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The surface of $SrTiO_3$ (111): effect of annealing in vacuum and in oxygen[1] MOHAMMAD SAGHAYEZHIAN, LINA CHEN, GAOMIN WANG, HANGWEN GUO, JIANDI ZHANG, EARL W. PLUMMER, Louisiana State Univ. -Baton Rouge — The surface of $SrTiO_3$ (111) have created a new playground for new physics, exhibiting novel properties such as 2DEG and topological phases such as quantum spin Hall effect. Due to the polar nature of the surface, it is very susceptible to different kinds of reconstructions which results in various terminations. There has been a fair amount of investigations on $SrTiO_3$ (111) as a function of sputtering and annealing, while less attention has been paid to its reconstruction when the surface comes in contact with oxygen or the mere effect of annealing in vacuum. We have focused on the surface reconstruction and chemical composition of $SrTiO_3$ (111) as a function of annealing temperature and oxygen pressure using LEED and ARXPS. We observed that annealing in oxygen brings more Ti to the surface in comparison with annealing in vacuum. Our data show that the $SrTiO_3$ (111) surface is highly reactive and easily absorbs carbon. Furthermore, we show that in contrast to $SrTiO_3$ (001), where carbon tends to be physisorbed and can easily be removed by low temperature annealing, on $SrTiO_3$ (111), carbon only leaves the surface after annealing to very high temperature. Also, our data show that the presence of oxygen can facilitate de-contamination of the surface and makes the surface more ordered.

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