**Abstract**

 Nano-structured materials are now being studied intensively due to their novel physicochemical properties. Applications of gas sensors have been growing at a consistent pace in the recent years. The mixed-metal oxide gas sensors offer advantages over other gas sensors devices due to their simple implementation, low cost and good reliability for real time control systems. To search for new good gas-sensing materials and the new properties of conventional materials has become an active research field. Among different ferrites, magnesium ferrite enjoys a special attention because of its vast applications in high density recording media, heterogeneous catalysis, adsorption, sensors and magnetic technologies. Also the technological importance of cobalt ferrite has motivated several studies on the synthesis as well as the physical properties of this material. Hence an attempt is made to synthesize cobalt doped magnesium ferrite nanoparticles by co-precipitation method. Magnesium chloride [MgCl2.6H2O], Cobaltous Chloride [CoCl2.6H2O], anhydrous Ferric Chloride [FeCl3] along with sodium hydroxide [NaOH] is used as raw materials. Magnesium-Cobalt ferrite sample annealed at 130○C, 600○C and 900○C are subjected to X-ray diffraction to calculate the average nano-crystalline size using Debye – Scherrer formula. The FT-IR spectra of the samples are recorded to ensure the presence of the metallic compounds. The morphological analysis of the sample is studied using Scanning Electron Microscope (SEM). The magnetic properties of the cobalt doped magnesium ferrite nano particles are studied using Vibrating Sample Magnetometer (VSM). These samples can be tested for gas sensing applications.