FT-IR evaluation of SmFeAsO$_{1-x}$F$_x$ (x = 0, 0.069)

HAJIME SHINOHARA, YOICHI KAMIHARA, Department of Applied Physics and Physico-Informatics, Keio University — Optical properties of superconducting SmFeAsO$_{1-x}$F$_x$ (x=0, 0.069) were demonstrated by reflection measurement with FT-IR method. Polycrystalline SmFeAsO$_{1-x}$F$_x$ samples were synthesized using two-step solid state reaction described elsewhere [New J. Phys. 12, 033005 (2010)]. Purity of samples was checked by X-ray diffraction patterns using Cu K- alpha radiation. The reflection measurement was performed at the range from 9000 cm$^{-1}$ to 18000 cm$^{-1}$ that was corresponded to an energy region from 1.12 eV to 2.25 eV. A photoconductivity of SmFeAsO$_{1-x}$F$_x$ was determined by Kramer-Kroning (KK) relation. Reflectivity and photoconductivity measurements, as well as by FT-IR, at various areas were performed to define an energy level of materials [EPL, 84 67013 (2008), and J. Phys. Soc. Jpn. 80 013707 (2011)]. Obtained photoconductivity and reflection spectra were similar to those of LaFeAsO$_{1-x}$F$_x$ that was a basic compound of LnFeAsO$_{1-x}$F$_x$ (Ln=La, Ce, Sm), reported by Z. G. Chen et al [Phys. Rev. B 81, 100502 (2010)]. Our result suggests that the energy band structure of SmFeAsO was affected by F-doping even in visible area. Details and temperature dependence of the reflection and photoconductivity spectra will be presented at the conference.