

## Synthesis and characterization of high aspect Copper Nanowires

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### Highlights

High aspect Copper Nanowires synthesis by polyol method; potential material to be applied in transparent conductive films.

### Resumo/Abstract

Copper nanowires (CuNWs) are one-dimensional materials with excellent optical, electrical and mechanical properties. For this reason, they have gained attention to scientific community due to their applications possibilities, as optoelectronic devices.<sup>1</sup> In particular, copper is a very good candidate for commercial applications because of their high abundance and low cost, compared to silver, for example, that is the most used and studied metal for this kind of application. CuNWs can be obtained by different methods from the metallic precursor reduction, followed by the nucleation and growth. In this process, a surfactant is used as a capping agent to stabilize the nanostructures and a reducing agent to reduce the copper ions. Here, we present the synthesis of CuNWs using ethylene glycol (EG) as reducing agent, oleylamine and NaBr as capping agents, that adsorbs preferentially on {100} plane of copper, favoring the growth in [110] of nanowires,<sup>2</sup> as could be checked by XRD data and the peaks at 43°, 50° and 74° that correspond to the (111), (200) and (220) planes of Cu-fcc. The CuNWs were also observed by high resolution transmission electron microscopy (HRTEM) and it was possible to see the wires crystallinity and the amorphous region surrounding the structures. Uv-vis absorption spectra show a characteristic peak in 385 nm that can be attributed to the plasma resonance of CuNWs. Otherwise, there was identified the presence of copper oxide (Cu<sub>2</sub>O) by XRD, suggesting that the reduction was not complete. The morphology was analyzed by scanning electron microscopy (SEM) and atomic force microscopy (AFM) where very long and thin structures could be observed. The CuNWs synthesized by salt-assisted polyol method are a very good candidate to be applied in transparent conductive films.

### References

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