

BL46XU R&D (2)

This X-ray undulator beamline is allotted for the second 'R&D beamline' such as a R&D of the new insertion device. Here is now installed the hybrid undulator which consists of 186 magnet pieces of 24 mm undulator period.

A rotated-inclined double monochromator is used to manage the high heat load. The photon energy from 12 to 25 keV can be obtained by combination of the fundamental undulator peak and Si 111 reflection.

The multiaxial diffractometer was installed in the experimental hutch. This diffractometer has two sets of 2-axis sets (horizontal and vertical set) and an ellipsometric analyzer type rotating axis. This diffractometer is controlled by the computer installed SPEC.

Area of research

Insertion devices R&D

Resonant and non-resonant magnetic scattering structural analysis

Keywords

Scientific field

Method and instrumentation, Magnetism, Liquid-solid interface, Strain

Equipment

Diffractometer, Cryostat, Electric magnet, PSPC, SPEC

Source and optics

X-rays at sample

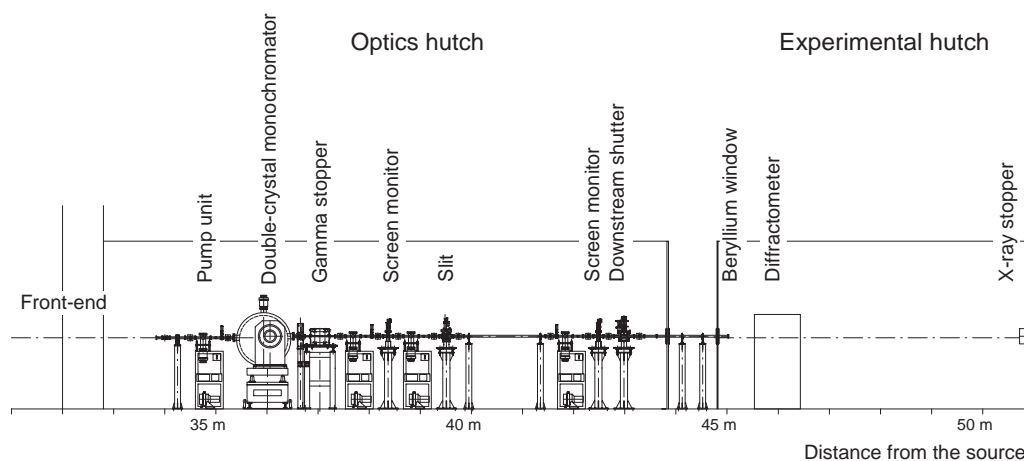
Energy range	12 ~ 25 keV (first harmonic of the undulator)
Energy resolution	$\Delta E/E \sim 10^{-4}$
Photon flux	4.6×10^{12} ph/s
Beam size	$< 1 \text{ mm}^2$

Experimental stations

The multi-axis diffractometer installed in the experimental hutch is suitable for precise measurements of superlattice points and diffuse scattering around Bragg points with changing the condition such as the temperature and the pressure. This diffractometer allows diffraction experiments

in both the vertical and the horizontal planes in a four-circle geometry. An analyzer assembly mounted on the 2θ arm provides high-Q resolution when necessary. In addition, an assembly for polarization analysis can be mounted on the 2θ arm. A cryostat is implemented on the diffractometer. The intensity of incident X-ray are monitored by the Gas flow type ion chamber and the scattered X-ray intensity is measured by the scintillation counter. All movements of diffractometer, the detector, the slit, the attenuator, and the mirror are controlled using the SPEC program.

Figure 1 shows HUBER 5020 eight-axis diffractometer. Table 1 shows the type model and resolution of eight axes. Table 2 shows the specifications of a detector and a cryostat installed in the diffractometer system.



Schematic view of beamline



Fig.1. The eight-axis diffractometer in experimental hutch

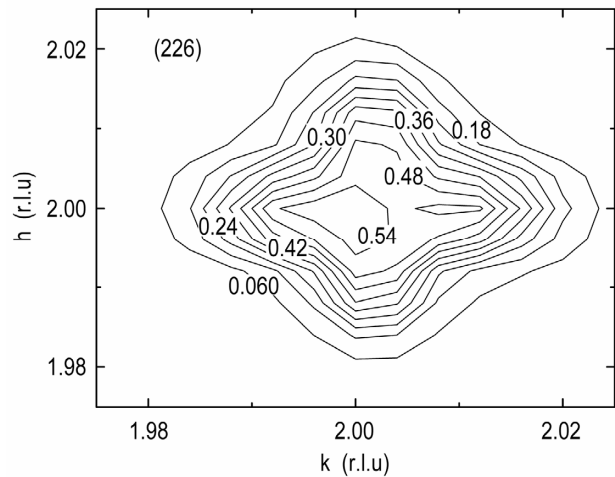


Fig.2. The contour map around (226) peak in the reciprocal space

Table 1. The resolution of eight-axes of HUBER diffractometer

Circle	Type of model	Resolution / deg
ω (vertical)	430	0.001
ϕ	512.1	0.001
χ	512.1	0.001
2θ (vertical)	440	0.001
Ω_a	410	0.001
$2\theta_a$	410	0.001
ω_z (horizontal)	440	0.001
$2\theta_z$ (horizontal)	480	0.001

Table 2. The detector and the cryostat equipped with BL46XU

Detector	<ul style="list-style-type: none"> • Ge solid state detector Detectable area : 100 mm² • Scintillation counter • Gas flow type ion chamber
Cryostat	<ul style="list-style-type: none"> • Built-in goniometer head Control range of temperature : 15 ~ 300 K

An example of data

Figure 2 shows the typical data at BL46XU. This figure is the contour plot of the measured diffuse scattering intensity of a transition metal oxide around the 226 reflection. The 206 and 026 reflections also exhibit diffuse scattering intensities. This result suggests the existence of lattice distortion in this system. BL46XU is suitable for the measurement such as diffuse scattering whose intensity is weak because the X-ray intensity at samples is much stronger.

Contact information

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