

Current status of the magneto-optical station in BL43IR at SPring-8 - the application to the study of the charge-spin degrees of freedom in the π - d coupled electrons system -

Takahiko Sasaki¹, Satoshi Iguchi¹ and Yuka Ikemoto²

¹Institute for Materials Research, Tohoku University, Japan

²SPring-8, JASRI, Japan

Magneto-optical station in BL43IR at SPring-8 was constructed in 2001. The station could provide characteristic conditions for investigations of the low-energy excitations in the correlated electrons system, narrow/zero-gap semiconductors and magnetic materials by infrared optical studies. Although the competitive specifications of the station - high magnetic fields of 14 T, low temperatures down to 5 K, and high space resolution of several 10 micrometer - availability situation by end-users has not been enough for a while. In actual, the station has not been operated after 2008. The authors planned to reconstruct the station for taking advantage of the characteristic specifications as a project of the Partner User (PU) program of JASRI in 2016A-2017B and 2018A-2019B.

The following renovations have been conducted in the PU program.

- Extension of the measurement energy range from only the mid-infrared to the far- and mid-infrared optical region (~ 20 meV (with Si bolometer) ~ 1 eV (with MCT)) by FT-IR spectrometer.
- Easy optical adjustment of the microscope system by end-users themselves.
- Improvement of the total rigidity and stability of the optical path.
- Replacement of the cryostat system totally for low liquid helium consumption (< 0.5 L/hour in 15 - 300 K, < 2 L/hour at ~ 5 K) and easy operation including short-time sample setting and optical windows replacement.

From 2017A period, the renovated station is open for user applications in parallel to the continual improvements. In addition to the user supports, we investigate the coupling of the charge ordered insulating state of π -electrons and the local spins of d -electrons in an organic charge transfer salt α' -(BEDT-TTF)₂RbCo(SCN)₄.

In this talk, we will present the current status of the renovated magneto-optical station in BL43IR and the tentative experimental results of the infrared optical spectroscopy under magnetic fields in organic conductors.