Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Electronic structure, Fermi surfaces, and electron-phonon coupling in La-doped Sr_2TiO_4 and $SrTiO_3$[1] YUEFENG NIE, SHOUVIK CHATTERJEE, BULAT BURGANOV, ERIC MONKMAN, JOHN HARTER, DANIEL SHAI, Laboratory of Atomic and Solid State Physics, Department of Physics, Cornell University, Ithaca, NY 14853, USA, CHE-HUI LEE, DARRELL SCHLOM, Department of Materials Science and Engineering, Cornell University, Ithaca, New York 14853, USA, KYLE SHEN, Laboratory of Atomic and Solid State Physics, Department of Physics, Cornell University, Ithaca, NY 14853, USA — Sr_2TiO_4 is a quasi-two-dimensional Ruddlesden-Popper structure analogue to $SrTiO_3$, and is isostructural with the cuprate parent compound La_2CuO_4. Although the electronic structure of $SrTiO_3$ has been well-explored due to its importance in oxide electronics, little is known about the electronic properties of Sr_2TiO_4. To investigate this, we synthesized epitaxial La doped Sr_2TiO_4 and $SrTiO_3$ films on (100) LSAT substrates by molecular beam epitaxy (MBE) and investigated the electronic structure using angle-resolved photoemission spectroscopy (ARPES). The electronic structure of 5% La doped Sr_2TiO_4 shows a single electron like band with mostly Ti-3d$_{xy}$ character dispersing across the Fermi surface which corresponds well with LDA calculations. This is in contrast to doped $SrTiO_3$ where all three t2g bands are degenerate. We also observed signatures of strong electron-phonon coupling in the quasi-two-dimensional Sr_2TiO_4 materials which appear to be absent in three-dimensional $SrTiO_3$.

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[1]The work is supported by the Cornell Center for Materials Research through the National Science Foundation.

Date submitted: 12 Dec 2011 Electronic form version 1.4