

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Structural and Magnetotransport Study of SrTiO_{3- δ} /Si Films Grown by Molecular Beam Epitaxy¹ ALEX CURRIE, RYAN COTTIER, Texas State University, San Marcos, OSCAR VILLARREAL, JESUS CANTU, ARTURO PONCE, University of Texas, San Antonio, NIKOLETA THEODOROPOULOU, Texas State University, San Marcos, TEXAS STATE UNIVERSITY, SAN MARCOS COLLABORATION, UNIVERSITY OF TEXAS, SAN ANTONIO COLLABORATION — SrTiO₃ (STO) films were grown on p-Si (001) substrates using molecular beam epitaxy (MBE). Oxygen vacancies were introduced by controlling the Oxygen resulting in SrTiO_{3- δ} with $\delta \sim 0.02\%$ for the lowest pressure. The single phase STO/Si films were of high crystalline quality as verified by x-ray diffraction, transmission electron microscopy, and had an rms roughness of less than 0.5nm measured by atomic force microscopy. Transport measurements were performed on the STO/Si structures in a Van der Pauw configuration. We measured resistance as a function of temperature, $T = 3\text{K}-300\text{K}$ and as a function of an applied magnetic field, $H=0$ to $\pm 9\text{T}$. The resistivity decreased from 1 Ohm cm to 3×10^{-2} Ohm cm as the film thickness increased (3nm-60nm) for all temperatures. The magnetoresistance (MR) shows a reproducible trend for all films, the MR is positive at 300K, becomes negative between 200K and 100K and at low temperatures $T=3-20\text{K}$ the MR is positive at low $H=0$ to $\pm 2\text{T}$ but at high fields, it starts decreasing again. The MR behavior combined with the Hall effect data indicates the presence of localized electrons that delocalize with H and T .

¹This research was supported by NSF Carrer Award DMR-1255629.

Daniel Currie
Texas State University, San Marcos

Date submitted: 15 Nov 2013

Electronic form version 1.4