

Abstract Submitted  
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**Preparing Atomically Flat Substrates for Oxide Film Synthesis<sup>1</sup>**

KEVIN KLEINER, CLAYTON FREDERICK, JIAN LIU, University of Tennessee Knoxville — Substrates with Perovskite oxide structures ( $ABO_3$ ) provide a useful base surface for growing artificial oxide layers through pulsed laser deposition (PLD). As-received substrate crystal pieces ( $10 \times 5 \times 0.5 \text{ mm}^3$ ) start with mixed termination as well as rough and possibly contaminated surface structures, but certain laboratory procedures can clean and treat the surface to prepare the substrate for growth. This methodology has been applied to  $\text{SrTiO}_3$  (001) (STO),  $\text{NdGaO}_3$  (001) (NGO),  $\text{GdScO}_3$  (001) (GSO), and  $\text{TbScO}_3$  (001) (TSO) substrates, and the resulting surface maps are analyzed at the micron level using atomic force microscopy (AFM). The results reveal that extended air annealing (temperatures  $> 1,000^\circ\text{C}$ ) most effectively removes terrace roughness and renders the step heights close to 0.4 nm for each substrate. Once the films are synthesized on a treated substrate, their unique electrical, magnetic, and functional properties can be studied with further experiments.

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