Abstract Submitted
for the 4CS20 Meeting of
The American Physical Society

Anisotropic domains and antiferrodistortive-transition controlled magnetization in epitaxial manganite films on vicinal $SrTiO_3$ substrates

BINOD PAUDEL, Department of Physics, New Mexico State University, Las Cruces, NM, BRUCE ZHANG, School of Materials Engineering, Purdue University, West Lafayette, IN, YOGESH SHARMA, KYEONG TAE KANG, CINT, Los Alamos National Laboratory, Los Almaos, NM, HEINRICH NAKOTTE, Department of Physics, New Mexico State University, Las Cruces, NM, HAIYAN WANG, School of Materials Engineering, Purdue University, West Lafayette, IN, AIPING CHEN, CINT, Los Alamos National Laboratory, Los Almaos, NM — We studied the microstructural evolution and magnetism of ferroelastic $La_{0.9}Sr_{0.1}MnO_3$ (LSMO) epitaxial thin films grown on $SrTiO_3$ (001) substrates with different miscut angles. The substrate miscut angle plays a critical role in controlling the in-plane magnetic anisotropy. The microscopic origin of such magnetic anisotropy is attributed to the formation of anisotropic stripe domains along the surface step terraces. The magnetization in the LSMO films was found to be selectively modulated by the antiferrodistortive phase transition of the $SrTiO_3$ substrate. This phenomenon has been qualitatively explained by a strain modified Stoner–Wohlfarth model. We conclude that the magnetization modulation by the $SrTiO_3$ phase transition depends on h, the ratio of applied magnetic field to the saturation field. Such modulation is only visible with $h?<?1$. The established domain microstructure–anisotropy–magnetism correlation in manganite films can be applied to a variety of complex oxide thin films on vicinal substrates.

Binod Paudel
Department of Physics, New Mexico State University, Las Cruces, NM

Date submitted: 23 Sep 2020 Electronic form version 1.4