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High resolution STM imaging of a unit cell of $SrTiO_3$(100)-$\sqrt{5} \times \sqrt{5} - R26.6°$ surface superstructures ICHIRO SHIRAKI, University of Yamanashi, KAZUSHI MIKI, National Institute for Materials Science (NIMS), SHUHENG PAN, University of Houston — $SrTiO_3$(100)-$\sqrt{5} \times \sqrt{5} - R26.6°$ surfaces were studied by scanning tunneling microscope (STM) in ultra-high vacuum conditions at room temperatures. In the our previous report, we showed the arrangement of titanium and oxygen atoms in the unit cells of a $(\sqrt{5} \times \sqrt{5})$ surface superstructure with scanning tunneling microscope and concluded the TiO_2 layer is the terminating plane of the $(\sqrt{5} \times \sqrt{5})$ surface [1]. Recently, we succeeded in imaging the surfaces in filled states with much higher spatial resolution. Oxygen atomic orbitals are individually recognized and the local structures at the center of the O fourfold hollow site with $(\sqrt{5} \times \sqrt{5})$ periodicity are more clearly seen. Comparing our experimental results with the previous works, especially a theoretical study of O-vacancy model [2] and an experimental and theoretical study of Sr adatom model [3], detailed discussion on $\sqrt{5} \times \sqrt{5}$ surfaces became possible.

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[2] Z. Fang and K Terakura, Surf. Sci. 470, L75(2000)
[3] T. Kubo and H. Nozoye, Phys. Rev. Lett. 86, 1801(2001)

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