Tensile Strain Effects on the Magneto-transport in Calcium Manganese Oxide Thin Films: Comparison with its Hole-doped Counterpart

BRIDGET LAWSON, SAMUEL NEUBAUER, ADEEL CHAUDHRY, CACIE HART, NATALIE FERRONE, DAVID HOUSTON, GRACE YONG, RAJESWARI KOLAGANI, Towson University — Magnetoresistance properties of the epitaxial thin films of doped rare earth manganites are known to be influenced by the effect of bi-axial strain induced by lattice mismatch with the substrate. In hole-doped manganites, the effect of both compressive and tensile strain is qualitatively consistent with the expected changes in unit cell symmetry from cubic to tetragonal, leading to Jahn-Teller strain fields that affect the energy levels of Mn3+ energy levels. Recent work in our laboratory on CaMnO₃ thin films has pointed out that tetragonal distortions introduced by tensile lattice mismatch strain may also have the effect of modulating the oxygen content of the films in agreement with theoretical models that propose such coupling between strain and oxygen content. Our research focuses on comparing the magneto-transport properties of hole-doped manganite LaCaMnO₃ thin films with that of its electron doped counter parts, in an effort to delineate the effects of oxygen stoichiometry changes on magneto-transport from the effects of Jahn-Teller type strain.

¹Towson University Office of Undergraduate Research, Fisher Endowment Grant and Undergraduate Research Grant from the Fisher College of Science and Mathematics, Seed Funding grant from the School of Emerging technologies and the NSF grant ECCS 112856

Bridget Lawson
Towson University

Date submitted: 06 Nov 2015