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Electronic structure study of UV photodoping evolution on the TiO2 terminated SrTiO3 CHAOFAN ZHANG, SIMES, Stanford University, ZHONGKAI LIU, ZHUOYU CHEN, Department of Applied Physics, Stanford University, CHUNJING JIA, YAO WANG, SIMES, Stanford University, YANWU XIE, Department of Applied Physics, Stanford University, WEI LI, SIMES, Stanford University, JAMES. -J LEE, TAO JIA, SLAVKO REBEC, ERIC YUE MA, Department of Applied Physics, Stanford University, SUNGKWAN MO, ALS, Lawrence Berkeley National Laboratory, BRIAN MORITZ, ROBERT MOORER, SIMES, Stanford University, RUIHUA HE, Department of Physics, Boston College, T.-P DEVEREAUX, SIMES, Stanford University, WORAWAT MEEVASANA, School of Physics, Suranaree University of Technology,Thailand, ZHIXUN SHEN, SIMES, Stanford University — The metallic two dimensional electron gas (2DEG) has been observed on the UV light irradiated bare SrTiO3 surface of various terminations ((001),(110),(111)) using angular resolved photoemission spectroscopy (ARPES). The study of electronic structure of 2DEG opens a window to study the complex physical properties on the bare SrTiO3 surface, such as the superconductivity, the high mobility and ferromagnetism. In this talk, we will show the clear polaron band that due to the electron phonon coupling formed at low carrier density gradually screening out and vanishing as the photodoping increases, instead of that, the quantum well states start appearing at higher doping level. Besides that, the upshifting of both the incoherent in-gap and deep valence states towards the Fermi level suggests a huge gap shrinking, which we believe to be the negative electronic compressibility on the 2DEG surface on SrTiO3. All the properties mentioned above were observed at all the three terminations. We also would like to compare their behavior at similar carrier density range.

Chaofan Zhang
Stanford University

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