

HOPPING CONDUCTION IN $\text{La}_{1/2}\text{Ba}_{1/2}(\text{Mn}_{1-x}\text{Al}_x)\text{O}_3$

Huda Abdullaha, Abdul Halim Shaaria and Hasan Abu Kassimb

^a*Department of Physics, Faculty of Science,
Universiti Putra Malaysia, 43400 UPM Serdang, Malaysia*

^b*Department of Physics, Faculty of Science,
Universiti Malaya, 40603 Kuala Lumpur, Malaysia*

ABSTRACT

Electrical resistivity behaviour of $\text{La}_{1/2}\text{Ba}_{1/2}(\text{Mn}_{1-x}\text{Al}_x)\text{O}_3$ compounds, prepared by the solid state reaction, have been investigated below the charge-ordering temperature to understand the mechanism of conduction. On analyzing the data by using several theoretical models, it is found that the metallic (ferromagnetic) part of the resistivity (ρ) (below T_P) fits well with the equation $\rho = \rho_0 + \rho_2 T^2$, where ρ_0 is due to the importance of grain/domain boundary effects, a second term $\sim \rho_2 T^2$ appears that might be attributed to the electron-electron scattering. In high temperature ($T_P < T < \theta_D/2$) paramagnetic insulating regime, the resistivity of samples obey the $T^{-1/4}$ law, characteristic of variable range hopping (VRH) model.

<http://journal.masshp.net/wp-content/uploads/Journal/2007/Jilid%201/Huda%20Abdullah%20203-209.pdf>

REFERENCES

- [1] Pal, S., Banerjee, A., Rozenberg, E. and Chaudhuri, B.K. (2001); Polaron hopping conduction and thermoelectric power in LaMnO_3 , Volume 89, Issue 9, pp. 4955-4961.
- [2] Zener, C. (1951); Phys. Rev. 81, 440; P. de Gennes, Phys. Rev., 118, 141.
- [3] Banarjee, A., Pal, S., Rozenberg, E., Chaudhuri, B.K. (2001); Magnetoresistance and magnetothermoelectric power of $\text{La}_{0.5}\text{Pb}_{0.5}\text{Mn}_{1-x}\text{Cr}_x\text{O}_3$. J. Chem. Phys., 115, 1550.
- [4] Sayani Bhattacharya, Sudipta Pal, Mukherjee, R.K., Chaudri, B.K., Neeleshwar, S., Chen, Y.Y., Mollah, S. and Yang, H.D. (2004); Journal of Magnetism and Magnetic Materials, 269, 359 – 371.
- [5] Saket Asthana, Bahadur, D., Nigam, A.K. and Malik, S.K. (2004); J/ Phys: Condens. Matter, 16, 5297 – 5307