

A novel rhombohedron-like nickel ferrite nanostructure: Microwave combustion synthesis, structural characterization and magnetic properties

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Abstract

Research on nickel ferrite nanostructures has drawn a great interest because of its inherent chemical, physical and electronic properties. In this study, we have synthesized rhombohedron - like nickel ferrite nanostructure by a rapid microwave assisted combustion method using ethylenediaminetetraacetic acid as a chelating agent. X-ray diffraction, Fourier Transform Infrared spectrometer, transmission electron microscope and energy dispersive X-ray microanalyser were used to characterize the prepared sample. The magnetic behaviour was analyzed by means of field dependent magnetization measurement which indicates that the prepared sample exhibits a soft ferromagnetic nature with saturation magnetization of 63.034 emu/g. This technique can be a potential method to synthesize novel nickel ferrite nanostructure with improved magnetic properties.

Keywords: Magnetic materials; Nanomaterials; Microwave synthesis; X-ray diffraction; TEM;

1. Introduction

The recent trends in materials research is shifting towards the nanotechnology which offers a unique approach to overcome the shortcomings of their conventional forms due to their large surface to volume ratio and quantum confinement effects [1,2]. Nickel ferrite nanoparticle have received much attention because it is very important group of magnetic nanomaterial due to its extensive applications in high density magnetic storage devices, gas sensors, telecommunication equipments, microwave devices, magnetic guided drug delivery,