XAFS Studies of Local Structure of Thin Film of Alkali Halide Single Crystals

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Single crystals grown between thin quartz plate have been extensively studied mainly in the energy region of intrinsic absorption of valence electrons.1) As the thickness of the samples is typically less than of the order of μm, the transmission of the photons in the intrinsic absorption region can be measured. The materials show various interesting properties such as shift in energy of the absorption edge, appearance of new emmision bands. The properties have been interpreted due to the strain caused by the confinement of the crystal into very thin region between two quartz plate. However, no direct observation of the deformation of the materials has been done so far.

X-ray absorption is one of the appropriate techniques for the study. For the first stage of the study, we planned to measure the X-ray absorption of Br K-edge of KBr, RbBr and I K-edge of KI and Rbl, and subsequent measurement of the thin crystal samples with fluorescence detection of the above edges. However, due to various experimental difficulties at the first stage of the experiments, we only succeeded to measure the absorption spectra of powder samples. Samples were ground as fine powder, and spread onto adhesive tape. Several sheets of tapes were stacked to have proper thickness for the absorption. Measurements were performed at various temperatures between 10 K and room temperature. Si (111) surface was used for the monochromator crystal.

In Figs. 1 is shown the Br K absorption spectrum of KBr at room temperature. The spectrum of the same material measured at BL-7C at the Photon Factory is also shown for the comparison. The resolution of the spectra are remarkably better in this beam line than in the Photon Factory. The I K absorption was also possible to measure with Si (111) surface as shown in Fig. 2. These are one of the examples of the quality of the beam at the SPring-8.

We plan to continue the experiments to investigate the local structure of the single crystal of the thin film.

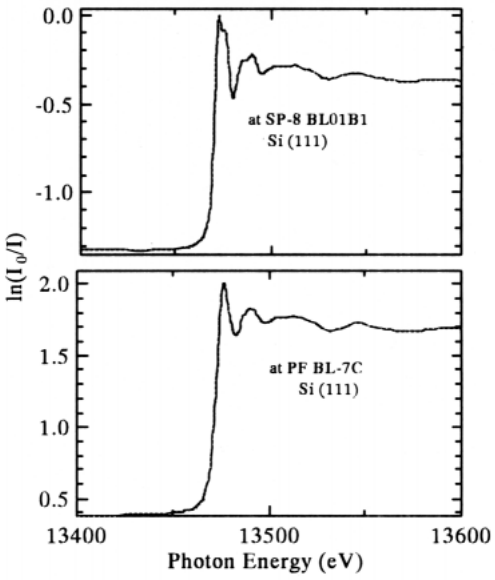

Fig. 1 Br K absorption of KBr at RT.

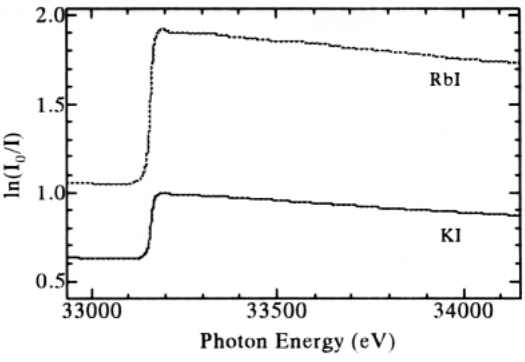

Fig. 2 I K absorption at RT with Si (111).

Reference: 1. M. Inaba and S. Hashimoto, Phys. Stat. Sol. (b) **195**, 433 (1996).