

Structural and Magnetic Properties of $\text{CoFe}_{2-x}\text{Nd}_x\text{O}_4$ Spinel Ferrite Nanoparticles

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Abstract : In this present work, $\text{CoFe}_{2-x}\text{Nd}_x\text{O}_4$ ($0.0 \leq x \leq 0.1$) spinel ferrite nanoparticles were synthesized by starch-assisted sol-gel auto-combustion method. Powder X-ray diffraction patterns were revealed the formation of cubic spinel ferrite with the signature of NdFeO_3 phase at higher Nd^{3+} concentration. The field emission scanning electron microscopy study demonstrated the spherical nanoparticle in the size range between 5-15 nm. Raman and Fourier Transform Infrared spectra supported the formation of the spinel ferrite structure in the nanocrystalline form. The X-ray photoelectron spectroscopy (XPS) analysis confirmed the presence of Co^{2+} and Fe^{3+} at octahedral as well as a tetrahedral site in $\text{CoFe}_{2-x}\text{Nd}_x\text{O}_4$ nanoparticles. The change in magnetic properties with a variation of concentration of Nd^{3+} ions in cobalt ferrite nanoparticles was observed.

Keywords : nanoparticles, spinel ferrites, sol-gel auto-combustion method, $\text{CoFe}_{2-x}\text{Nd}_x\text{O}_4$

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