

# Magnetic relaxation behavior in $\text{Nd}_{0.5}\text{Sr}_{0.5}\text{MnO}_3$ : Observation of negative imaginary component of ac magnetic susceptibility

Ulyanov A.N., Quang H.D., Lee K.W., Yu S.C., Sinh N.H., Kang Y.M., Yoo S.I.

Department of Materials Science and Engineering, Seoul National University, Seoul 151-744, South Korea; Solid State Physics Group, Department of Physics and Astronomy, University of Glasgow, Glasgow G12 8QQ, United Kingdom; Korea Research Institute of Standards and Science, Taejon 305-340, South Korea; Department of Physics, Chungbuk National University, Cheongju 361-763, South Korea; Cryogenics Laboratory, Department of Physics, Hanoi National University, Hanoi, Viet Nam

**Abstract:** Short time relaxation effect in  $\text{Nd}_{0.5}\text{Sr}_{0.5}\text{MnO}_3$  manganites was observed. The effect is manifested as negative peak of imaginary component of ac magnetic susceptibility near the point of first order phase transition. The effect is explained at the frame of Landau theory of phase transition, where the coexistence of metastable and stable phases is considered. © 2008 IEEE.

**Author Keywords:** Magnetic losses; Magnetic susceptibility; Relaxation processes

**Index Keywords:** AC Magnetic susceptibility; First-order phase transitions; Landau theory; Magnetic loss; Magnetic losses; Relaxation effect; Stable phasis; Magnetic susceptibility; Magnetism; Manganese oxide; Metastable phases; Neodymium; Oxide minerals; Phase transitions; Relaxation processes; Magnetic materials

Year: 2008

Source title: IEEE Transactions on Magnetics

Volume: 44

Issue: 11 PART 2

Page : 3060-3062

Cited by: 1

Link: Scopus Link

Correspondence Address: Ulyanov, A. N.; Department of Materials Science and Engineering, Seoul National University, Seoul 151-744, South Korea; email: a\_n\_ulyanov@yahoo.com

ISSN: 189464

CODEN: IEMGA

DOI: 10.1109/TMAG.2008.2001792

Language of Original Document: English

Abbreviated Source Title: IEEE Transactions on Magnetics

Document Type: Conference Paper

Source: Scopus

Authors with affiliations:

- Ulyanov, A.N., Department of Materials Science and Engineering, Seoul National University, Seoul 151-744, South Korea
- Quang, H.D., Solid State Physics Group, Department of Physics and Astronomy, University of Glasgow, Glasgow G12 8QQ, United Kingdom

- Lee, K.W., Korea Research Institute of Standards and Science, Taejon 305-340, South Korea
- Yu, S.C., Department of Physics, Chungbuk National University, Cheongju 361-763, South Korea
- Sinh, N.H., Cryogenics Laboratory, Department of Physics, Hanoi National University, Hanoi, Viet Nam
- Kang, Y.M., Department of Materials Science and Engineering, Seoul National University, Seoul 151-744, South Korea
- Yoo, S.I., Department of Materials Science and Engineering, Seoul National University, Seoul 151-744, South Korea

#### References:

- Jonker, G.H., Van Santen, J.H., Ferromagnetic compounds of manganese with perovskite structure (1950) *Physica*, 16, pp. 337-349. , Mar
- Van Santen, J.H., Jonker, G.H., Electrical conductivity of ferromagnetic compounds of manganese with perovskite structure (1950) *Physica*, 16, pp. 599-560. , Jul./Aug
- Dagotto, E., Hotta, T., Moreo, A., Colossal magnetoresistant materials: The key role of phase separation (2001) *Physics Reports*, 344, pp. 1-153. , Apr
- Zener, C., Interaction between the d-shells in the transition metals. II. Ferromagnetic compounds of manganese with perovskite structure (1951) *Phys. Rev.*, 82, pp. 403-405. , May
- López, J., Lisboa-Filho, P.N., Passos, W.A.C., Ortiz, W.A., Araujo-Moreira, F.M., De Lima, O.F., Schaniell, D., Ghosh, K., Magnetic relaxation behavior in  $\text{La}_{0.5}\text{Ca}_{0.5}\text{MnO}_3$  and  $\text{Nd}_{0.5}\text{Sr}_{0.5}\text{MnO}_3$  (2001) *Phys. Rev. B.*, 63, pp. 2244221-2244229. , May
- Anane, A., Renald, J.-P., Reversat, L., Dupas, C., Veillet, P.P., Viret, M., Pinsard, L., Revcolevschi, A., Colossal resistive relaxation effects in a  $\text{Pr}_{0.67}\text{Ca}_{0.33}\text{MnO}_3$  single crystal (1999) *Phys. Rev. B.*, 59, pp. 77-80. , Jan
- Nam, D.D.N.H., Jonason, K., Nordblad, P., Khiem, N.V., Phuc, N.X., Coexistence of ferromagnetic and glassy behavior in the  $\text{La}_{0.6}\text{Sr}_{0.5}\text{CoO}_3$  perovskite compound (1999) *Phys. Rev. B.*, 59, pp. 4189-4194. , Feb
- Nam, D.N.H., Mathieu, R., Nordblad, P., Khiem, N.V., Phuc, N.X., Ferromagnetism and frustration in  $\text{Nd}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ , (2000) *Phys. Rev. B.*, 62, pp. 1027-1032. , July
- Jönsson, P.E., Mathieu, R., Nordblad, P., Yoshino, H., Katori, H.A., Ito, A., Nonequilibrium dynamics of spin glasses: Examination of the ghost domain scenario (2004) *Phys. Rev. B.*, 70, pp. 1744021-17440227. , Nov
- Kuwahara, H., Tomioka, Y., Asamitsu, A., Moritomo, Y., Tokura, Y., A first-order phase transition induced by a magnetic field (1995) *Science*, 270, pp. 961-963. , Nov
- Jiráček, Z., Damay, F., Hervieu, M., Martin, C., Raveau, B., André, G., Bourée, F., Magnetism and charge ordering in  $\text{Pr}_{0.5}\text{Ca}_{0.5-x}\text{MnO}_3$  ( $x = 0.09$  and  $0.5$ ) (2000) *Phys. Rev. B.*, 61, pp. 1181-1188. , Jan
- Palacio, F., Lazaro, F.J., Van Duyneveldt, A.J., Magnetic phenomena in molecular solids: A tutorial approach (1989) *Mol. Cryst. Liq. Cryst.*, 176, pp. 289-306. , Jan./Feb
- Levin, E.M., Pecharsky, V.K., Gscheidner Jr., K.A., Unusual magnetic behavior in  $\text{Gd}_5(\text{Si}_{1.5}\text{Ge}_{2.5})$  and  $\text{Gd}_5(\text{Si}_2\text{Ge}_2)$  (2000) *Phys. Rev. B.*, 62, pp. R14625-R14628. , Dec
- Kou, X.C., Grössinger, R., Hilscher, G., Kirchmayr, H.R., De Boer, F.R., Ac susceptibility study on  $\text{R}_2\text{Fe}_{14}\text{B}$  single crystals ( $\text{R} = \text{Y}, \text{Pr}, \text{Nd}, \text{Sm}, \text{Gd}, \text{Tb}, \text{Dy}, \text{Ho}, \text{Er}, \text{Tm}$ ) (1996) *Phys. Rev. B.*, 64, pp. 6421-6429. , Sept
- Ginzburg, V.L., Levanyuk, A.P., Sobyenin, A.A., Light scattering near phase transition points in solids (1980) *Phys. Rep.*, 57, pp. 151-240. , Jan