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Structural and magnetic study of  $Mn_{0.5}Zn_{0.5}Cu_xFe_{2-x}O_4$  nanoferrites synthesized via solution combustion method

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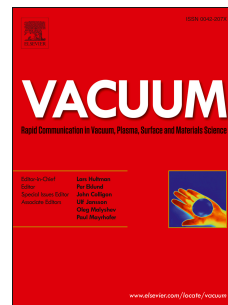
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**Structural and magnetic study of  $Mn_{0.5}Zn_{0.5}Cu_xFe_{2-x}O_4$  nanoferrites synthesized via solution combustion method**

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**Abstract**

In the present work,  $Mn_{0.5}Zn_{0.5}Cu_xFe_{2-x}O_4$  ( $x = 0.0, 0.1, 0.2$  &  $0.3$ ) nanoferrites have been synthesized via solution combustion technique. X-ray diffraction (XRD), vibrating sample magnetometer (VSM) and Mössbauer spectroscopy techniques have been employed to explore the structural, cation distribution and magnetic behaviour of the synthesized nanoferrites. Rietveld refined XRD confirmed the cubic spinel phase of the nanoferrites with  $Fd3m$  space group. A reduction in particle size (51-40 nm) has been observed with the addition of copper ions. The Nelson–Riley plots have been used to estimate the lattice parameter and the same has been observed to increase (8.40-8.46 Å) with the increasing substitution of copper content. The addition of copper ions has been observed to decrease the saturation magnetization (0.89-0.76 emu/g) and magnetic hyperfine field. Magnetization method has been used to predict the distribution of cations. The distribution of cations has been further utilized to investigate various structural parameters.

*Key words:* Nanoferrites; X-ray diffraction; Mössbauer spectroscopy; Cation distribution; Bond lengths.

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