

Abstract Submitted  
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**Atomically Resolved Surface of Laser-MBE Grown SrRuO<sub>3</sub> Thin Films**<sup>1</sup> A. TSELEV, P. GANESH, A.P. BADDORF, S.V. KALININ, Oak Ridge National Laboratory, Oak Ridge, TN — Surface of SrRuO<sub>3</sub> (SRO) thin films is of high interest since SRO layers are used as bottom electrodes in oxide heterostructures demanding sharp interfaces. Here we studied SRO films in-situ using STM with atomic resolution. Films were grown on undoped, SrTiO<sub>3</sub> substrates by laser-MBE. Depending on preparation conditions, the film surfaces exhibited varying reconstructions. Films deposited at 650°C and annealed at deposition conditions for 15 min. revealed surfaces with double-row 1D-structures along  $\langle 110 \rangle_{pc}$  of SRO. Atoms in the 1D-structures are packed in square or zigzag arrangements. The surface in-between the structures appeared poorly ordered. Similar patterns were observed on surfaces of films deposited at 700°C without anneal. In turn, deposition at 700°C with post-anneal resulted in well-ordered surfaces covered by double-rowed structures with square atomic arrangement. Ab initio DFT calculations show a high local DOS from oxygen adatoms with zigzag and square patterns contributing to STM images. Oxygen atoms have high adsorption energies and will be present at our growth conditions. Surface O-adatoms show AFM coupling to the film, with possible ramifications to understand interfacial bonding/magnetism between SRO and oxide-insulators.

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