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X-Ray Diffraction and Structural Study of $Cu_{0.7+x}$ $Cd_{0.3}Zr_xFe_{2-2x}O_4$ (x = 0.1) Mixed Spinel System

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Abstract: *The crystal structure and lattice parameters of the Cu and Fe co-substituted disordered spinel series* $Cu_{0.7+x}$ $Cd_{0.3}Zr_x$ $Fe_{2-2x}O_4$ *are investigated by means of X-ray diffraction (XRD) at room temperature(300K) and SEM results. The crystalline ferrite has been prepared by a modified Sol-Gel method. The analysis of XRD pattern suggests that the prepared* $Cu_{0.7+x}$ $Cd_{0.3}Zr_x$ $Fe_{2-2x}O_4$ *(x = 0.1) spinel ferrite possesses single phase cubic spinel structure. The intense peaks of the XRD pattern were used to determine the average crystalline size. The crystalline size obtained from XRD data using Scherrer formula is of the order of ~0.5nm. So far no one has reported any crystalline size smaller than 0.5 nm. The calculations from SEM results agreed within the limits. In present work the lattice parameter, particle size, lattice strain and studied with the different concentrations (x = 0.1 to 0.4). The results were compared with ceramically prepared samples.*

Keywords: X-ray diffraction, lattice constant, Sol-gel technique; Nanoparticle; SEM

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