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Scaling of $SrTiO_3$ growth rates of using hybrid molecular beam epitaxy JASON LAPANO, MATTHEW BRAHLEK, LEI ZHANG, ROMAN ENGEL-HERBERT, Pennsylvania State University — Perovskites exhibit a wide range of desirable properties, including ferroelectricity, ferromagnetism, as well as transport properties ranging from superconductivity to Mott-like behavior. However, deposition is plagued by notoriously slow growth rates, as well as a high sensitivity to nonstoichiometric defects. In this work, we have been able to mitigate these barriers for $SrTiO_3$ films grown using hybrid molecular beam epitaxy (HMBE). In HMBE, one of the cations is supplied via a volatile metalorganic precursor. This allows for the development of a stoichiometric "growth window", similar to those seen in GaAs and to replicate the fast deposition rates achievable in GaAs growth. In-situ reflection high energy electron diffraction was used to assess film stoichiometry and efficiently determine the limits of the growth window. A series of $SrTiO_3$ films were grown on LSAT substrates at rates ranging from ˜25 nm/h to 500 nm/h. I will present x-ray diffraction, atomic force microscopy, and electron microscopy images to show homoepitaxial $SrTiO_3$ films are indistinguishable from the bulk substrate, even at these accelerated growth rates.

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