General evaluation of XAFS beamline I - XAFS in the high energy region -

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The radiation spectrum from a bending magnet at the SPring-8 storage ring shows sufficient photon density to observe qualitative XAFS (X-ray Absorption Fine Structure) spectra even at 100 keV. This advantage makes it possible to measure XAFS spectra near K absorption edges of almost all elements. However, it is theoretically pointed out that the finite lifetime of a core hole smears out EXAFS (Extended X-ray Absorption Fine Structure) oscillation, and that this effect becomes more serious for K absorption edges of heavier elements.

XAFS spectra near K absorption edges of Ce (40.5 keV), Dy (53.8 keV), Ta (67.4 keV), Pt (78.4 keV) and Pb (88.0 keV) were measured at BL01B1. Measurements were carried out in transmission mode with Si (511) planes of an adjustable inclined double-crystal monochromator. The incident and transmitted x-ray intensities were monitored with ionization chambers with flowing Kr gas. The energy resolution was estimated as good as 7 eV at Pt K-edge, benefitted from the high brilliant x-rays from the Storage ring. Figure 1 shows XAFS spectrum near the Pt-K edge of Pt foil. Blunt edge jumps and reduction of EXAFS amplitudes were observed due to the finite lifetime effect of the core hole. Local structure parameters have been evaluated from EXAFS signals above the K-edges and have been compared with those obtained from EXAFS signals above their L_{III}-edges. It was found that they were in good agreement with each other, and that the lifetime effect was effectively taken into the mean-free-path term of photoelectrons as predicted theoretically.

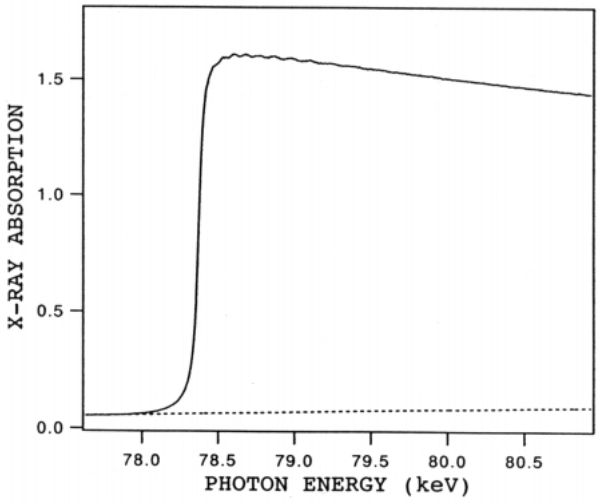

Fig. 1 XAFS spectrum near the Pt-K edge of Pt foil at RT.