Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Anisotropic magnetoresistance in colossal magnetoresistive oxide $La_{1-x}Sr_xMnO_3$ thin films LE ZHANG, VIJAY SINGH, ANIL RAJAPITAMAHUNI, XIA HONG, Department of Physics and Astronomy, University of Nebraska - Lincoln, NE 68588-0299 — We present our studies of the anisotropic magnetoresitance (AMR) in colossal magnetoresistive oxide $La_{1-x}Sr_xMnO_3$ (LSMO, x = 0.3, 0.5) thin films as a function of temperature, magnetic field and film thickness. LSMO thin films with thickness below 10 nm are grown on $SrTiO_3$ (001) and $NdGaO_3$(110) substrates via off-axis magnetron sputtering. X-ray diffraction and atomic force microscopy studies reveal high crystallinity and atomically smooth surfaces of these films. As the thickness of the films decreases, the metal insulator transition temperature (T_{MI}) shifts to below the bulk value. Films thinner than 3 nm become totally insulating. We extract the AMR from the resistance change as a function of the orientation between current and magnetic field. AMR reaches the maximum value in the vicinity of T_{MI}. At low magnetic field ($\sim$ 100 Oe), the angular dependence of AMR deviates from a sinusoidal shape, which is attributed to the effect of magnetocrystalline anisotropy. We discuss the effects of the carrier density, film thickness, and substrate strain on the AMR.

Le Zhang
Department of Physics and Astronomy,
University of Nebraska - Lincoln, NE 68588-0299

Date submitted: 15 Nov 2013 Electronic form version 1.4