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Nickel (Ni2+) Substituted Cu0.25Co0.25Mg0.5-xNixCe0.03Fe1.97O4 spinel ferrites synthesized via Sol-gel auto combustion (SGAC) route are the future of business

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The sol-gel auto-combustion (SGAC) route was used to prepare the Cu0.25Co0.25Mg0.5-xNixCe0.03Fe1.97O4[Ni-CCMCF] (0.0≤x ≤ 0.5 with the step interval of 0.125) spinel ferrites (SFs). The formation of a single-phase spinel matrix was observed by X-ray diffraction (XRD) analysis. Moreover, the sharp peaks of XRD spectra confirmed the high crystallinity of the as-prepared spinel ferrites. The crystallite size (D) was reduced from (57.33–10.51) ± 0.05 nm and for the pure CCMCF sample, the specific surface area was 20.36m2/g. The variation absorption bands at tetrahedral and octahedral sites along five Raman modes in Raman spectra were also confirmed in the spinel matrix of the Ni-CCMCFsamples. The optical bandgap increased from 0.87 eV to 1.68 eV was observed with the replacement of dopant ions. Furthermore, the minimum resistivity was observed both in Ferro and para regions for the pure CCMCF sample. The tangent loss and dielectric constant were reduced, but conductivity was enhanced with increasing frequency and all the dielectric parameters have a minimum value for the pure CCMCF sample. Therefore, due to the low tangent loss of the pure CCMCF sample that will be used for high resonant frequency applications and electronics, we concluded that these materials are the future of the industry.

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