Structure, magnetic, magnetocaloric and magnetoresistance properties of $La_{1-x}Pb_xMnO_3$ perovskite

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Abstract: $La_{1-x}Pb_xMnO_3$ (x = 0.1, 0.2, 0.3, 0.4, and 0.5) perovskites were prepared by a solid-state reaction. Except for x = 0.5 (cubic) and x = 0.4 (rhombohedral), the structure of the other compositions was pseudo-rhombohedral with P1 symmetry. The particle size of the grains is depending on the Pb content of the samples. The Curie temperature T_c increases from 235 K for x = 0.1-310 K for x = 0.2 and is almost constant (about 360 K) for x ? 0.3. The field-cooled and zero-field-cooled thermomagnetic curves measured at low field show a split below a so-called irreversibility temperature T_r, which is somewhat smaller than T_c except for x = 0.1, where it is 270 K. From a series of magnetic isotherms the magnetic entropy changes ??S(T) were determined for a field step of 500 Oe. The maximum value of $??S_{max}$ increases with increasing x till x = 0.3 and then decreases with further increasing x. The conductivity of perovskites is metallic at low temperatures and semiconducting at high temperatures. Magnetoresistance measurements have been performed.

Author Keywords: Magnetic oxides; Magnetocaloric effect; Perovskite structure
Index Keywords: Coercive force; Composition; Entropy; Isotherms; Lanthanum compounds; Magnetic properties; Magnetoresistance; Particle size analysis; Magnetocaloric effects; Perovskite

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References:

1. Von Helmolt, R., Wecker, J., Holzapfel, D., Schultz, L., Samwer, K., (1993) Phys. Rev. Lett., 71, p. 2331
2. Jin, S., Tiefel, T.H., McCormark, M., Fastnacht, R.R., Ramesh, R., Chen, L.H., (1994) Science, 264, p. 413
3. Chaudhary, S., Kumar, V.S., Ruy, S.B., Chaddah, P., Krishnakumar, S.R., Sathe, V.G., Kumar, A., Sarma, D.D., (1999) J. Magn. Magn. Mater., 202, p. 47
4. Schiffer, P.E., Ramirez, P.A., Bao, W., Cheong, S.W., (1995) Phys. Rev. Lett., 75, p. 3336
5. Ibarra, M.R., Algarabel, A.P., Marquina, C., Blasco, J., Garcia, J., (1995) Phys. Rev. Lett., 75, p. 354
6. Hwang, H.Y., Cheong, S.W., Radaelli, P.G., Magegio, M., Batlogg, B., (1995) Phys. Rev. Lett., 75, p. 914
7. Radaelli, P.G., Cox, D.E., Marezio, M., Cheong, S.W., Schiffer, P.E., Ramirez, A.P., (1995) Phys. Rev. Lett., 75, p. 4488
8. Coey, J.M.D., Viret, M., Molnar, S.V., (1999) Adv. Phys., 48, p. 167
9. Young, S.L., Chen, Y.C., Horng, L., Wu, T.C., Chen, H.Z., Shi, J.B., (2000) J. Magn. Magn. Mater., 289, p. 5576
10. Troyanchuk, I.O., Khalyavin, D.D., Szymczak, H., (1997) Mater. Sci. Bull., 32, p. 1637
11. Huang, T.S., Chen, C.H., Tai, M.F., (2001) Mater. Res. Soc. Symp. Proc., 674, pp. U341
12. Chinh, H.D., Hanh, N., Chau, N., (2001) Proceedings of the Fifth Vietnam National Conference on Physics, p. 783. , 3
13. Luong, N.H., Chau, N., Huong, P.M., Minh, D.L., Chau, N.N., Cong, B.T., Kurisu, M., (2002) J. Magn. Magn. Mater., 242-245, p. 760
14. Tuong, L.T.C., Phuc, P.V., Toan, N.N., Proceedings of IWOMS'99, p. 399
15. Chen, C.H., Huang, T.S., Tai, M.F., (2001) Mater. Res. Soc. Symp. Proc., 674, pp. U381
16. Itoh, M., Natori, I., Kubota, S., Motoya, K., (1994) J. Phys. Soc. Japan, 63, p. 1486
17. Nam, D.N.H., Jonason, K., Nordblad, P., Khiem, N.V., Phuc, N.X., (1999) Phys. Rev. B., 5, p. 4189
18. Tishin, A.M., (1998) J. Magn. Magn. Mater., 184, p. 62
19. Tang, T., Gu, K.M., Cao, Q.Q., Wang, D.H., Zhang, S.Y., Du, Y.W., (2000) J. Magn. Magn. Mater., 222, p. 110

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