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Dopant-Induced Nanoscale Electronic Inhomogeneity in Ca2-xSrxRuO4[1] JIANDI ZHANG, Florida International University, ROB MOORE, University of Tennessee-Knoxville, SHANCAI WANG, HONG DING, Boston College, RONGYING JIN, DAVID MANDRUS, Oak Ridge National Laboratory, WARD PLUMMER, University of Tennessee-Knoxville — $Ca_{2-x}Sr_xRuO_4$ single crystals with $0.1 \leq \quad x \quad \leq 2.0$ have been studied systematically using scanning tunneling microscopy (STM) and spectroscopy (STS), low-energy electron diffraction (LEED), and angle resolved photoelectron spectroscopy (ARPES). In contrast to the well-ordered lattice structure, the local density of states (LDOS) at the surface clearly shows a strong doping dependent nanoscale electronic inhomogeneity, regardless of the fact of *isovalent* substitution. Remarkably, the surface electronic roughness measured by STM and the inverse spectral weight of quasiparticle (QP) states determined by ARPES are found to vary with x in the same manner as the bulk in-plane residual resistivity, following the Nordheim rule. For the first time, the surface measurements–especially those with STM–are shown to be in good agreement with the bulk transport results, all clearly indicating a doping induced electronic disorder in the system.

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