

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Anisotropic Drude response in $\text{Mg}(\text{B}_{1-x}\text{C}_x)_2$ TERUHISA KAKESHITA, SERGEY LEE, SRL-ISTEC, SETSUKO TAJIMA, Osaka University, SRL-ISTEC TEAM, OSAKA UNIVERSITY COLLABORATION — There exists an unsolved issue on MgB_2 that a plasma edge estimated from optical spectra so far is conspicuously inconsistent with a band calculation. It is mysterious since experimental band dispersions by ARPES are marvelously coincident with the band calculation. We report on a- and c-axis optical responses in $\text{Mg}(\text{B}_{1-x}\text{C}_x)_2$ using small single crystals and a FTIR spectrometer combined with an optical microscope. It was verified that the Drude responses show the anisotropy between a- and c-axis. The observed plasma frequencies $\omega_{p'}$ are considerably small compared to a theoretical value ($\sim 7\text{eV}$), whereas the bare ones ω_p , estimated from a sum rule of optical conductivity $\int d\omega\sigma(\omega) = (\pi/2)\omega_p^2 = (\pi/2)\varepsilon_\infty\omega_p'^2$, are fairly coincident with it. We also discuss an effect of carbon-substitution on carrier concentration and scattering rate in a multiband system. This work was supported by the New Energy and Industrial Technology Development Organization (NEDO) through ISTEC as the Collaborative Research and Development of Fundamental Technologies for Superconductivity Applications.

Teruhisa Kakeshita
SRL-ISTEC

Date submitted: 06 Jan 2006

Electronic form version 1.4