

## **EFFECT OF PRASEODYMIUM SUBSTITUTED ON THE STRUCTURAL AND ELECTRICAL TRANSPORT PROPERTIES OF La<sub>0.5</sub>Ba<sub>0.5</sub>MnO<sub>3</sub> PEROVSKITE**

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### **ABSTRACT**

The influence of praseodymium substituting at La-site in La<sub>0.5</sub>Ba<sub>0.5</sub>MnO<sub>3</sub> has been investigated, in magnetotransport and structural properties. The doping Pr at La site on La-Ba-Mn-O ceramics was using solid state reaction. Polycrystalline (La<sub>1-x</sub>Pr<sub>x</sub>)<sub>0.5</sub>Ba<sub>0.5</sub>MnO<sub>3</sub> (x = 0, 0.167, 0.33, 0.5, 0.67, 0.833, 1) is doped with Pr site based manganites, calcined at 900°C for 12 hours, pelletized and sintered at 1300°C for 24 hours have been synthesized and investigated. The electrical property,  $T_p$  was determined by using standard four-point probe resistivity measurement in a temperature range of 30 K to 300 K. With increasing the Pr doping,  $T_p$  for the films shifted to lower temperatures, which are 254, 248, 228, 220, 196, 180, 158 K for the bulks with x = 0, 0.167, 0.33, 0.5, 0.67, 0.833, 1, respectively. As the Praseodymium concentration increases, the metal-insulator transition temperature ( $T_p$ ) decreases while the activation energy in the insulating region ( $T > T_p$ ) and resistivity increases. The structural property of bulk samples have been investigated via X-Ray Diffractometer (XRD). XRD patterns show that these systems are in single-phase. The lattice parameters of undoped sample, La<sub>0.5</sub>Ba<sub>0.5</sub>MnO<sub>3</sub> can be observed at, a  $\approx$  15.120 Å, b  $\approx$  7.776 Å and c  $\approx$  4.335 Å. All the samples are in orthorhombic distortion perovskite structure with a > b > c. The unit cell volume decreases as Pr concentration increases.

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### **REFERENCES**

- [1]. Abdullah Chik, S.A.Halim, M.S.Sharmawati, Zohra Gebrel, K.P.Lim, Imad Hamadne, K.K.Kabashi, M.T.Azman, W.M.M. Yunus and M.M.Mokhsin, 2002, *Proc. Mal. Sci. & Tech. Con. Symp. A*
- [2]. Abdelmoula, N., Cheikh-Rouhou, A., and Reversat, L., 2001, *Journal of Physics: Condensed Matter*, **13**; 449-458
- [3]. Chang Seop hong, Wan Seop Kim, and Nam Hwi Hur, 2000. *Physical Review B*, **63**:092504
- [4]. Zener, C., 1951. *Phys. Rev.* **82**, 403 – 405.
- [5]. Q. Huang, Z W Li, J Li and C K Ong, 2001, *J. Phys.: Condens. Matter* **13**, 4033–4047.
- [6]. Ravi Bathe, S.R. Shinde, K.M. Gapchup, K.P. Adhi, S.I. Patil, 2003, *Journal of Magnetism and Magnetic Material*, 256, 425 – 429.
- [7]. Z.C. Xial \*, S.L. Yuan, W. Feng, L.J. Zhang, G.H. Zhang, J. Tang, L.

- Liu, S. Liu, G. Peng, D.W. Niu, L. Chen, Q.H. Zheng, Z.H. Fang, C.Q. Tang, 2003, *Solid State Communications*, 128, 291–294.
- [8]. M.R. Ibarra and J.M. De Teresa, 1998, World Scientific Publishing Co. Pte. Ltd., 83 – 154.
- [9]. E. Suard, F.Fauth, C.Martin, A. Maignan, F. Millange, L. Keller, 2003, *Journal of Magnetism and Magnetic Materials*, 264, 221-233.
- [10]. Garcý´a-Herna´ndez, A. de Andre´s, J.L. Martý´nez, D. Sa´nchez Soria, L. Martý´n-Carro´n, and S. Taboada, 2003, *Journal of Solid State Chemistry*, 171, 76-83.