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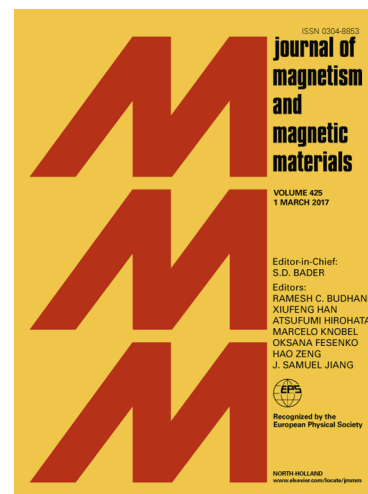
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Effect of *d*-block element Co²⁺ substitution on structural, Mössbauer and Dielectric properties of spinel copper ferrites

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Abstract: The present work focuses on the influence of replacement of *d*-block element Cu²⁺ ion by Co²⁺ in Cu-spinel ferrites [Cu_{1-x}Co_xFe₂O₄ ($x = 0.0, 0.1, 0.2, 0.4, 0.6$, and 1.0)] on the structural, vibrational and dielectric properties as synthesized by Solid-state reaction route. A structural transition from tetragonal (space group *I41/amd*) to cubic (space group *Fd3m*) phase is observed due to introduction of cobalt. Cubic spinel- type structure at room temperature of Cu_{1-x}Co_xFe₂O₄ ($0.4 \leq x \leq 1.0$) is confirmed by Rietveld – refined X-ray powder diffraction patterns. Raman spectroscopic studies reveal 2 (5) optical active modes in CuFe₂O₄ (CoFe₂O₄) at room temperature. Transmission Mössbauer spectroscopy of Cu_{1-x}Co_xFe₂O₄ ($x = 0.0, 0.2$ and 0.6) shows two sets of six-line hyperfine patterns for all the three samples, indicating the presence of Fe in both *A* and *B* sites. Identification of sites is accomplished by evidence from hyperfine distribution and isomer-shift data. Dielectric constant and dielectric loss tangent measured in the frequency range from 1 KHz to 1 MHz at room temperature are found to be decreasing with the increase in frequency.

Keywords: Ferrite; X - ray diffraction; Rietveld refinement; Raman; Dielectric

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