Abstract Submitted
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Dominant Electron Scattering Mechanisms in $SrTiO_3$[1] AMIT VERMA, Electrical Engineering, Univ. of Notre Dame, ADAM KAJDOS, TYLER CAIN, SUSANNE STEMMER, Materials Dept., Univ. of California, Santa Barbara, DEBDEEP JENA, Electrical Engineering, Univ. of Notre Dame — Transport studies in the complex oxide, $SrTiO_3$ (STO), have been carried out for many decades, but a clear consensus on dominant electron scattering mechanisms in action at different temperature and carrier concentration ranges is lacking. Recent progress in the growth of STO by low energetic deposition techniques like MBE has enabled STO thin films with carefully controlled doping and record high mobilities. Such control in turn enables a careful study of scattering mechanisms. In this work, hall mobility data from La-doped STO thin films grown by hybrid-MBE, have been analyzed and modeled considering various electron scattering mechanisms. By comparing theory to measured mobilities, we find that in addition to longitudinal optical phonon and ionized impurity scattering, a) acoustic phonon, and b) a $\sim$ 6meV transverse optical phonon deformation potential scattering mechanisms are necessary to explain the dependence of transport on temperature (2-300K) as the doping concentration is varied over two orders of magnitude ($8x10^{17}$ – $2x10^{20}$ cm^{-3}). We hope the understanding of scattering mechanisms acting in STO coming out of this work would seed ideas to improve the mobility in this important material.

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