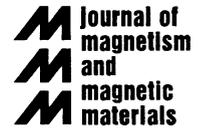




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Effect of precursor milling on magnetic and structural properties of $\text{BaFe}_{12}\text{O}_{19}$ M-ferrite

R. Martinez Garcia, E. Reguera Ruiz, E. Estevez Rams^{a,*}, R. Martinez Sanchez^b

^aLaboratory for Structural Analysis, IMRE, Universidad de La Habana, Facultad de Fisica, San Lazaro YL. CP 10400, Ciudad Habana, Cuba

^bLaboratory of Polymer, IMRE, Universidad de La Habana, Facultad de Fisica, San Lazaro YL. CP 10400, Ciudad Habana, Cuba

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Abstract

$\text{BaFe}_{12}\text{O}_{19}$ fine particles were synthesized after milling a precursor obtained as an intermediate in the sol–gel method. The samples were analyzed by X-ray diffraction, scanning electron microscopy and vibrating sample magnetometry. The milling process favors the formation of the BaM phase and therefore, provides a better specific magnetization and smaller grain size compared to the same preparation route but without the milling step. We report the magnetic and structural properties of the ferrite samples obtained from milled and non-milled precursors. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Sol–gel; Hexaferrite; Fine particles; Milling

1. Introduction

The hexagonal M-phase ferrite $\text{BaFe}_{12}\text{O}_{19}$ has been studied intensively for many years due to their importance as permanent magnets and high-density magnetic recording media among other applications [1,2]. Some of these technological applications require materials with a strict control of homogeneity, particle size and shape, which governs the magnetic behavior. The preparation method strongly determines its magnetic and structural properties.

The most used method for the preparation of barium ferrite in industrial and technical application is the ceramic method which results in a mater-

ial that is inhomogeneous at a microscopic scale [3].

The sol–gel technique has emerged as a new method for synthesizing barium ferrite [4,5]. In the sol–gel technique the obtained particles exhibit a fine grain size in the nanometer range with a narrow size distribution. Single-phase barium ferrite powder can be produced in a short time by this technique.

In this paper we report the influence of milling an intermediate precursor obtained by the sol–gel method on the final structural, and magnetic properties of $\text{BaFe}_{12}\text{O}_{19}$ fine particles powder.

2. Experimental

A precursor of barium hexaferrite was prepared by the sol–gel method using ethylene glycol as

* Corresponding author. Fax: + 53-11-537-707666.

E-mail address: estevez@lae.ff.oc.uh.cu (E. Estevez Rams).