

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

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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  $24\text{ K}$ ,  $74\text{ K}$ , and  $69\text{ K}$  for  $x = 0.10$ ,  $0.13$ , and  $0.19$ , respectively. The magnetoresistance decreases with increasing values of  $\text{Cu}$ , 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  $\sim 196\text{ K}$ ,  $170\text{ K}$ ,  $140\text{ K}$ ,  $137\text{ K}$ , and  $113\text{ K}$  for  $x = 0$ ,  $0.06$ ,  $0.10$ ,  $0.13$ , and  $0.19$  respectively.