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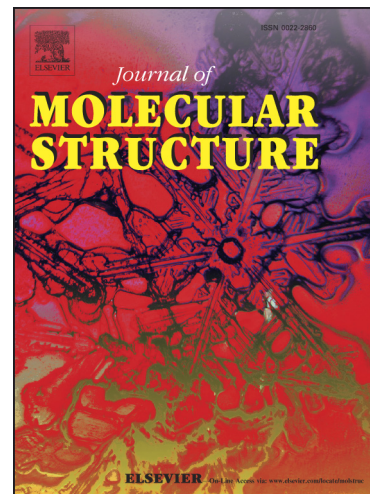
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**Electric, dielectric and ac electrical conductivity study of nanocrystalline cobalt substituted
Mg-Mn ferrites synthesized via solution combustion technique**

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Abstract

Nanosized cobalt substituted Mg-Mn ferrites with a chemical composition $\text{Mg}_{0.9}\text{Mn}_{0.1}\text{Co}_x\text{Fe}_{2-x}\text{O}_4$ ($x = 0.0, 0.1, 0.2 \text{ \& } 0.3$) were synthesized for the first time by solution combustion technique. X-ray diffraction (XRD) technique was used to confirm the phase formation and it revealed the formation of single phase cubic spinel structure. The surface morphology of samples was studied by using scanning electron microscopy (SEM). The dc resistivity of nanoferrites was studied as a function of temperature which indicates the semiconducting nature of nanoferrites. The dielectric properties such as dielectric constant and dielectric loss have been investigated as a function of frequency and temperature. The dielectric constant and dielectric loss were found to increase with an increase in temperature whereas with an increase in frequency both are observed to decrease. AC electrical conductivity was found to increase with an increase with frequency and temperature. Impedance spectroscopy technique was used to study the effect of grain and grain boundary on the electrical properties of the prepared samples. A very low value of dielectric loss even at high frequencies and high value of dc resistivity ($10^8 \text{ } \Omega\text{-cm}$) are the cardinal achievements of the present work which make these nanoferrites suitable for microwave applications.

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