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Photoacoustic effect at second-order phase transition in $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$

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Abstract

The gas-microphone photoacoustic (PA) technique has been applied to determine the second-order phase transition in manganite compounds $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ ($x = 0.1$ and 0.2). A comparative analysis of the PA result with magnetization and electrical resistivity measurements has been performed. The doping of Ca causes the occurrence of ferromagnetic (FM) ordering. The FM transition temperature T_c , determined from magnetization measurement, is 145 and 180 K for $x = 0.1$ and 0.2 , respectively. The temperature at which the anomaly of PA signal occurs is consistent with T_c determined from the magnetization measurement. The change of PA signal arises at the same temperature in both cases with decreasing and increasing temperatures. This implies that the paramagnetic to FM phase transition can be regarded as a second-order phase transition with no latent heat at T_c . © 2002 Elsevier Science B.V. All rights reserved.

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