Influence of A-site substitution on ESR spectra of lanthanum manganite perovskites

Phan T.L., Tho N.D., Bau L.V., Phuc N.X., Yu S.C.

Department of Physics, Chungbuk National University, Cheongju, 361-763, South Korea; Center for Materials Science, Hanoi University of Science, 334 Nguyen Trai, Hanoi, Viet Nam; Institute of Materials Science, VAST, Caugiay, Hanoi, Viet Nam

Abstract: We studied electron spin resonance (ESR) spectra of $La_{0.7}A?_{0.3}MnO_3$ (A?=Sr, Ba, Pb, and Cd) perovskites in a large range of temperature, from their Curie temperature to ?500 K. Asymmetrical EPR signals at temperatures $T_C < T < T_{min}$, due to FM correlations, became Lorentzian at T {greater than or slanted equal to} T_{min}, where T_{min} is the temperature corresponding to the narrowest ESR linewidth. The ESR linewidth vs. temperature, ??H(T), in the region $T > T_{min}$ well fits to the model of adiabatic hopping motion of small polarons $?? H (T) = ?? H_0 + (a / T) \exp (- E_a / k_B T)$, where E_a and k_B are the activation energy and the Boltzmann factor, respectively; $??H_0$ and a are constants. It is worth noticing that, in this temperature range, the Lande factor g for the samples is about 2.00, indicating spin-spin interaction among electrons of Mn^{3+} and Mn^{4+} ions playing an important role. ?? 2006 Elsevier B.V. All rights reserved.

Author Keywords: EPR; Manganites

Index Keywords: Activation energy; Electrons; Lanthanum compounds; Manganese compounds; Mathematical models; Paramagnetic resonance; Thermal effects; Adiabatic hopping motion; Boltzmann factor; Manganites; Perovskite

Year: 2006

Source title: Journal of Magnetism and Magnetic Materials

Volume: 303

Issue: 2 SPEC. ISS.

Cited by: 1

Link: Scorpus Link

Correspondence Address: Yu, S.C.; Department of Physics, Chungbuk National University, Cheongju, 361-763, South Korea; email: scyu@chungbuk.ac.kr

ISSN: 3048853

CODEN: JMMMD

DOI: 10.1016/j.jmmm.2006.01.230

Language of Original Document: English

Abbreviated Source Title: Journal of Magnetism and Magnetic Materials

Document Type: Article

Source: Scopus

Authors with affiliations:

1. Phan, T.L., Department of Physics, Chungbuk National University, Cheongju, 361-763, South Korea

2. Tho, N.D., Center for Materials Science, Hanoi University of Science, 334 Nguyen Trai, Hanoi, Viet Nam
3. Bau, L.V., Institute of Materials Science, VAST, Caugiay, Hanoi, Viet Nam
4. Phuc, N.X., Institute of Materials Science, VAST, Caugiay, Hanoi, Viet Nam
5. Yu, S.C., Department of Physics, Chungbuk National University, Cheongju, 361-763, South Korea

References:

1. Shengelaya, A., (1996) Phys. Rev. Lett., 77, p. 5296
2. Shengelaya, A., (2000) Phys. Rev. B, 61, p. 5888
3. Ulyanov, A.N., (2002) J. Appl. Phys., 91, p. 7926
4. Ivanshin, V.A., (2000) Phys. Rev. B, 61, p. 6213
5. Oseroff, S.B., (1996) Phys. Rev. B, 53, p. 6521
6. Oseroff, S.B., (2000) J. Appl. Phys., 87, p. 5810
7. Rettori, C., (1997) Phys. Rev. B, 55, p. 3083
8. Causa, M.T., (1998) Phys. Rev. B, 58, p. 3233
9. Joshi, J.P., (2004) J. Magn. Magn. Mater., 279, p. 91
10. Angappane, S., (2003) J. Appl. Phys., 93, p. 8334
11. Luong, N.H., (2005) J. Magn. Magn. Mater., 290, p. 690
12. Chau, N., (2003) Physica B, 327, p. 270
13. Mitsui, T., (1961) Phys. Rev., 124, p. 1354
14. Kaplan, T.A., Mahanti, S.D., (1999) Physics of Manganites, , Kluwer Academic/Plenum Publishers, New York
15. Radaelli, P.G., (1997) Phys. Rev. B, 56, p. 8265
16. Mitsui, T., (1961) Phys. Rev., 124, p. 1354