Author's Accepted Manuscript

Characterization of magnetic phase in yttriumdoped polycrystalline $_{La1-x-yYyCaxMnO3}$ with x=0.05,0.33 and y=0.07 using dielectric and optical parameters

T.N. Ghosh, U.N. Nandi, D. Jana, Tapas Paramanik

ELEVIER	
PHYSICA	1
Recognized by the European Physical Society	CONDENSED MATTER
	Eden FR DE BOER PE BROARE LE BROARE L DOCHEMSEN
Available online at ScienceDirect www.sciencedirect.com	Intip://www.eduevias.com/socane/physio

 PII:
 S0921-4526(16)30572-5

 DOI:
 http://dx.doi.org/10.1016/j.physb.2016.12.005

 Reference:
 PHYSB309746

To appear in: Physica B: Physics of Condensed Matter

Received date: 3 January 2016 Revised date: 29 July 2016 Accepted date: 1 December 2016

Cite this article as: T.N. Ghosh, U.N. Nandi, D. Jana and Tapas Paramanik Characterization of magnetic phase in yttrium-doped polycrystallin $La_{1-x-yYyCaxMnO3}$ with x=0.05,0.33 and y=0.07 using dielectric and optica p a r a m et e r s, *Physica B: Physics of Condensed Matter* http://dx.doi.org/10.1016/j.physb.2016.12.005

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable 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

Characterization of magnetic phase in yttrium-doped polycrystalline $La_{1-x-y}Y_yCa_xMnO_3$ with x = 0.05, 0.33 and y = 0.07 using dielectric and optical parameters

T. N. Ghosh¹, U. N. Nandi^{2*}, D. Jana³ and Tapas Paramanik⁴

¹Department of Electronics, Vidyasagar University, Midnapore-721 102, West Bengal, India ^{2,*}Department of Physics, Scottish Church College, 1 & 3, Urquhart Square, Kolkata-700 006, India ³Department of Physics, University of Calcutta, 92, A P C Road, Kolkata - 700 009, India ⁴ Department of Condensed Matter Physics and Material Sciences

S. N. Bose National Centre for Basic Sciences, Block-JD, Sector-III, Salt Lake, Kolkata - 700106, India

*Corresponding author: E-mail:unphys@scottishchurch.ac.in and un_nandi@yahoo.co.in

Abstract

The dielectric permittivity of yttrium-doped polycrystalline samples $La_{1-x-y}Y_yCa_xMnO_3$ with x = 0.05, 0.33 and y = 0.07 has been measured at frequencies f from 20 Hz to 2 MHz and at temperatures T from 80 K to 350 K. These samples were prepared in the form of bulk polycrystals(ceramics) by solid state reaction method and characterized by X-ray diffraction technique. With the decrease in temperature, this system exhibits a phase transition from paramagnetic insulating to ferromagnetic metallic at a temperature $T_{MI} = 225 K$ for x = 0.05 and at 170 K for x = 0.33. In this report, it is shown that such phase transition can be characterized by the exponents obtained from the scaling analysis of the variation of the real and the imaginary part of the dielectric permittivity ϵ_1 and ϵ_2 and the loss factor $tan\delta$ as a function of frequency and temperature. Results are analyzed systematically from the existing theoretical models and the scaling formalism.

Keywords

Polycrystalline system, Dielectric properties, Scaling, Master curve, Exponent, Magnetic phase transition

PACS:75.47.Lx, 51.50.+v, 77.22.Gm

1. Introduction

Divalent cation doped polycrystalline $La_{1-x}Ca_xMnO_3$ shows a strong correlation between metallicity and ferromagnetism and a metal-insulator transition (MIT) at a temperature T_{MI} with a ferromagnetic metallic(FMM) ground state at lower temperature and paramagnetic insulating(PMI) state at high temperature [1]. The existence of FMM state is explained by doubleexchange (DE) mechanism based on the strong Hund coupling between t_{2g} and e_g electrons [2]. This transition temperature T_{MI} depends on the fraction of divalent cation x and the magnetotransport in such polycrystalline systems is mostly determined by the bond lengths and the bond angles of $Mn^{3+} - O - Mn^{4+}$. The substitution of smaller trivalent ion Y^{3+} (ionic radius=1.018A) Download English Version:

https://daneshyari.com/en/article/5492102

Download Persian Version:

https://daneshyari.com/article/5492102

Daneshyari.com