

## Phase transitions in $\text{La}_{0.73}\text{Ca}_{0.27}\text{Mn}_{1-x}\text{Cu}_x\text{O}_3$ ( $0 < x < 0.19$ )

Y. E. Gunanto, author

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=9999920521732&lokasi=lokal>

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### Abstrak

We have performed resistivity measurements as a function of temperature, with and without an external magnetic field. Magnetization measurements are also done as a function of temperature  $M(T)$  as well as a function of an external magnetic field  $M(H)$  for  $\text{La}_{0.73}\text{Ca}_{0.27}\text{Mn}_{1-x}\text{Cu}_x\text{O}_3$  compounds with  $0 < x < 0.19$ . The samples with  $x = 0$  and  $0.06$  are insulators. As for the samples with  $x = 0.10$ ,  $0.13$ , and  $0.19$ , they undergo an insulator to metal transition as the temperature is lowered. The insulator-metal transition temperatures are  $24$  K,  $74$  K, and  $69$  K for  $x = 0.10$ ,  $0.13$ , and  $0.19$ , respectively. The magnetoresistance decreases with increasing values of Cu, i.e.  $75\%$ ,  $72\%$ ,  $64\%$ , and  $35\%$  for  $x = 0$ ,  $0.06$ ,  $0.10$ , and  $0.13$  respectively. Samples in accordance with the model of crystalline metal  $\ln R$  vs.  $1/T$  are compared to Mott insulator models  $\ln R$  vs.  $1/T^{0.25}$ . Based on the magnetization curve, a paramagnetic to ferromagnetic transition is observed at Curie temperature,  $T_C$ , of  $\sim 196$  K,  $170$  K,  $140$  K,  $137$  K, and  $113$  K for  $x = 0$ ,  $0.06$ ,  $0.10$ ,  $0.13$ , and  $0.19$  respectively.