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The Effect of Polarization on Local Electronic Structure in Ferroelectric Nano-Domains in $BaTiO_3$ ERIE MORALES, Univ of Pennsylvania, CARLOS PEREZ, DAWN BONNELL, University of Pennsylvania, MSE TEAM — Novel ferroelectric $BaTiO_3$ applications ranging from sensors to nanogenerators require a detailed understanding of atomic interactions at surfaces. Single crystals provide a platform that allows the exploitation of surface physical and chemical properties that can be readily transferred to other ABO_3 perovskites. The processes that result in the atomic and electronic structures of surfaces in tandem with polarization of domains are necessary steps towards understanding $BaTiO_3$. Here we treat $BaTiO_3$ surface using sputtering-annealing cycles that yield the (6x1) reconstruction. We demonstrate that it is possible to pole a thin $BaTiO_3$ single crystal in ultra high vacuum using scanning tunneling microscopy (STM). We determine that we can prepare $BaTiO_3$ using *in-situ* annealing that allows us to control the size of poled region to 40nm. We pole in constant-current mode in STM by applying a bias of less than 10 V between tip and sample for 100ms. STM and scanning tunneling spectroscopy characterization allow us to map topography and local density of states, respectively. For a given unique pulse, the poled domains show a fluctuating electronic occupation of conduction bands and shifting of valence band. We will also discuss the effect of polarization on molecular adsorption.

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