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Effect of Copper Substitution on the Structural, Magnetic, and Electrical Properties of NiZn Ferrites

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Abstract: NiCuZn ferrites were synthesized using the auto-combustion method, a self-propagating process involving metal nitrates and glycine. This study investigates the structural, magnetic, and electrical properties of the resulting ferrites. X-ray diffraction analysis revealed that the crystallite size of the NiCuZn ferrites was below 120 nm. The ferrite exhibited a single-phase cubic spinel structure after calcination at 600°C and sintering at 900°C, demonstrating typical ferrimagnetic behavior. Both NiZn and NiCuZn ferrite compositions displayed a polycrystalline structure with a space group number of 227. The saturation magnetization of the NiCuZn ferrites was approximately 70 emu/g, consistent with published values. Additionally, the ferrite compositions showed high electrical resistivity, reaching 10⁶ Ω -cm. These findings suggest that the synthesized ferrites, with their high electrical resistivity and substantial saturation magnetization, are well-suited for use in the fabrication of multilayer chip inductors (MLCI)..

Keywords: NiCuZn ferrite, Auto-combustion method, magnetization, XRD

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