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Surface Properties and Thermal Behavior of Epitaxial $SrRuO_3$ Thin Films

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$SrRuO_3$ has attracted attention as a strongly correlated oxide with good conductivity. The growth and interface properties are dependent on surface stability with respect to contamination, reduction and loss of volatile ruthenium oxides. We have studied surfaces of high quality epitaxial $SrRuO_3$ thin films grown by pulsed laser deposition, exposed to air, then reinserted into vacuum, using low energy electron diffraction (LEED), scanning tunneling microscopy (STM) and electron spectroscopies including X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), and High Resolution Electron Energy Loss Spectroscopy (HREELS). To investigate the thermal behavior, $SrRuO_3$ thin films have been annealed in high vacuum in steps of 100ºC up to 800ºC and examined for chemical state, surface topography, and desorption products. We find that loss of SrO, from the first layer only, leads to disorder and leaves Ru rich particles, possibly a result of surface hydrocarbon contamination during air exposure.
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