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Spectroscopic ellipsometry study on doped $SrTiO_3$ superlattice films YUNSANG LEE, Y.K. SEO, Soongsil University, E. CHOI, J.W. SEO, J. LEE, Sungkyunkwan University — We report on the spectroscopic ellipsometry study on the low-dimensional confinement of chemical doping in $SrTiO_3$. We fabricated superlattice films composed of the stacking of insulating $SrTiO_3$ (STO) and metallic La-doped $SrTiO_3$ (SLTO) layers. As the dimensionality is varied from three to two dimensions by changing the thickness of the $SrTiO_3$ layers, phase transition from metal to insulator occurred through interplay of charge, spin, orbital, and lattice degrees of freedom. The optical conductivity spectra obtained from the spectrosocopic ellipsometry show a significant change below the charge transfer gap near 3 eV through the insulator-metal transition. We detail our spectroscopic finding on the STO/SLTO superlattice, and compare them with the transport and structural properties of the films.

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