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**Growth of epitaxial poly-crystalline transition metal oxide thin films** SUNGMIN WOO, HOIDONG JEONG, SANG A LEE, HOSUNG SEO, Sungkyunkwan University, MORGANE LACOTTE, ADRIAN DAVID, CNRS UMR 6508, HYUN YOU KIM, Chungnam National University, WILFRID PRELLIER, CNRS UMR 6508, YUNSEOK KIM, WOO SEOK CHOI, Sungkyunkwan University — By comparing single- and poly-crystalline transition metal oxides (TMOs), one can study intriguing physical phenomena such as electronic and ionic conduction at the grain boundaries, phonon propagation, and various domain properties. In this work, we propose an approach to simultaneously fabricate single- and poly-crystalline epitaxial TMO thin films using substrate epitaxy of poly-crystalline $SrTiO_3$ (STO). In order to grow TMO thin films epitaxially with atomic precision, an atomically flat surface of the substrate is required. We first examined (100), (110), and (111) oriented single-crystalline STO surfaces, which required different annealing conditions to achieve an atomically flat surface. A poly-crystalline STO surface was then prepared at the optimum condition for which all the domains with different crystallographic orientations could be successfully flattened. Studying the surface properties (surface potential, topography, and orientation) of poly-crystalline STO helped us to understand the formation of the atomically flat surface. Based on our research, we envision expansion of the studies regarding the epitaxial poly-crystalline TMO thin films and heterostructures..

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