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Optical properties of Nb:$SrTiO_3$/$SrTiO_3$ superlattices WOO SEOK CHOI, SOON JAE MOON, Seoul National University, HIROMICHI OHTA, Nagoya University, BYUNG CHEOL JEON, JONG HOON SHIN, Seoul National University, YUN SANG LEE, Soongsil University, TAE WON NOH, Seoul National University — Recently, oxide heterostructures are being extensively investigated as an effort to understand unusual physics occurring at the oxide interfaces. For example, formation of 2DEG or strongly modified electronic structures at the interface between two different oxide constituents have been examined carefully and understood to some extent. In this contribution, we studied the electronic properties and phonon dynamics of Nb:$SrTiO_3$/$SrTiO_3$ superlattices. Using optical spectroscopy, we obtained the optical conductivity for a wide range of photon energy (3.7 meV – 6 eV). We could separately identify the free carrier response and the phonon dynamics of the superlattice. The carrier density and unusually small scattering rate were obtained varying temperature as well as the superlattice period. In addition, we could reveal a strong electron-phonon coupling from the existence of the spectral weight in mid-IR photon range.

Woo Seok Choi
Seoul National University

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