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New metallic interface state in oxide artificial superlattices investigated by optical spectroscopy SUNG SEOK A. SEO, WOO SEOK CHOI, KYUNGWAN KIM, School of Physics and Research Center for Oxide Electronics, Seoul National University, Seoul 151-747, Korea, HO NYUNG LEE, Condensed Matter Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, LI YU, CHRISTIAN BERNHARD, Department of Physics, University of Fribourg, Fribourg, CH-1700, Switzerland, TAE WON NOH, School of Physics and Research Center for Oxide Electronics, Seoul National University, Seoul 151-747, Korea — Interfaces between the artificial structures of oxides have been attracting a lot of attention because of their novel physical properties, which are usually not obtained in single-phase bulk materials. As a model system to understand the interfaces between the Mott insulators and the band insulators, high quality artificial superlattices of $SrTiO_3$ / $LaTiO_3$ were epitaxially grown by pulsed laser deposition equipped with reflection high energy electron diffraction. Mid infrared-visible optical transmittance and reflectance spectra were measured to show highly conducting interface, providing clear evidences for electronic reconstruction at the interface. Moreover, temperature-dependent infrared ellipsometry results showed that the interface state was different from conventional metal, indicating a new two dimensional metallic state.

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