

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

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We have sufficient photon density even at 100 keV from a bending magnet at SPring-8 storage ring so as to observe qualitative XAFS (X-ray Absorption Fine Structure) spectra near K absorption edges for almost all heavy elements. Especially, EXAFS spectra with K absorption edge are anticipated in order to improve the accuracy of local structure parameters for elements, e. g. lanthanoids.

Measurements were carried out at beamline BL01B1 in transmission mode with Si (511) planes of the adjustable inclined double-crystal monochromator. The incident and transmitted x-ray intensities were monitored with flowing Kr gas ionization chambers. It took 5 sec to monitor the x-ray intensities for each data point. Counting of higher-order harmonics was estimated to be less than 1 % in comparison with that of the K edge energy, by considering both of photon flux of the source and efficiency of the detector. The high-brilliance x-rays of third generation synchrotron radiation source enable us to measure XAFS spectra with better energy resolution than before. The energy resolution near the Pt K edge were estimated to be 7 eV from the vertical size of the x-ray source (0.1 mm) and the width of the vertical slit at 47 m from the source (0.2 mm). Since the width of the rocking curve of the monochromator crystal is sharp, the first crystal holder is equipped with a piezo actuator for keeping the crystals in parallel during the scan.

Figures 1 (a) and (b) show the x-ray absorption spectra near the Pt K edge (78.4 keV) of a Pt foil measured at room

temperature and at 12 K, respectively. The amplitude of the EXAFS oscillation at 12 K increases considerably against the smearing effect due to the finite lifetime of the core hole, indicating that it is very sensitive to the Debye-Waller factor at high-k values. We could not observe any EXAFS oscillation above the Pb K edge (88.0 keV) at room temperature before. However, we have succeeded in observing the EXAFS oscillation above the Pb K edge at low temperature.

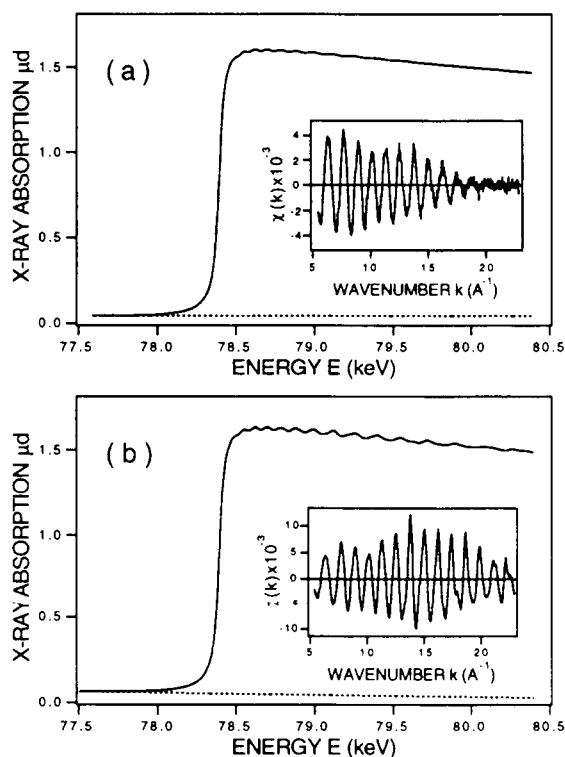


Fig. 1 XAFS spectrum near the Pt-K edge of Pt foil (a) at RT and (b) at 12 K.