

6th World Congress on Nanomaterials

January 13, 2022 | Webinar

Structural and Magnetic Properties Analysis of Trivalent Al³⁺ - Doped Ni-Zn-Co Nano-Spinel Ferrites

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The present study explored the structural, morphological, optical, and magnetic properties of Ni_{0.4}Zn_{0.35}Co_{0.25}Fe_{2-_x}Al_xO₄ (0 ≤ x ≤ 0.12) nano-spinel ferrites. Thermogravimetric analysis and differential scanning calorimetry (TGA-DSC) determined nanocrystalline cubic structure formation. Single-phase cubic spinel structures with Fd3m space group of synthesized samples confirmed by Rietveld refinement X-ray diffraction (XRD) data. The particle sizes ranged from 6.7 nm-5.25 nm, and agglomeration occurred inside the ferrite samples. The atomic planes and strong crystallinity were detected through selected area electron diffraction (SAED) images. The existence of metal-oxygen (M-O) bonding was identified by the Raman spectra' characteristic peaks inside the sub-lattices. The optical bandgaps (E_g) were found 2.1

eV–2.52 eV for all the samples. Superparamagnetic natures of the nano samples were conformed through the S-shape hysteresis(M -H) loops. The studies' outcomes indicated the applicability for biomedical applications of these nano samples.

Speaker Biography

Nusrat Jahan is a PhD student in the Department of Physics, Jahangirnagar University. She is conducting her PhD research in Material Science and Nanotechnology. She was completed her MSc and BSc from the University of Dhaka. She is working at the American International University Bangladesh as an Assistant Professor. She published three articles from her PhD research in three International peers reviewed journals. She is a member of the American Chemical Society (ACS).

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