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High Precision Spectroscopic Imaging of Single Layer Cuprate:

Bi₂Sr_{1.6}La_{0.4}CuO_{6+x} A.M. WANG, J. LEE, J. SLEZAK, LASSP, Dept. of Physics, Cornell University, K. FUJITA, Dept. of Adv. Mater. Sci., University of Tokyo, H. EISAKI, AIST, Japan, S. UCHIDA, Dept. of Physics, University of Tokyo, J.C. DAVIS, LASSP, Dept. of Physics, Cornell University — We present high spatial resolution scanning tunneling spectroscopy (STS) study of single layer cuprate Bi₂Sr_{1.6}La_{0.4}CuO_{6+x}. The sample is optimally doped, with $T_c = 34\text{K}$. We focus on two main points: (1) Quasiparticle interference pattern obtained by Fourier transform of high resolution local density of states (LDOS) map, (2) LDOS map shows even stronger nanoscale electronic disorder than double layer cuprate Bi₂Sr₂CaCu₂O_{8+x} of similar doping. Inside the primary energy gap, at very low energies, small LDOS peaks emerge and exhibit short range modulations in their heights. Scattering by La substitution on Sr sites may be key to these new phenomena.

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