Supporting Information

Electric Field - Induced Phase Change in Copper Oxide Nanostructures

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1. Copper oxides nanostructures by EFA-PLAL

Copper (Cu) is a transition metal known to mankind since 9000 BC. Its name was derived from the Latin term “cuprum”, meaning “metal of Cyprus” because Cyprus, an island located in the Eastern Basin of the Mediterranean Sea, was a famous source of Cu at that time [1]. Nowadays, Chile, Peru, China, the Democratic Republic of Congo, and the United States are the world's largest

Cu producers. With the United States being the fifth largest Cu producer in the world, the production came close to an estimate of nearly 1.2 million metric tons in the year 2020 alone [2]. It is one of the most abundant metals on Earth. Cu is not a noble metal consequently; it gets easily oxidized into cupric oxide (CuO) or cuprous oxide (Cu_2O).

In order to create CuO or Cu_2O at the nanoscale, we used the EFA-PLAL protocol. As shown, on Figure S1, the EFA-PLAL protocol is very efficient to boost the concentration of Cu_xO NSs compared to a regular PLAL protocol.

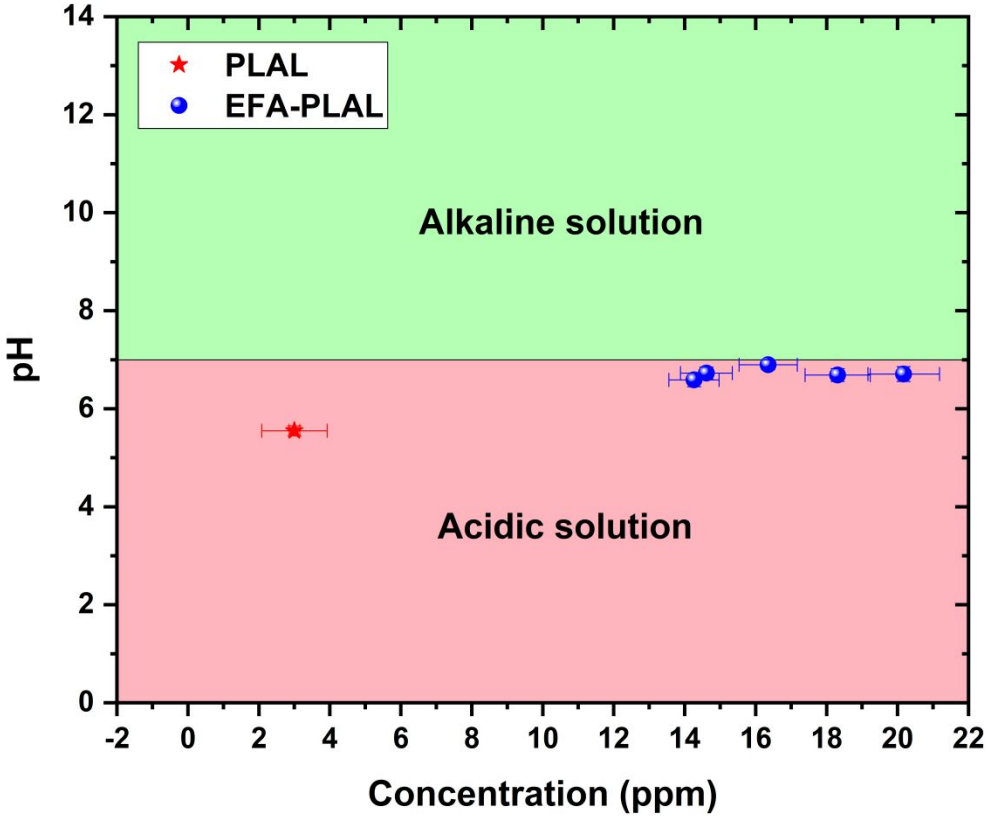

Figure S1. pH versus the concentration of the CuxO NSs within the colloid.

2. SEM characterization

To perform SEM analysis, a droplet of the colloidal solution was deposited onto a silicon wafer and dried in an environmentally controlled glove box. Figure S2 shows some Cu_xO NSs observed under an SEM.

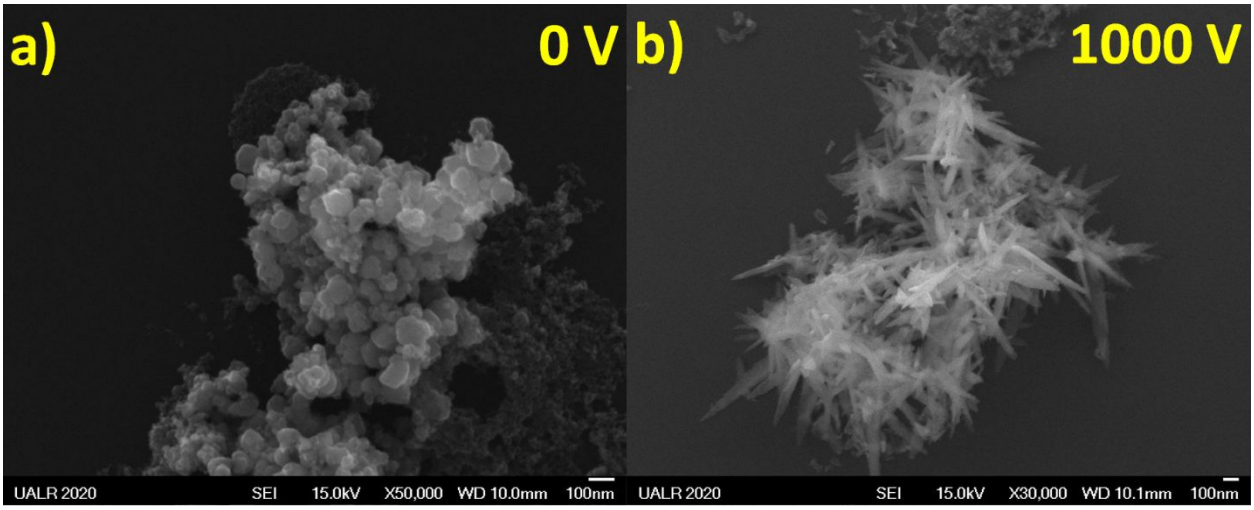

Figure S2. SEM images of the CuxO NSs synthesized by EFA-PLAL @ **a)** 0V and **b)** 1000V.

References

1. https://www.rsc.org/periodic-table/element/29/copper.
2. Flanagan, D. M., Copper. *U.S. Geological Survey, Mineral Commodity Summaries* **2021**.