

## Supplementary Materials

# Direct Synthesis of $\text{CuP}_2$ and $\text{Cu}_3\text{P}$ and Their Performance as Electrocatalysts for Hydrogen Evolution, Oxygen Evolution, and Oxygen Reduction Reactions

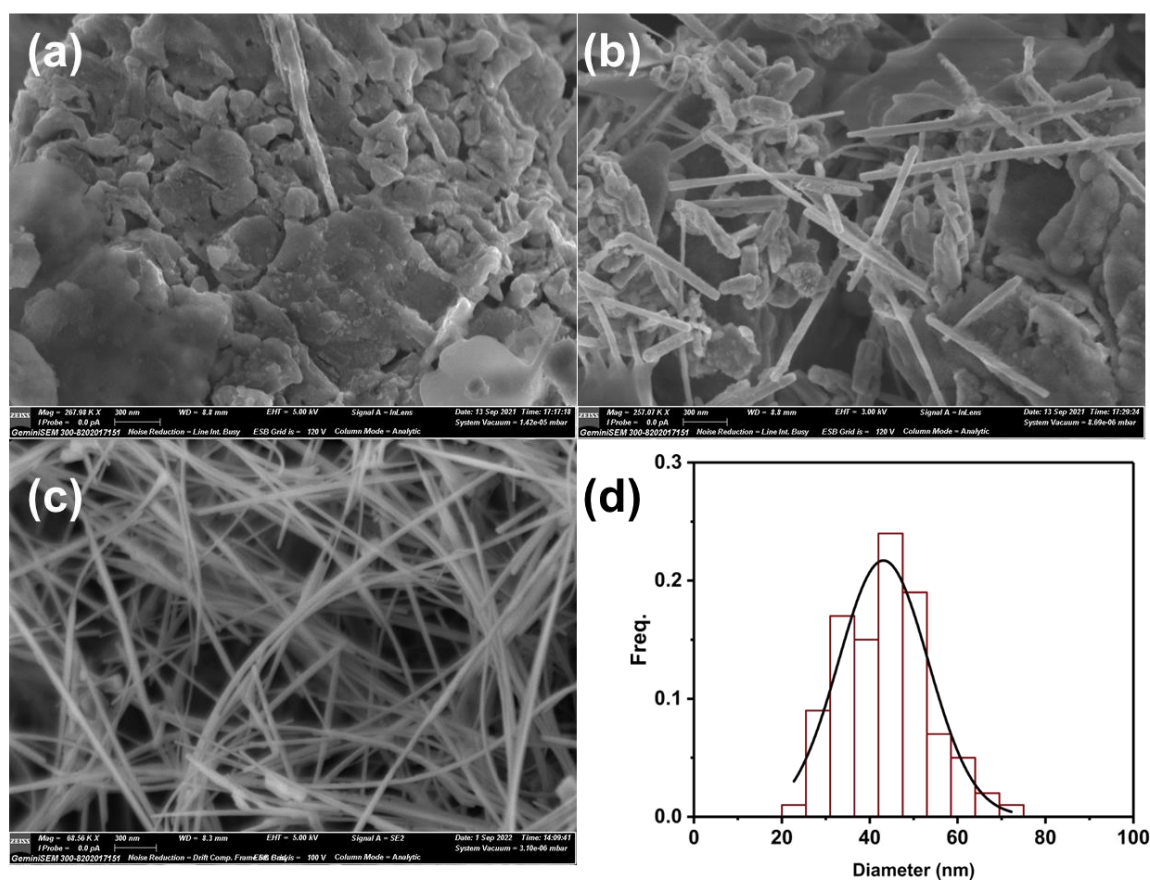
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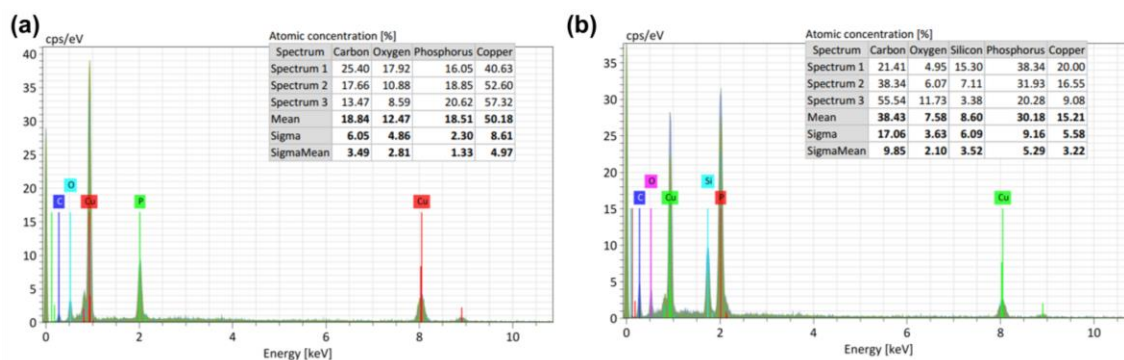
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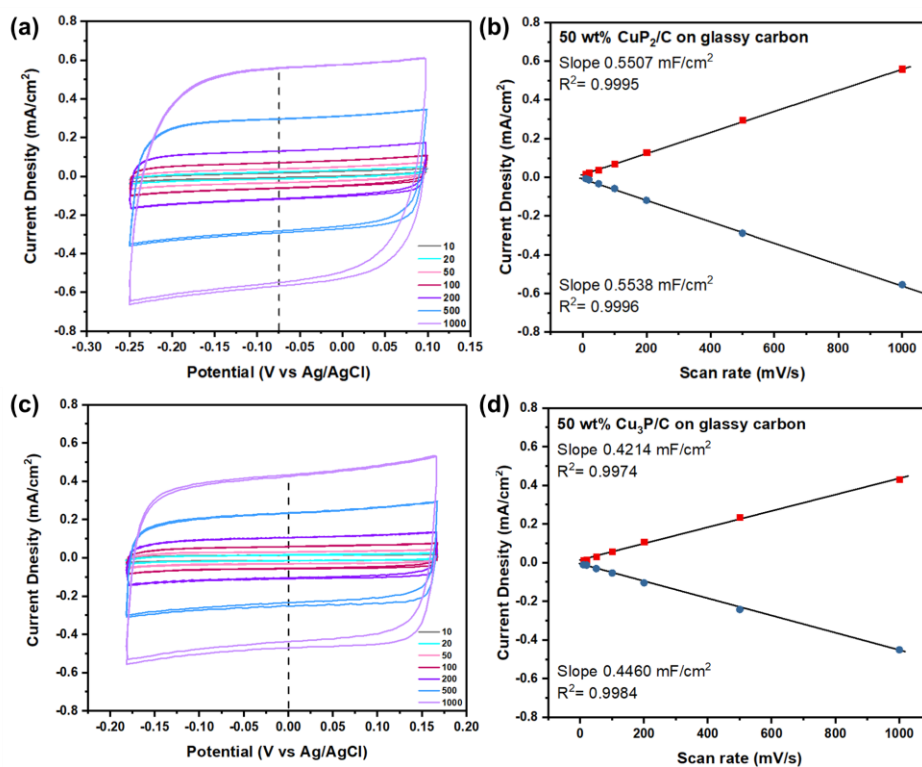
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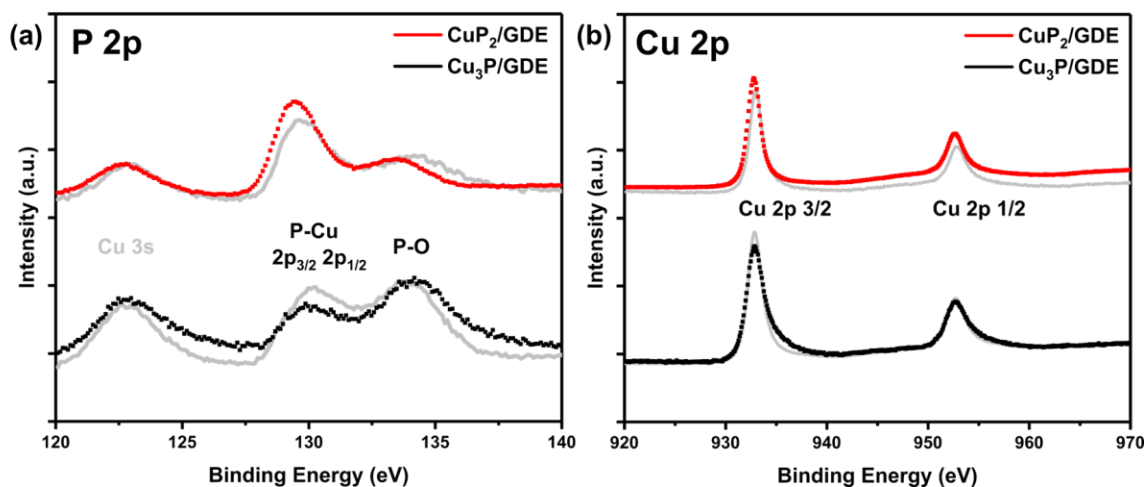
**Figure S1.** SEM results of morphology differences by increasing TOPO/ODE ratio at the same temperature for  $\text{CuP}_2$  synthesis, specifically, 10% for (a), 30% for (b) and 50% for (c). (d) Corresponding diameter distribution histogram of  $\text{CuP}_2$  of (c).



