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Strain Relaxation in Buried $SrRuO_3$ Thin Film under a Biaxial Compression: $CaZrO_3/SrRuO_3/SrTiO_3$ System SOO GIL KIM, YUDI WANG, I-WEI CHEN, Deparment of Materials Science and Engineering, University of Pennsylvania — We have observed a novel strain relaxation phenomenon in the buried thin film that develops during the deposition of an overcoat layer. In $SrRuO_3/SrTiO_3$ (100) system, the $SrRuO_3$ film is initially in biaxial compression, but the strain relaxation develops after a $CaZrO_3$ overcoat is deposited, manifested as misfit dislocations at the $CaZrO_3/SrRuO_3$ interface and a cross-hatch pattern of surface corrugation on the $CaZrO_3$ surface. This arises because $CaZrO_3$ (0.4012 nm) has a larger lattice parameter than those of $SrRuO_3$ (0.393 nm) and $SrTiO_3$ (0.3905 nm), thus contributing to the strain energy. By increasing point defect population in $CaZrO_3$ to accommodate the misfit strain, this phenomenon can be avoided and atomically flat thin film stacks obtained.

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