

# Effect of Cu Doping on The Structural and Optical Properties of Zirconia Nanopowders Synthesized via Non-Aqueous Sol-Gel route

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## Abstract

In this study, we have utilized the sol-gel technique for the synthesis of Cu doped zirconia powder series using copper (II) nitrate trihydrate as the dopant precursor (1, 3 and 5 mol%) and Zirconium (IV) propoxide as the zirconia precursor (fig.1). The synthesized powders were annealed at a temperature of 500°C for 5 hours. The powder samples were examined for the structural and optical properties via various characterization techniques. The phase structure and crystallinity were validated by the X-ray diffraction and it was concluded that the host zirconia is primarily in tetragonal phase [JCPDS; 00-081-1544, tetragonal, space group 137: P4<sub>2</sub>/nmc]. Field emission scanning electron microscopy was carried out to study the morphology complemented by the Energy-dispersive X-ray spectroscopy for the elemental composition of the samples. UV-Vis analysis and the corresponding Tauc plots revealed the impact of doping concentration on the optical band gap of the samples. The absorption bands were analyzed to observe the phenomenon called Localized surface plasmon resonance as the noble metal dopants like Au, Ag and Cu are known to cause strong light absorption band in the visible region [1,2].

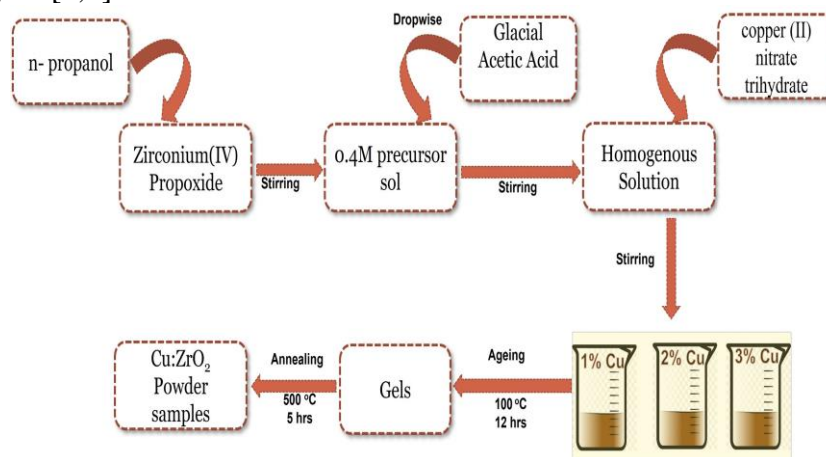


Fig. 1. Schematic representation of the synthesis of Cu doped zirconia nano powders (a) and rietveld refinement of undoped zirconia host validating tetragonal phase(b).

## References

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