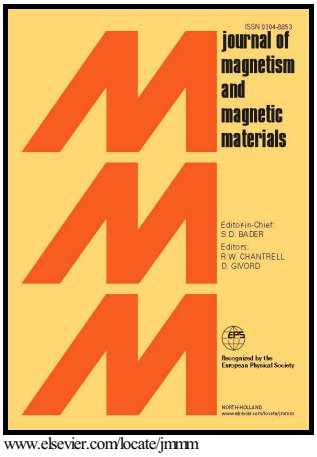

www.elsevier.com/locate/jmmm

Magnetodielectric coupling in multiferroic holmium iron garnets

M. Malar Selvi, Deepannita Chakraborty, C. Venkateswaran

PII: S0304-8853(16)32111-4
DOI: http://dx.doi.org/10.1016/j.jmmm.2016.09.039
Reference: MAGMA61820

To appear in: *Journal of Magnetism and Magnetic Materials*

Received date: 18 April 2016
Revised date: 1 September 2016
Accepted date: 7 September 2016

Cite this article as: M. Malar Selvi, Deepannita Chakraborty and C Venkateswaran, Magnetodielectric coupling in multiferroic holmium iron garnets *Journal of Magnetism and Magnetic Materials* http://dx.doi.org/10.1016/j.jmmm.2016.09.039

Magnetodielectric coupling in multiferroic holmium iron garnets

M. Malar Selvi, Deepannita Chakraborty and C. Venkateswaran*

Department of Nuclear Physics, University of Madras, Guindy Campus, Chennai- 600 025.

**E-Mail: cvunom@hotmail.com*

Abstract

Single phase magneto-electric multiferroics require a large magnetic or electric field for producing magneto-electric (ME) and magnetodielectric (MD) effects. For utilizing these effects in devices investigations on the room temperature and low field MD studies are necessary. Recently, efforts have been largely devoted to the investigation of rare earth iron garnets. In the physical method, the preparation of rare earth iron garnet requires high sintering temperature and processing time. To solve these problems, ball milling assisted microwave sintering technique is used to prepare nanocrystalline holmium iron garnets ($Ho_3Fe_5O_{12}$). Magnetic and dielectric properties of the prepared sample are investigated. These properties get enhanced in nanocrystalline form when compared to the bulk. The MD coupling of the prepared sample is evident from the anomaly in the temperature dependent dielectric constant plot and the ME coupling susceptibility is derived from the room temperature MD measurements.

Keywords

Ferrites; milling; dielectric properties; magnetic properties and materials; Electric impedance measurement.

1. Introduction

Multiferroic materials having more than one fundamental ferroic (magnetic, electric, elastic and toroidic) orders can be used in multifunctional devices and for the miniaturization of electronic components [1-7]. Among the above four orders, magnetic and electric orders have their own significance. The coupling between magnetic and electric orders, give a new property known as the