BL14B1 JAERI Materials Science I

This beamline is designed for the various kinds of experiments on diffraction and XAFS-type spectroscopy in the energy range of 5~90 keV for monochromatized beams and 5~150 keV for white beams. The main optics refers to the standard SPring-8 bending magnet system with two mirrors and a fixed-exit double crystal monochromator. These optical elements can be removed completely for the experiment with white beams. This beamline has two experimental hutches: one is dedicated to high pressure experiments, while the other is dedicated to structure analysis of surface and interface, glass, ferroelectrics, catalysts, metals, etc.

Area of research

Materials science at high pressure

Structure physics

Keywords

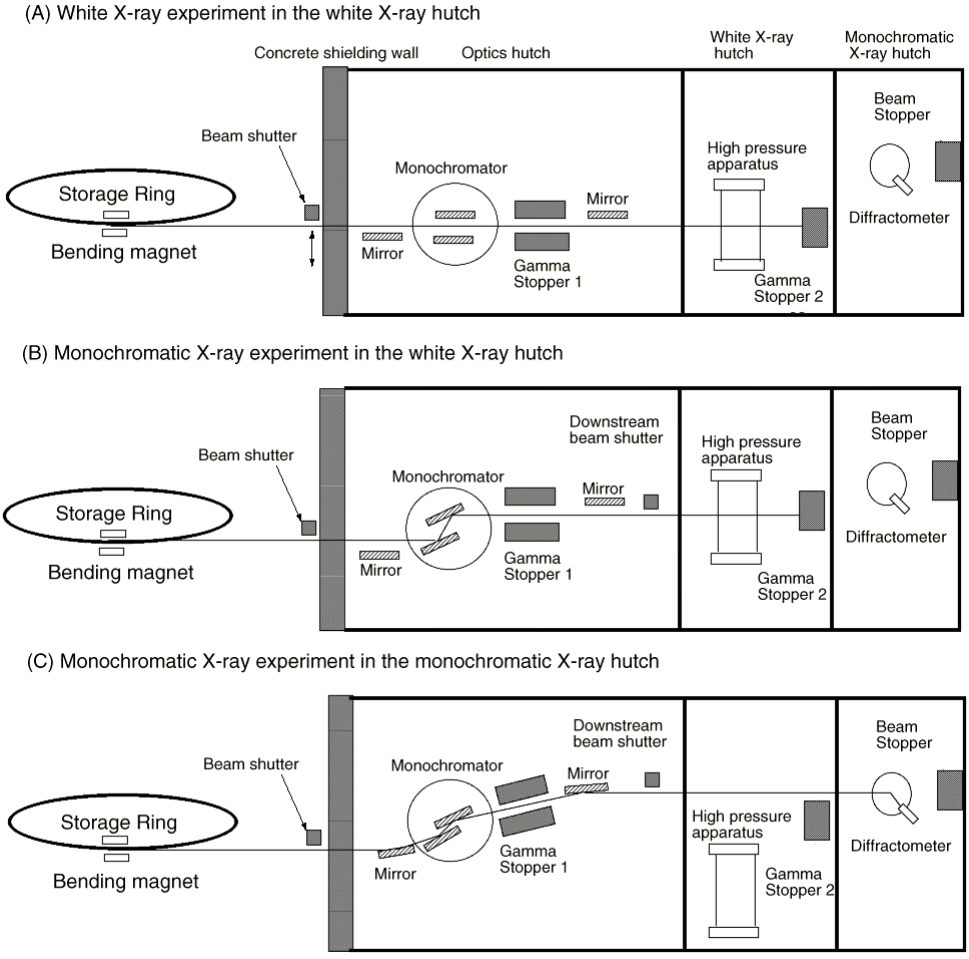
Scientific field

X-ray diffraction, XAFS, High pressure, High temperature, Surface, Interface, Glass, Catalyst, Ferroelectrics, Metals

Equipment

Cubic anvil type high-pressure apparatus, Energy dispersive x-ray diffractometer, κ-type multi-axis diffractometer

Source and optics



Schematic drawing of beam arrangements in the white X-ray hutch and the monochromatic X-ray hutch of the BL14B1 beamline

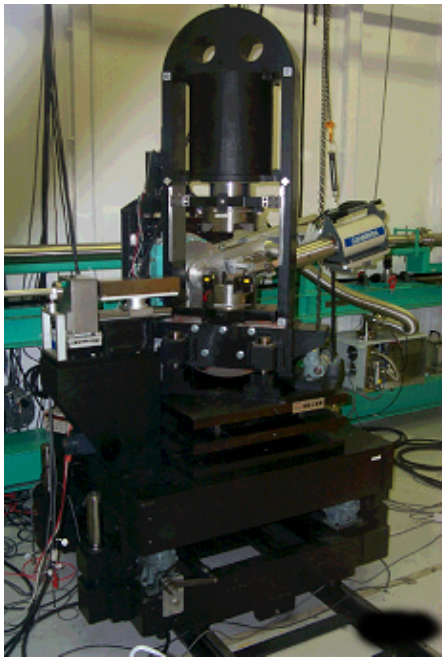
X-rays at sample

Monochromatic

Energy range	5.0 ~ 90 keV
Energy resolution	Si (111) : $\Delta E/E = 10^{-4}$
	Si (311) : $\Delta E/E = 3 \times 10^{-5}$
	Si (511) : $\Delta E/E = 7 \times 10^{-6}$
Photon flux	10^{10} ph/s
Beam size	1×1 mm^2

White

Energy range	5.0 ~ 150 keV
Photon flux	~ 10^{13} ph/s
Beam size	1×1 mm^2



SMAP2

κ-type multi-axis diffractometer

Experimental stations

Measurement

- Gas-flow type ion chamber with the gas supply system
- Scintillation counter
- Si solid-state detector
- Measurement devices

  Power supply for NIM bin, High voltage power supplies for ion chamber and SSD, Counter MCA, etc.

Sample

- A cubic anvil type high-pressure apparatus (SMAP2) with a one-circle goniometer for powder x-ray diffraction, which can generate high pressures up to 13GPa and high temperatures up to 2400 °C.
- A κ-type multi-axis diffractometer with a cryostat from 10 K to RT and with an electric furnace from RT to 700 °C.

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