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Charge leakage in superconducting $La_2CuO_4-La_{2-x}Sr_xCuO_4$ superlattices S. SMADICI, P. ABBAMONTE, J. LEE, S. WANG, University of Illinois at Urbana-Champaign, IL 61801, USA, C.D. CAVELLIN, Universite Paris 12 and CNRS UPR5-ESPCI, Paris, France, A. GOZAR, G. LOGVENOV, I. BOZOVIC, Brookhaven National Laboratory, NY 11973, USA — Ability of grow crystalline high-temperature superconductor (HTS) superlattices using molecular beam epitaxy has opened new avenues of research. Scanning tunneling microscopy measurements have identified a pronounced influence of the dopant atoms on microscopic properties of bulk HTS, therefore raising the question of whether the holes can be spatially separated in an oxide heterostructure from the disordered doped layers in a way analogous to semiconductor modulation doping. We used resonant soft x-ray scattering (RSXS) to answer this question for $La_2CuO_4 - La_{2-x}Sr_xCuO_4$ superlattices. For a $15 \times [2 \times \text{LCO} - 4 \times \text{LSCO}]$ superlattice with x=0.36, the measured hole amplitude modulation at the O K edge shows a relatively weak localization of the doped holes to the LSCO layers. By using the interference between "structural" and resonant scattering at the Cu L_3 edge, the c-axis stress of the LSCO sublattice was also observed.

Serban Smadici
University of Illinois at Urbana-Champaign

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