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SYNTHESIS OF $Mn_{0.5}Cu_{0.5}Fe_2O_4$ BY SOL-GEL AUTOCOMBUSTION METHOD

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Abstract. *Nanocrystalline $Mn_{0.5}Cu_{0.5}Fe_2O_4$ ferrite powders were successfully synthesized using the sol–gel autocombustion method, by using nitrates as cations source and cellulose and urea as chelating/fuel agents. Reaction advancement was observed by means of IR absorption spectroscopy, by monitoring two characteristic bands for the spinel compounds at around 550 and 400 cm−1, respectively. X-ray diffraction studies reveal the formations of single phase cubic spinel structure.*

Keywords: *Ferrites, Sol–gel method, Nanopowders, X-ray diffraction, Spinel structure.*

Introduction

Ferrites are advanced materials generally characterized by high magnetic permeability, high saturation magnetization and low power losses.

Magnesium ferrite ($MgFe_2O_4$) is one of the most important ferrites. It has a cubic structure of normal spinel-type. This ferrite is a soft magnetic n-type semiconducting material, which finds a number of applications in heterogeneous catalysis, adsorption, sensors, and magnetic technologies. (Verma et. al., 2004) Recently, nanostructures of magnetic materials have received more and more attention due to their novel material properties that are significantly different from those of their bulk counterparts. (Busca et al., 1996, Shimizu et al., 1985, Machera et al., 2002, Franco et al., 2009

Magnesium ferrite with diamagnetic substitution for Mg^{2+} and Fe^{3+} ions has attracted attention of a number of research workers who attempted to explain magnetic properties on the basis of the distribution of only magnetic ion Fe^{3+} in tetrahedral (A) and octahedral [B] sites, which makes the analysis reliable. (Chhaya et al., 2004)

Physical and chemical properties of magnesium ferrites substituted or non-substituted, depend upon the cation distribution, which in turn is a complex function of processing parameters and preparation method of the material. (Pavlovič et al., 2009)

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