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## Comparative Study Of The Structural And Magnetic Properties Of Magnesium Ferrite Prepared By Ceramic And Sol-Gel Auto Combustion Technique

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### ABSTRACT

Magnesium ferrite ( $MgFe_2O_4$ ) in bulk and nanocrystalline form has been synthesized by standard ceramic and sol-gel auto combustion method respectively. X-ray diffraction (XRD), scanning electron microscopy (SEM) and pulse field hysteresis loop technique were employed to investigate structural and magnetic properties. The X-Ray diffraction pattern of bulk and nano size Mg ferrite indicates that the bulk sample shows sharp and intense Bragg's reflection whereas nano size samples show slightly broader Bragg's reflection. The analysis of X-ray diffraction pattern revealed the formation of single phase cubic spinel structure for both the samples. The particle size evaluated using Scherrer's formula confirms the bulk and nanocrystalline nature of the prepared magnesium ferrite. The scanning electron microscopy technique proves the nanocrystalline nature of the sol-gel prepared magnesium ferrite. The bulk magnesium ferrite requires high sintering temperature of the order of 1050 °C whereas nano size Mg ferrite is sintered at sufficiently low temperature i.e. 600 °C. The sintering temperature affects the physical properties of magnesium ferrite as evidenced from the X-ray density, bulk density and porosity values. A comparative study of the structural and magnetic properties of bulk and nano size magnesium ferrite is presented in this work.

**Keywords:** Magnesium ferrite, Nanocrystalline, Ceramic technique, Sol-gel auto combustion technique, Comparative study.

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