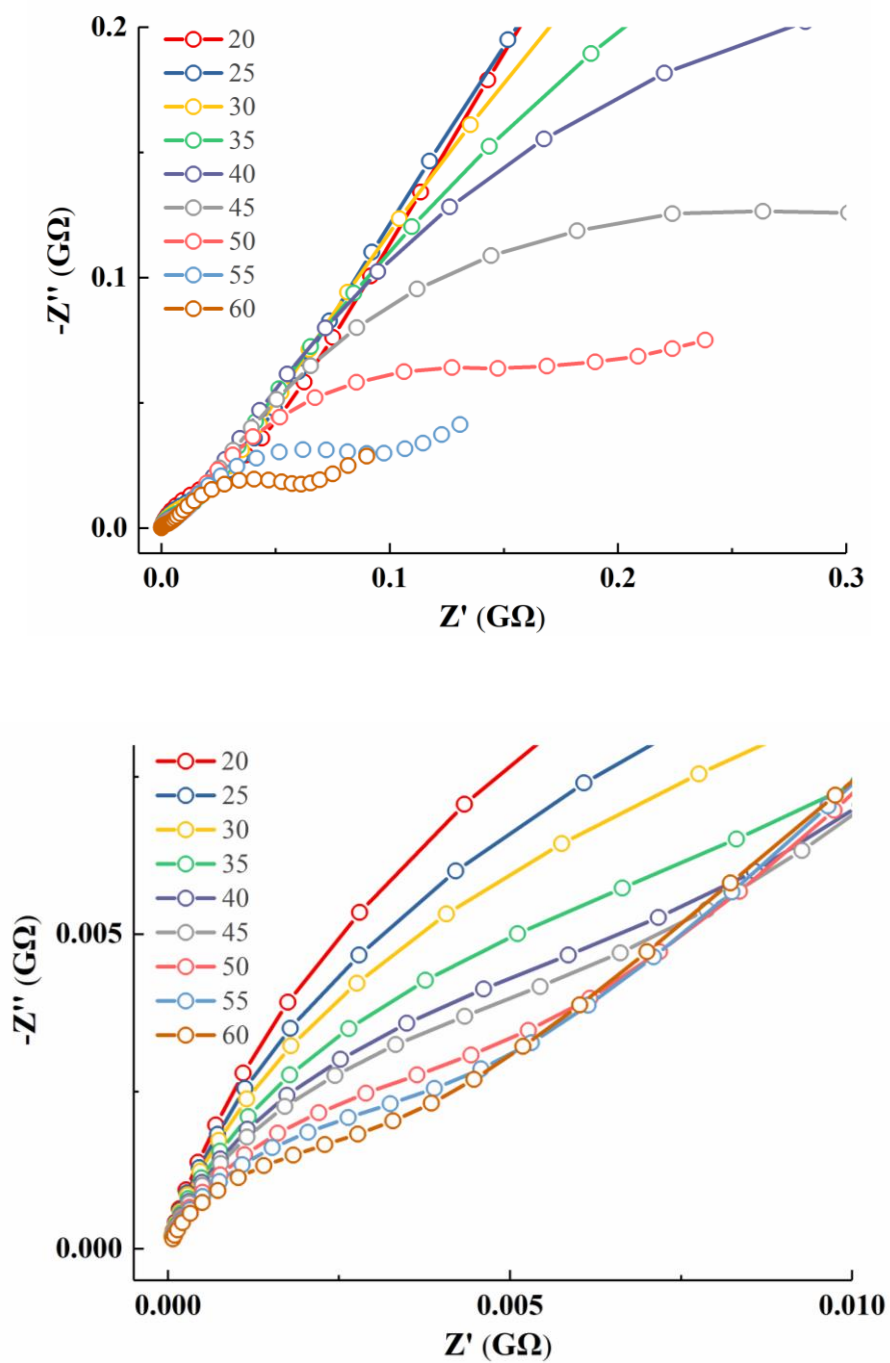


Fig. S14. Nyquist plots for α -Cu-2 at 95% RH and various temperatures. Bottom: The enlarged view of graph.

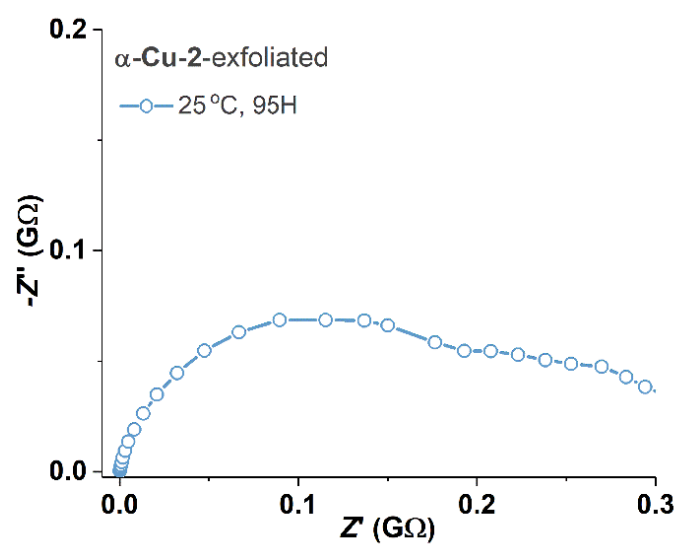


Fig. S15. Nyquist plots for α -Cu-2-exfoliated at 25 °C, 95%RH.