Ferromagnetic-paramagnetic phase transition properties of $Eu_{0.8}Sr_{0.2}MnO_3$ perovskite powder

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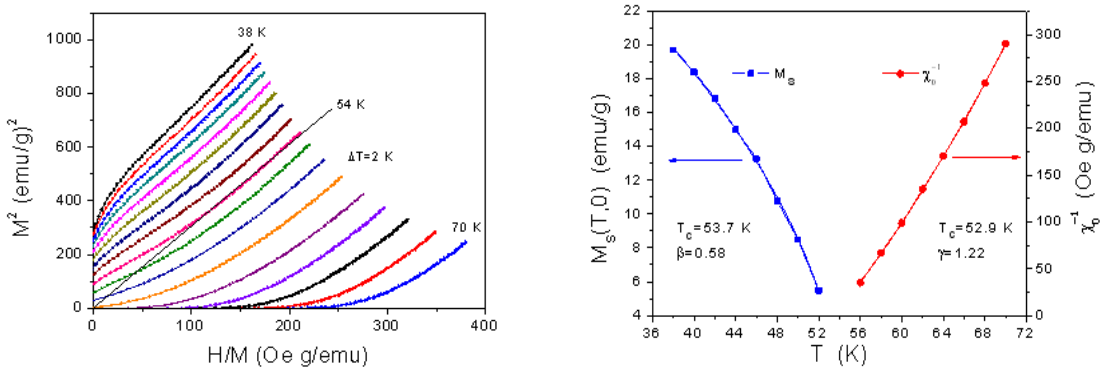
Perovskite manganites have recently attracted great interests due to several fundamental phenomena such as colossal magnetoresistance and phase transition induced by photon, current, magnetic field, or pressure[1]. In particular, the phase transition nature of the three dimensional bulk-form materials is under debates[2], where the detailed understanding of ordering mechanism at the transition would be key in realizing magnetoelectric devices based on the perovskite manganites. In this work, we report our systematic investigation on the phase transition behavior of the $Eu_{0.8}Sr_{0.2}MnO_3$ perovskite powder materials. The powder samples have been fabricated using the solid-state reaction method after three times of annealing of 45 hours at 950 ^oC and 20 hours at 1350 ^oC. Magnetic hysteresis loops are measured using vibrating sample magnetometer at temperatures from 10 K to the room temperature. After detailed analys is of temperature dependent magnetization and isothermal magnetization curves at different temperatures (Fig. 1(a)), we could determine the critical scaling exponents of the ferromag netic-paramagnetic phase transition at the Curie temperature. Spontaneous magnetization and inverse susceptibility (Fig. 1(b)) are observed, leading to determination of other scaling exponents. Comparison of the exponents values to the predicted exponent values from various models will be presented.

Keywords: Manganite perovskite, Curie temperature, phase transition, scaling behavior



(a) (b)

Figure 1: (a) M^2 vs. H/M at various tempera turesand (b) spontaneous magnetization Ms and inverse susceptibility.

References

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