Accepted Manuscript

Structural and magnetic properties of frustrated $Ga_xMn_{(3-x)}O(1.2 \leq x \leq 1.6)$ spinels

B. Mehdaoui, R. Moubah, B. Orayech, M. Bahout, O. Peña, M. Jáuregui, D. Saurel, A. El Bouari

PII: S0925-8388(18)31032-6

DOI: 10.1016/j.jallcom.2018.03.164

Reference: JALCOM 45394

To appear in: *Journal of Alloys and Compounds*

Received Date: 14 December 2017

Revised Date: 22 February 2018

Accepted Date: 12 March 2018

Please cite this article as: B. Mehdaoui, R. Moubah, B. Orayech, M. Bahout, O. Peña, M. Jáuregui, D. Saurel, A. El Bouari, Structural and magnetic properties of frustrated $Ga_xMn_{(3-x)}O(1.2 \leq x \leq 1.6)$ spinels, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.03.164.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Structural and magnetic properties of frustrated $Ga_xMn_{(3-x)}O(1.2 \leq x \leq 1.6)$ spinels

B. Mehdaoui[a,b,*], R. Moubah[c], B. Orayech[d], M. Bahout[b], O. Peña[b], M. Jáuregui[d], D. Saurel[d], A. El Bouari[a]

[a]*LPCMA, Faculté des Sciences Ben M'Sik, Université Hassan II de Casablanca, B.P 7955, Casablanca, Morocco*
[b]*Institut des Sciences Chimiques de Rennes, UMR 6226, Université de Rennes 1, 35042 Rennes, France*
[c] *LPMMAT, Faculté des Sciences Ain Chock, Université Hassan II de Casablanca, B.P. 5366 Casablanca, Morocco*
[d]*CIC Energigune, Albert Einstein 48, 01510 Miñano, Alava, Spain*
[*]*Corresponding author: boubker.mehdaoui@gmail.com*

ABSTRACT

We report a systematic study of the structural and magnetic properties of frustrated compounds of $Ga_xMn_{(3-x)}O_4$ ($1.2 \leq x \leq 1.6$) prepared by solid-state reaction. Using Rietveld refinement of X-ray diffraction patterns and O'Neill-Navrotsky model, we demonstrate that the system $Ga_xMn_{(3-x)}O_4$ ($1.2 \leq x \leq 1.6$) is an inverse spinel with low inversion parameter, in which Ga^{3+} replaces Mn^{3+} cations located in B-sites. The inverse magnetic susceptibility, the shape of ZFC/FC magnetization curves at low temperatures, the existence of hysteresis in all compounds, the frustration parameter and the spontaneous magnetization analysis show that the compounds with x = 1.2-1.4 exhibit a non-collinear ferrimagnetic order and the compounds with x = 1.5-1.6 exhibit a frustrated non-collinear ferrimagnetic order. Spin wave stiffness parameters were determined for each composition using the fitting results of spontaneous magnetization curves. It is demonstrated that for the compounds x = 1.2 - 1.4 with a non-frustrated ferrimagnetic order, the change of spontaneous magnetization Ms(T) obeys to Bloch's law ($T^{3/2}$). For x = 1.5 - 1.6, the compounds exhibit a frustrated ferrimagnetic order, and the Ms(T) shows a deviation from Bloch's law.

Keywords: Spinel, Cation distribution, Ferrimagnetism, Magnetic frustration, Spin wave Stiffness parameter.

1. Introduction

Magnetic spinels with general formula AB_2O_4 are a large class of oxides with remarkable magnetic properties which make them interesting for both the fundamental and technological

Download English Version:

https://daneshyari.com/en/article/7992420

Download Persian Version:

https://daneshyari.com/article/7992420

Daneshyari.com