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High resolution scanning tunneling microscope (STM) image of $SrTiO_3$(100)-$\sqrt{5}\times\sqrt{5}-R26.6^\circ$ surface ICHIRO SHIRAKI, Interdisciplinary Graduate School of Medical and Engineering, University of Yamanashi, Japan, KAZUSHI MIKI, National Institute for Materials Science (NIMS), Japan, SHUHENG PAN, Department of Physics, University of Houston, Houston, Texas — $SrTiO_3$(100)-$\sqrt{5}\times\sqrt{5}-R26.6^\circ$ surfaces were studied by scanning tunneling microscope (STM) in ultra-high vacuum conditions at room temperatures. STM images with truly atomic resolution in filled states, which have never been reported, were successfully obtained. The atomic arrangement in $\sqrt{5}\times\sqrt{5}$ unit cell is clearly seen. It is currently assumed that Ti and its fourfold site O atoms were separately imaged with varying bias voltages, which indicates that TiO_2 plane is a basic plane of $\sqrt{5}\times\sqrt{5}$ surface superstructures. The dI/dV images simultaneously taken with topographic images were also obtained in filled states. Comparing our experimental results with the previous works, especially a theoretical study of O-vacancy model [1] and an experimental and theoretical study of Sr adatom model [2], possible structures on $\sqrt{5}\times\sqrt{5}$ surfaces will be discussed.

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

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