Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Oxygen redistribution and induced high-Tc superconductivity at the CaCuO2/SrTiO3 interface.[1] CLAUDIA CANTONI, Oak Ridge National Laboratory, DANIELE DI CASTRO, CNR-SPIN and Dipartimento di Ingegneria Civile e Ingegneria Informatica, Universita' di Roma Tor Vergata, Via del Politecnico 1, I-00133 Roma, Italy, CARMELA ARUTA, CNR-SPIN, Dipartimento di Scienze Fisiche, Via Cintia, Monte S. Angelo, 80126 Napoli, Italy, GIUSEPPE BALESTRINO, CNR-SPIN and Dipartimento di Ingegneria Civile e Ingegneria Informatica, Universita' di Roma Tor Vergata, Via del Politecnico 1, I-00133 Roma, Italy — High-Tc cuprate superconductors (HTS) can be thought of as a sequence of natural interfaces between two blocks with different structure and functionality: an insulating block with infinite layer (IL) structure, containing the CuO2 planes, and a charge reservoir (CR) block, that, opportunely doped by chemical substitution or excess oxygen, provides charge carriers to the IL block, giving rise to superconductivity. The increased understanding of electronic phenomena in artificial interfaces between complex oxides, such as the LAO/STO interface, naturally suggests the opportunity to exploit similar interfaces as a charge reservoir to dope a cuprate IL. We have explored the system in which LAO is replaced by the insulating IL CaCuO2 (CCO/STO interface) and found a Tc of 50 K. This interface closely reproduces the IL/CR native interface of HTS and can be used to extract important information on the physical processes occurring in HTS. We present atomically resolved ABF-STEM and EELS measurements, which combined with XAS uncover the existence of interfacial apical O atoms. We will discuss their electronic signature for superconductivity.

[1]Research supported by the U. S. Department of Energy, Basic Energy Sciences, Materials Science and Engineering Division.

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Date submitted: 14 Nov 2014 Electronic form version 1.4