

Study and Characterisation of Some Hexa-Ferrite Systems

Nano particles of Strontium hexaferrite, $\text{SrFe}_{12}\text{O}_{19}$ were synthesized by using different chemical routes. The effect of surface active agents (SURFACTANTS) on the morphology of hexaferrites has been studied. The role of annealing temperature on the formation of Sr-M has been studied. Composite series of $\text{SrFe}_{12}\text{O}_{19}$ and CoFe_2O_4 were prepared using an SHS (Self propagation High temperature Synthesis) route. An irradiation with 200 MeV, Ag^{16+} swift heavy ions is performed on few synthesized ferrite samples. All these samples were characterized in order to investigate structural, magnetic and dielectric properties. The results reveal that the best synthesis route to achieve nano-sized homogeneous particles at lower sintering temperature is a Microemulsion route. Another versatile technique to produce ultrafine homogeneous hexaferrite nanoparticles with pure phase is Self propagation High temperature Synthesis (SHS) route. The advantages of this method are: low processing cost, energy efficiency and high production rate. The magnetic properties of hexaferrites synthesized by this route, found to be improved compared to the products of other methods. The composites of $\text{SrFe}_{12}\text{O}_{19}$ and CoFe_2O_4 made with different weight ratios. The exchange interactions between hard and soft magnetic phases improve magnetic and dielectric properties with change in the parameters, H_c and σ_s . The Swift Heavy Ion irradiation enhances the dielectric properties of the hexaferrites. Due to the modifications in surface states of the nano ferrites induced by SHI irradiation, increases the saturation magnetization of prepared hexaferrites.