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Probing electronic structure and electron-phonon interaction in borides using optical spectroscopy JEREMIE TEYSSIER, ALEXEY KUZMENKO, RICCARDO TEDIOSI, DIRK VAN DER MAREL, DPMC, University of Geneva, 1211 Geneva 4, Switzerland, NATALJA SHITSEVALOVA, VLADIMIR FILIPPOV, IPMS, Academy of Sciences of Ukraine, 252680 Kiev, Ukraine — We report optical properties of high-quality single crystals of boron type superconductor ZrB_{12} (T_c=6 K) in the normal state from 20 to 300 K. The optical conductivity was measured from (6 meV-4 eV) by a combination of reflectivity and ellipsometry. The Drude plasma frequency and interband optical conductivity calculated by self-consistent full-potential LMTO method agree well with experiments. The $\alpha^2F(\omega)$ function extracted from optical spectra presents two peaks at 25 and 80 meV with partial coupling constants of 0.8 and 0.3 respectively. The low energy peak corresponds to the displacement mode of Zr inside B_{24} cages, while the second one involves the rigid boron network. In addition to the usual narrowing of the Drude peak with cooling down, we observed an unexpected removal of about 10 % of the Drude spectral weight which is partially transferred to the region of the lowest-energy interband transition ($\approx$ 1 eV). This effect may be caused by a delocalization of the metal ion from the centre of the B_{24} cage. The discussion will refer to recent work on other boron rich compounds.

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