Industrial Consortium BM (BL16B2)

1. Introduction

The Industrial Consortium BM Beamline for Materials Research (BL16B2), together with its sister beamline BL16XU, is designed by an industrial consortium of 13 companies, in cooperation with JASRI. This bending magnet beamline covers the photon energy from 3.5 keV to 60 keV.

XAFS, X-ray topography, and X-ray reflectivity measurement systems were constructed and preliminary experiments were made in the summer run of 1999. The beamline has been open to user experiments since the autumn run of 1999. The layout of BL16B2 and BL16XU is shown in Fig.1.

2. Light Source and Optics

The light source is a bending magnet (B2 type) with critical energy of 28.9 keV. This spectral feature is advantageous to the XAFS measurement of heavy elements. The optics of this beamline consist of the standard double crystal monochromator at SPring-8, and a bent cylindrical mirror. As for the monochromator, we use either Si(111) or Si(311) crystal for XAFS and X-ray topography.

The bent cylindrical mirror is set downstream of the monochromator with an incidence angle of 5 mrad. The reflecting surface is a thin film of Rh on fused-quartz substrate. This mirror suppresses the higher harmonics in the photon energy from 4.5 keV to 14 keV, and focuses the beam on the sample alone.

3. Experimental Station

Apparatus for XAFS, X-ray topography, and X-ray reflectivity measurement can be set up on a common base, using slits, ionization chambers, detectors, and several goniometers. XAFS spectra are obtained using a transmission and a fluorescence mode. We measure XAFS spectra of Ti-compound at the Ti K-edge. We measure the topograph of Si crystal using the X-ray plane wave method. We also obtain the surface selective topograph of partially oxidized Si surface. X-ray reflectivity of a thin film sample is obtained with the dynamic range of more than six digits.

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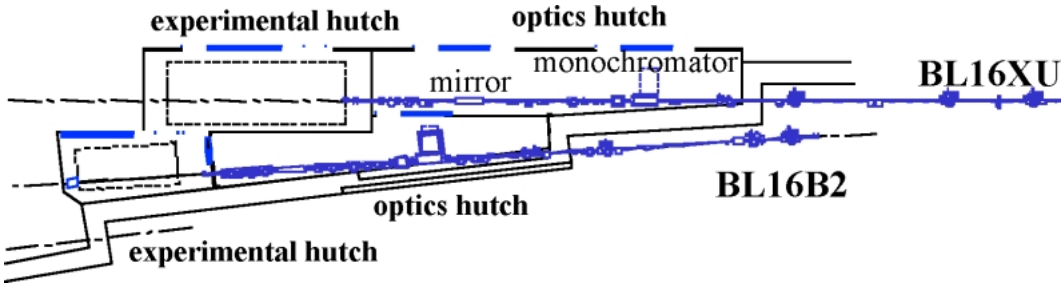

Fig. 1. Layout of beamline (BL16B2, BL16XU)

Light Source	
Type	Bending magnet (BL16B2)

X-rays at Sample	
Energy range	3.5 - 60 keV
Energy resolution	$\Delta E/E \sim 10^{-4}$ (4.5-20keV)
Photon flux	10^{10} ph/s
Beam size (with mirror)	5 mm(V) × 60 mm(H)
(without mirror)	0.1 mm × 0.1 mm

Facilities in Experimental Station
* Experimental table
* Precision goniometer
* Two-axes (ω1, ω2) precision goniometer
* Two-axes (ω-2θ) goniometer
* 4-jaw slit
* SSD, SC, and IC as detectors
* Stage for XAFS experiment
* Cryostat
* Motor control and data acquisition system using a PC