Abstract Submitted
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Atomic control and characterization of surface defect states of TiO_2 terminated $SrTiO_3$.[1] A. KAREEV, University of Arkansas, M. KAREEV, S. PROSANDEEV, J. LIU, C. GAN, J.W. FREELAND, MIN XIAO, J. ZHANG, L. BRILLSON, J. CHAKHALIAN — By using a new wet-etch procedure[1] we have obtained high-quality atomically flat TiO_2 terminated surfaces of STO (100) single crystals with the surface morphology equivalent or better to that of the conventional routes. By applying a combined power of CL and PL, RHEED, AFM, and resonant XAS, we are able to identify and monitor the complex evolution of oxygen defect states and Ti ion valency at the surface and near-surface regions. Our data revealed a high level of local defects resulting in the presence of the $Ti^{3+\delta}$ states at the surface in the conventionally treated STO surface. We have developed an efficient method to control the defect states capable of a marked reduction of the defect concentration. We have demonstrated that the PL, CL and XAS are able to distinguish the surface-related Ti states from oxygen vacancies trapping charge transfer vibronic excitons.
[1]M. Kareev et al., Appl. Phys. Lett. 93, 061909 (2008).

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