

Short Communication

## Synthesis and Characterization of $\text{Al}_y\text{Cu}_{0.15}\text{Zn}_{0.85-y}\text{Fe}_2\text{O}_4$ Ferrite Prepared by the Sol-Gel Method

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Nano powder of zinc ferrite with the chemical formula  $\text{Al}_y\text{Cu}_{0.15}\text{Zn}_{0.85-y}\text{Fe}_2\text{O}_4$  ( $y = 0.15, 0.30, 0.45, 0.60, 0.75$ ) was synthesized by the sol-gel/auto combustion technique. The average crystallite size was found to be in the range of 28.82–42.27 nm, and the lattice constant decreased from 8.3958 to 8.2966 Å, while the density increased from 5.271 to 5.386 g/cm<sup>3</sup> with increasing Al content. The dielectric loss factor ( $\epsilon''$ ), dielectric constant ( $\epsilon'$ ) and AC electric conductivity ( $\sigma_{a.c}$ ) were studied, and it was found that ( $\epsilon'$ ) and ( $\epsilon''$ ) decreased with increasing frequency, while the behavior of conductivity was the opposite. It was also found that there was a variation in the behavior of ( $\epsilon'$ ), ( $\epsilon''$ ) and ( $\sigma_{a.c}$ ) based on Al content, and the highest values were found for the sample with an Al content of  $x = 0.3$ .

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**Keywords:** Al-Zinc ferrites, Nanoferrite, XRD, SEM, EDX, Dielectric properties.

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