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STM study of lattice distortion effect on $Sr_3(Ru_{1-x}Mn_x)_2O_7$ surfaces[1] JISUN KIM, ZHENYU DIAO, JIANDI ZHANG, RONGYING JIN, E.W. PLUMMER, Department of Physics and Astronomy, Louisiana State University, Baton Rouge — The Ruddlesden-Popper ruthenates $Sr_{n+1}Ru_nO_{3n+1}$ (n=1 to ∞) exhibit a wide range of distinct electronic and magnetic properties due to strong coupling between charge, spin, lattice, and orbital degrees of freedom. For example, substituting Ru with Mn in $Sr_3Ru_2O_7$ (Sr327) leads to a metal-insulator transition (MIT) at T_{MIT}, as well as a magnetic phase transition from paramagnetic at high temperatures to long-range AFM ordering at T_M. In the parent compound (x=0), RuO_6 octahedra are rotated by $\sim 8^\circ$ in the bulk and the distortion is enhanced at the surface (12°) with the addition of tilt ($\sim 5^\circ$). With Mn doping, the rotation of octahedra at the surface does not change but tilt is eliminated. Our recent study of Mn doped Sr327 shows that the surface symmetry and Mn-induced local disturbance observed by scanning tunneling microscope (STM) changes with increasing Mn doping (6 to 16 %), suggesting that the surface electronic properties change with the concentration of Mn doping, driven by the structural change. By studying lower Mn doped Sr327 using STM/STS we delineate the relationship of size of the disturbance induced by Mn to surface metalicity. The result is also compared to 1 % Ti doped Sr327 case.

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