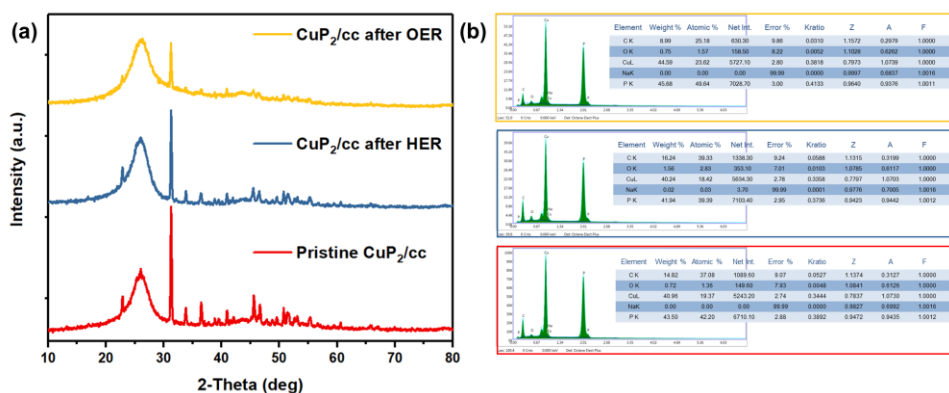
**Figure S2.** Typical EDS results for (a) Cu<sub>3</sub>P and (b) CuP<sub>2</sub>.



**Figure S3.** ECSA comparison of (a, b) 50 wt % CuP<sub>2</sub>/C and (b) 50 wt % Cu<sub>3</sub>P/C on glassy carbon in 0.1 M NaOH.



**Figure S4.** XPS results for  $\text{CuP}_2$  and  $\text{Cu}_3\text{P}$  on gas diffusion electrode after scanned between 0.4 and 0.8 V vs. RHE for 1000 cycles, the results for pristine materials were shown in grey for easier comparison.



**Figure S5.** (a) XRD and (b) EDS results for  $\text{CuP}_2$  on carboncloth (cc) before HER, after HER and after ORR.