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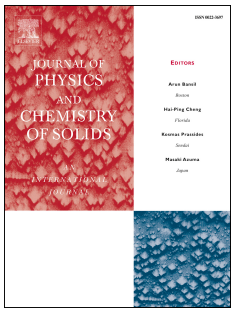

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ABSTRACT

In this study, indium (In^{3+})-substituted NiCuZn nanostructured ceramic ferrites with a chemical composition of $Ni_{0.5}Cu_{0.25}Zn_{0.25}Fe_{2-x}In_xO_4$ ($0.0 \leqslant x \leqslant 0.5$) were prepared by chemical synthesis involving sol–gel chemistry. Single phased cubic spinel structure materials were prepared successfully according to X-ray diffraction and transmission electron microscopy analyses. The dielectric properties of the prepared ferrites were measured using an LCR HiTester at temperatures ranging from room temperature to 300°C at different frequencies from 10^2 Hz to 5×10^6 Hz. The variations in the dielectric parameters ε' and tan δ with temperature demonstrated the frequency- and temperature-dependent characteristics due to electron hopping between the ions. The materials had low dielectric loss values in the high frequency range at all temperatures, which makes them suitable for high frequency microwave applications. A qualitative explanation is provided for the dependences of the dielectric constant and dielectric loss tangent on the frequency, temperature, and composition. Mössbauer spectroscopy was employed at room temperature to characterize the magnetic behavior.