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Time Resolved Surface Diffuse Scattering During Oxide Growth[1]

J.Z. TISCHLER, B.C. LARSON, GYULA ERES, C.M. ROULEAU, Oak Ridge National Laboratory, P. ZSCHACK, Advanced Photon Source — The time dependence of surface x-ray diffraction during pulsed laser deposition provides detailed information about transverse surface structure and interlayer transport during layer-by-layer growth. To investigate the nature of growth during homoepitaxy of $SrTiO_3$, we measured the time-dependent evolution of surface diffuse scattering around the specular crystal truncation rod during deposition from a single laser shot (0.1 monolayer/pulse) on a pristine surface of (001) $SrTiO_3$. We observed the nucleation of very small islands and measured the time dependence of ripening into larger structures for the temperature range of 600 to 760C. We will relate these measurements to measurements of time-resolved diffuse scattering from multiple pulses during layer-by-layer growth and previous measuremens of time-resolved truncation rod intensities.

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