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Optical properties of the doped Bi_2Te_3 single crystals: electron-phonon coupling and bulk-boundary correspondence BYUNG CHEOL PARK, Department of Physics, Yonsei University, N.H. CHO, K.J. LEE, M.H. JUNG, Department of Physics, Sogang University, JAE HOON KIM, Department of Physics, Yonsei University — We studied the optical properties of Bi_2Te_3 single crystals doped with La (8%), Ce (8%), Fe(8%, 15%) via a combination of terahertz time-domain spectroscopy and spectroscopic ellipsometry. We observed the Drude peak and the in-plane phonon near 60 cm^{-1} in the optical conductivity in the terahertz regime as well as the absorptions corresponding to the bulk interband transitions in the far-infrared and the visible-ultraviolet regions. We confirmed that the terahertz in-plane phonon asymmetry can be employed as spectroscopic evidence in order to investigate the electron-phonon interaction arising from external dopants while the bulk band structure can be determined from ellipsometry.

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