11th International Conference
on Advanced Materials

Rio de Janeiro Brazil
September 20 - 25

ICAM2009

A.C- Susceptibility study of $La_{0.7}Ca_{0.3}MnO_3$ samples

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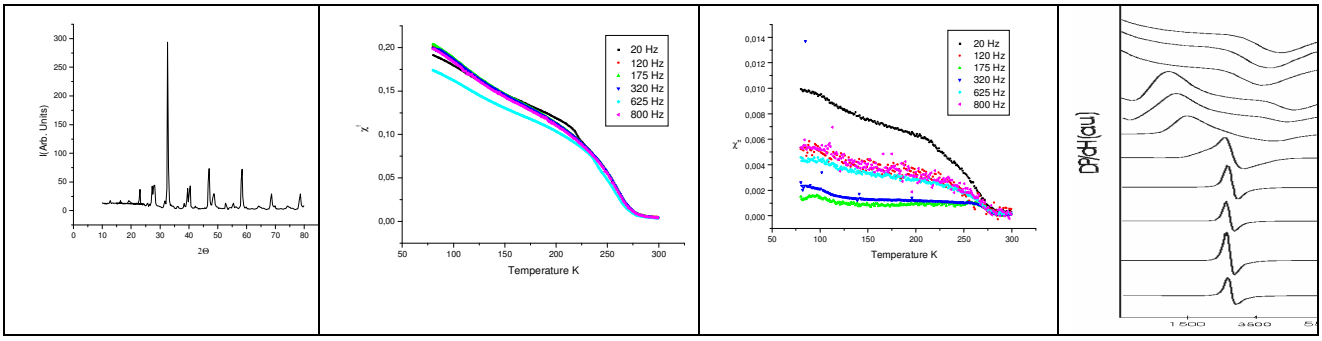
Abstract – La0.7Ca0.3MnO3 bulk samples were characterized by A.C- Susceptibility. The A.C- Susceptibility show a more or less pronounced single - peak structure in both the real and imaginary part of the susceptibility. A double-peak structure attributed to micro strain and pinning of domain walls was not observed. Both susceptibility components become frequency dependent at T<Tc. Far above Tc the response is practically frequency independent. The position of the maxima is also not shifted with the frequency. Electron spin resonance (EPR) measurements showed a irregular signal below Tc, which has been attributed to local inhomogeneities effects. However, the line shape goes to a narrower and more symmetric signal at T>Tc in the paramagnetic (PM) region.

Samples of La2/3Ca1/3MnO3 using highly pure OXIDES were synthesized BY solid state reaction technique. The raw materials were well mixed and heated at 800 ºC in air for 16 h. After that the samples were mixed again and annealed at 900ºC for 16 hours. X – ray diffraction patterns were recorded with a Rigaku diffractometer at room temperature using Cu Kα radiation. Fig 1. Lattice constants were determined with the PCW program and a cubic structure was found out. Electron paramagnetic resonance (EPR) measurements were performed in the X-band at a fixed frequency (9.5 GHz), using a Bruker spectrometer ESP-300 from 200K to 300K. The AC-susceptibility measurements were carried out with an AC-susceptometer (Lakeshore ACS 7000).

The A.C- Susceptibility shows a more or less pronounced single - peak structure in both the real and imaginary part of the susceptibility Fig 2. A double-peak structure attributed to micro strain and pinning of domain walls was not observed. Both susceptibility components become frequency dependent at T<Tc. Far above Tc the response is practically frequency independent. The Curie temperatures were determined from the maximum of the imaginary part of susceptibility versus temperature since it indicates the onset of domain walls motion. The position of the maxima is also not shifted with the frequency; one might assume that this arises from the Hopkinson effect, i.e. from the divergence of the susceptibility near Tc due to the vanishing of the anisotropy, which has been attributed to the absence of changes in micro strain size. Electron spin resonance (EPR) measurements Fig.3 showed an irregular signal below Tc, which has been attributed to local inhomogeneities effects. A narrower and more symmetric signal at T>Tc was observed in the paramagnetic region.



(a) (B)

Figure 1: *The x – ray diffraction patterns show the characteristic diffraction peaks of the cubic phase* $La_{2/3}Ca_{1/3}MnO_3$

Figure 2: a), b). Real and imaginary part of the AC-susceptibility of LCMO respectively

Figure 3. EPR spectra of LCMO

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