

# PHASE DIAGRAM OF HEAVILY DOPED ( $x > 0.5$ ) $\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$

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A vast majority of research of  $\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$  manganites was done for  $x < 0.5$ . Data on  $0.5 < x \leq 1$  materials are sparse because of inherent difficulty in synthesizing them. The occurrence of a rich phase diagram for  $x > 0.5$  was evidenced by structural and magnetic measurements. For the present, first specific heat studies of  $x = 0.55, 0.7,$  and  $0.9$  compositions, highly stoichiometric samples were prepared. Specific heat was measured from 2 K to 395 K on heating and on cooling, in zero magnetic field and in  $B = 7$  T. Orders of particular phase transitions and specific heat anomalies accompanying them were studied. For  $x = 0.55$ , the second order paramagnet-ferromagnet phase transition, visible as the  $\lambda$ -anomaly at 267 K, and the first-order transition from ferromagnetic to A-type antiferromagnetic state, associated with the structural transition from a tetragonal to an orthorhombic structure, were observed. The latter, visible as a  $\delta$ -type anomaly at 216 K, was very sensitive to magnetic field (7 T lowered the transition temperature by 26 K). For  $x = 0.7$  and  $0.9$ , the second-order transition from the paramagnetic to the C-type antiferromagnetic state, occurring at 265 K and 205 K, respectively, was studied. For  $x = 0.7$ , it was a purely magnetic transition, whereas for  $x = 0.9$ , it was coupled with the structural transition from a cubic to a tetragonal phase.

9.7 cm

13.4 cm

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