

The NMR ^{55}Mn study of the $\text{La}_{0.75}\text{Sr}_{0.25}\text{MnO}_3$ nanoparticles
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We report on a ^{55}Mn NMR study of the $\text{La}_{0.75}\text{Sr}_{0.25}\text{MnO}_3$ nanoparticles with the average grain size of 33nm and 114nm at 4.2K and at the applied field 0, 0.2 and 0.5T. A dominant signal from the double exchange (DE) controlled metallic ferromagnetic interior of the grains as well as a small signal from insulating ferromagnetic surface regions of the grains are observed. The DE resonant line shows a frequency shift in the applied field according to a full gyromagnetic ratio and a value of the demagnetizing field much smaller than 0.2T is obtained. In both samples studied a two-exponential nuclear spin-spin (T_2) relaxation is observed at zero field, whereas a single-exponential relaxation is observed at the applied field of 0.5T. For the sample with larger grains a higher NMR enhancement is observed, which indicates a higher magnetic susceptibility of the sample at the NMR frequencies. A comparison to the NMR data obtained on a bulk material is made. The results are discussed in terms of the influence of the grain size and on the presence of domain walls or other magnetic inhomogeneities and on the magnetic anisotropy.

9.7 cm

13.4 cm

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