Influence of Ce^{+3} co-substitution on the structure and electric properties of $Zn_{0.5}Mn_{0.43}Cd_{0.07}Fe_{2-y}Ce_yO_4$ ferrites

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The separation techniques are uniquely physical in nature and operate without the usage of heat and thus utilizing least energy as compared to the orthodox thermal separation methods. In this research work we have analyzed the role of substitution of Ce on the electric behavior and structure properties of Cadmium doped Mn Zn ferrites. Series of $Zn_{0.5}Mn_{0.43}Cd_{0.07}Fe_{2-y}Ce_y O_4$ (x=0.0, 0.1, 0.2, 0.3, 0.4, 0.7) was synthesized by coprecipitation technique. The synthesized particles were sintered at 900^0C. XRD analysis showed that particles have cubic spinel structure. Crystallite size lied in the range 46.4 nm-53.5 nm calculated by the Scherrer formula. Crystallite size, lattice constant and x-ray density were found directly affected by concentration of RE^{3+}. By using two probe method IV properties were studied at different temperatures. It was observed that resistivity of synthesized nanoparticle increases by increasing concentration of Ce and temperature. The value of electrical resistivity lied in the range ~10^9 Ω cm to ~10^{10} Ω cm. Activation energy of these nanomaterials lies in the range of 1.04 - 2.73. Activation energy decreases with the increase in concentration of x. These characteristics made these particles promising candidates for high frequency applications.

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