Ho3+ substitution on the structural and magnetic proeprties of LiFe2O4 ferrite nanoparticles

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Abstract:

Ho3+ doped Ferrite nanoparticles of Li0.5Fe2.5-xO4 system were prepared by sol-gel auto-combustion technique. The as-prepared samples were characterized by X-ray diffraction (XRD) and SEM. XRD analysis confirms the cubic spinel structure with appearance of secondary phase due to presence of Ho3+ ions for the samples (0.0≥ x≥0.1). The lattice parameter increases with increase in Ho3+ ions which replaces Fe3+ ions and found in the range 8.2929 Å to 8.3389 Å. Crystalline size was estimated from XRD data and it was found in the 21- 29 nm range. Cation distribution obtained from XRD analysis suggests the strong preference of Ho3+ ions towards octahedral – B site while Li+ and Fe3+ ions distributed over both A-and B-sites. An infrared spectrum shows two main bands 1 and 2 around 300 and 600 cm-1. SEM images confirm the crystalline form of samples and, EDAX patterns confirm the atomic percentage of constituent elements with their weight proportions. Dielectric response of the samples show that the samples show Maxwell-Wagner type of interfacial polarization which follows Koop's phenomenological theory of dielectric relaxation. The dielectric properties decrease with increasing substation and shows low dielectric loss which makes samples best choice for the energy storage devices. The room temperature magnetic properties like saturation magnetization, coercivity and remanence ratio are studied by using vibrating sample magnetometer. M-H loops, shows that the saturation magnetization (MS) increases with increase in Ho3+ concentration having high magnetic moment.

Biography:

Khalid Mujasam Batoo had research and teaching experience of more than 9 years excluding Ph.D. Worked as an Assistant Professor at King Abdullah Intitule for Nanotechnology from 2010 to 2015. He Worked as a Project

Fellow at Inter-University Accelerator University Center, New Delhi, India from 2007 to 2010. I am having 3 years of experience in usage of Swift Heavy Ion (SHI) irradiation technique using the 15UD-Pelletron facility in order to tune the properties of the powder and thin-film materials by irradiation of SHI beams and their characterization such as structural, transport electrical and magnetic and optical properties with respect to the pristine sample.

Publication of speakers:

1. Structure and electrical properties of Co0. 5CdxFe2. 5 xO4 ferrites; AMM Farea, S Kumar, KM Batoo, A Yousef, CG Lee
2. Synthesis and characterization of nano-sized pure and Al-doped lithium ferrite having high value of dielectric constant; MA Dar, KM Batoo, V Verma, WA Siddiqui, RK Kotnala
3. Hydrothermal synthesis of CoyZnyMn1-2yFe2O4 nanoferrites: magneto-optical investigation; S Asiri, M Sertkol, S Guner, H Gungunes, KM Batoo, TA Saleh, H Sozeri
4. Study of dielectric and impedance properties of Mn ferrites; KM Batoo
5. Influence of Al doping on electrical properties of Ni–Cd nano ferrites; KM Batoo, S Kumar, CG Lee.

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