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Electronic Inhomogeneity and Vortex Disorder in Superconducting $Sr_{0.75}K_{0.25}Fe_2As_2$[1] CAN-LI SONG, YI YIN, MARTIN ZECH, TESS WILLIAMS, MICHAEL YEE, Department of Physics, Harvard University, Cambridge, MA 02138, USA, GEN-FU CHEN, JIAN-LIN LUO, NAN-LIN WANG, Beijing National Laboratory for Condensed Matter Physics and Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China, ERIC W. HUDSON, Department of Physics, The Pennsylvania State University, University Park, PA 16802, USA, JENNIFER E. HOFFMAN, Department of Physics, Harvard University, Cambridge, MA 02138, USA — We characterize the surface structure, superconducting, and vortex properties in the hole-doped superconductor $Sr_{0.75}K_{0.25}Fe_2As_2$ (underdoped, T_c =32 K) by scanning tunneling microscopy. A 1×2 surface reconstruction and inhomogeneous superconducting gap with clear coherence peaks are universally found on the dominant Sr/K-terminated surfaces. Rarer patches of As termination show no reconstruction and no gap. The superconducting gap energy Δ anticorrelates with both the zero bias conductance and coherence peak strength with a characteristic length scale of $\sim$ 3 nm. Isotropic single-quantum vortices with short-range hexagonal order are imaged at 9 T magnetic field. By fitting the vortex-induced subgap density of states, the coherence length $\xi \sim 2.8$ nm is found to be comparable to the length scale of Δ variations. We suggest that the vortices are strongly pinned by nanoscale electronic inhomogeneity arising from K clustering.

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