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Structural characterization of low temperature synthesized $SrFe_{12}O_{19}$

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Abstract

$SrFe_{12}O_{19}$ fine particles were synthesized by the sol–gel method and heat treatment was carried out in oxygen-controlled atmosphere. $SrFe_{12}O_{19}$ hexaferrite was obtained at 250°C. The effect of the $SrCO_3$ phase hindering the synthesis of the hexaferrite in air atmosphere at lower temperatures is analyzed. The samples were studied by infrared spectroscopy and X-ray diffraction. The morphology of the samples was analyzed by transmission electron microscope (TEM). Grain size was determined by X-ray diffraction.

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1. Introduction

The sol–gel method has been already established as an alternative route for ferrite production. This method allows the preparation of $SrFe_{12}O_{19}$ hexaferrite with magnetoplumbite structure (M-ferrite) with high crystalline perfection and small particle size, resulting in favorable properties for several technological applications [1,2].

An intermediate product of the sol–gel method is an organometallic gel with Fe^{3+} and Sr^{2+} ions. This gel is submitted to heat treatment, in order to obtain $SrFe_{12}O_{19}$ M-ferrite powder. The traditional heat treatment is made at 1050–1100°C for 5–10 h in air atmosphere. Zhong et al. [2] reported the beginning of the hexaferrite formation at 650°C and the completion of the phase transition of the precursor to the M-ferrite at 1050°C.

In this paper, we report the synthesis of $SrFe_{12}O_{19}$ M-ferrite at 250°C after heat treatment under oxygen flux. We discuss the role of controlled atmosphere in the synthesis procedure and the structural properties of the resulting powder. Magnetic measurements will be reported elsewhere.

2. Experimental

The samples were prepared using the sol–gel method [2,3]. Suitable amount of $Fe(NO_3)_3$ was dis-

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