

HYPERFINE INTERACTIONS AND MAGNETIC, TRANSPORT AND STRUCTURAL PROPERTIES OF $\text{La}_{0.67}\text{Ca}_{0.33}\text{Mn}_{0.94}^{57}\text{Fe}_{0.06}\text{O}_3$

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The $\text{La}_{0.67}\text{Ca}_{0.33}\text{Mn}_{0.94}^{57}\text{Fe}_{0.06}\text{O}_3$ compound was studied using powder X-ray diffraction (XRD), VSM magnetometry, four-probe resistance (R) measurements and Mössbauer spectroscopy. XRD measurements were performed between 4 and 500 K and precise values of the unit cell parameters *vs* temperature were obtained. The metal-insulator transition temperature T_{M-I} , defined as the maximum of the $R(T)$ curve, was found surprisingly low and equal to 62 K. The ^{57}Fe Mössbauer spectra were recorded between 15 K and 850 K. The Curie temperature ($T_C \cong 141$ K), determined from temperature dependence of the ^{57}Fe hyperfine field, was in good agreement with the magnetisation result (142 K). Our results on $\text{La}_{0.67}\text{Ca}_{0.33}\text{Mn}_{0.94}^{57}\text{Fe}_{0.06}\text{O}_3$ clearly reveal that substitution of Fe^{3+} for Mn^{3+} suppresses locally double exchange interactions and strongly affects the magnetic and transport properties of the parent compound. It causes the strong reduction of T_C , the huge difference between T_C and T_{M-I} temperatures and complete suppression of the thermal expansion anomaly at T_C .

9.7 cm

13.4 cm

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