

(111)_p microtwinning in SrRuO₃ thin films on (001)_p LaAlO₃

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Abstract: SrRuO₃ (SRO) thin films grown on (001)_p (p = pseudocubic) oriented LaAlO₃ (LAO) by pulsed laser deposition have been characterized using transmission electron microscopy. Observations along the $\langle 100 \rangle_p$ directions suggests that although the SRO layer maintains a pseudocube-to-pseudocube orientation relationship with the underlying LAO substrate, it has a ferroelastic domain structure associated with a transformation on cooling to room temperature to an orthorhombic Pbnm phase $a^-a^+c^+$ Glazer tilt system). In addition, extra diffraction spots located at $\pm 1/6(000)_p$ and $\pm 1/3(000)_p$ (where 'o' indicates an index with an odd number) positions were obtained in $\langle 110 \rangle_p$ zone-axis diffraction patterns. These were attributed to the existence of high-density twins on $\{111\}_p$ pseudocubic planes within the SrRuO₃ films rather than to more conventional mechanisms for the generation of superstructure reflections.