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Stoichiometric SrTiO3 Films via High Pressure Oxygen Sputter Deposition[1] PALAK AMBWANI, BHARAT JALAN, CHRIS LEIGHTON, Department of Chemical Engineering and Materials Science, University of Minnesota, USA — Defect management in epilayers of semiconducting complex oxides such as $SrTiO_3$ is a topic of considerable contemporary interest. Recent work has shown that sufficiently precise control over stoichiometry and defects in $SrTiO_3$ enables facile*n*-type doping, record high mobilities, and even simultaneous observation of quantum oscillations and superconductivity. Such progress has typically been made using techniques such as oxygen/LASER MBE or high-temperature PLD. In this work we demonstrate, via homoepitaxy on $SrTiO_3$(001), that RF high pressure oxygen sputtering from a ceramic target is similarly capable of growth of high-quality, stoichiometric $SrTiO_3$ films. We show that optimization of the deposition temperature (above 750 °C) and oxygen pressure (above 2.5 mBar) leads to the deposition of films indistinguishable from the substrate via grazing incidence and wide-angle x-ray scattering. The importance of a pre-treatment of the substrates in oxygen above 900 °C is emphasized. The defect density/stoichiometry was further probed via the transport properties of vacuum annealed samples with controlled O vacancy density. Finally, we also demonstrate that the stoichiometry and defect density of films deposited under non-optimal conditions can be remarkably improved via post-deposition heat treatment.

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