BL24XU Hyogo

This beamline is designed for conducting various experiments performed by the members of new material, bio-crystallography and industrial users teams organized by Hyogo prefecture. Employing a figure-8 undulator which can provide both vertically and horizontally polarized hard X-rays, three experimental equipments for different purposes can be operated simultaneously. Two double-crystal monochromators composed of diamond crystals are placed in the center of a white beam from the undulator to introduce monochromatized X-rays to a bio-crystal structure analysis hutch (experimental hutch A) and a material characterization hutch (experimental hutch B). The latter hutch enables *in-situ* grazing incidence X-ray diffraction to observe atom arrangements during epitaxial growth using metal-organic chemical vapor sources. Therefore, a disposal system for exhausting gases has been completed.

A microbeam with a size of smaller than 1 μm and also a microbeam with a small angular divergence have been developed in the experimental hutch C1 and C2, respectively, with respect to its application for material and life science.

Area of research

Structure analysis of small bio-crystals for industry

Surface/interface analysis of metallic materials for industry (fluorescent X-ray analysis and strain measurements)

Surface/interface analysis during metal-organic chemical vapor deposition (grazing incidence X-ray diffraction)

Microbeam formation studies for materials and life science

Keywords

Scientific field

Structural analysis of bio-crystals, Surface/interface analysis, Phase-contrast imaging, Microscopic phase measurements, Strain measurements

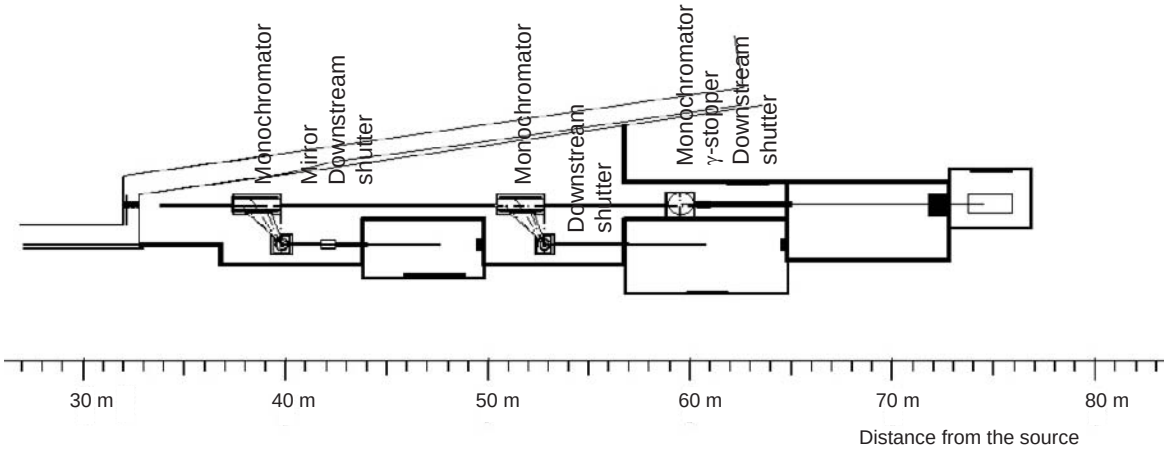
Equipment

Diffractometer for bio-crystals, 6-axis X-ray diffractometer, Metal-Organic Chemical Vapor Deposition (MOCVD) equipment, X-ray microscope, High resolution X-ray diffractometer

Source and optics

X-rays at sample

Energy resolution	$\Delta E/E < 10^{-4}$
Photon flux	$\sim 10^{12}$ photons/s
Beam size	< 1 mm



Schematic view of beamline

Experimental stations

Hutch A

A diffractometer with two types of detectors (an imaging plate area detector [Rigaku R-AXIS V] and a CCD camera [Rigaku Jupiter 210]), a kappa-goniometer, and a cryo-cooling system

(Structural analysis of small bio-crystals for industry)

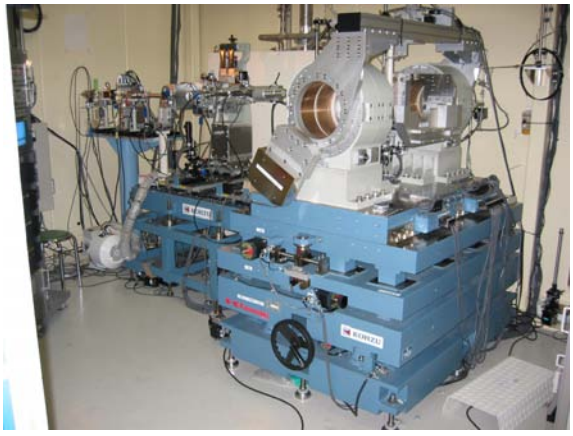
[Hyogo Science and Technology Association]

Hutch B

(i) High precision multipurpose 6-axis X-ray diffractometer with supply and exhaust equipment for incombustible gases

(Multipurpose industrial applications)

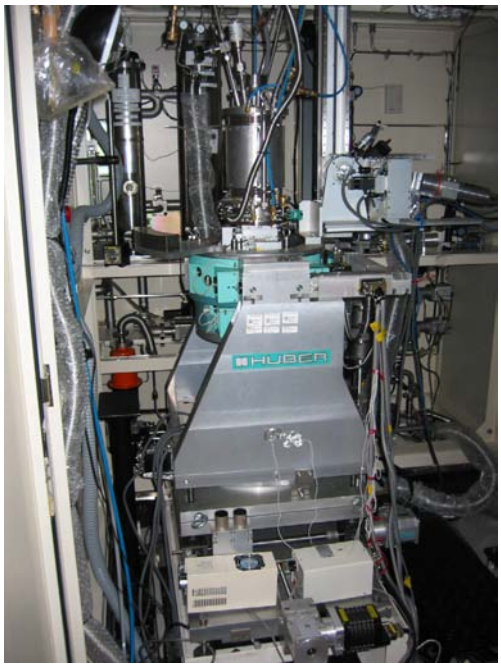
[Hyogo Science and Technology Association]



(ii) *In-situ* surface X-ray diffractometer for metal-organic chemical vapor deposition (MOCVD) with Z-axis diffractometer, material sources delivering system for MOCVD growth and neutralization system for exhausted gases

(Surface/interface analysis during metal-organic chemical vapor deposition)

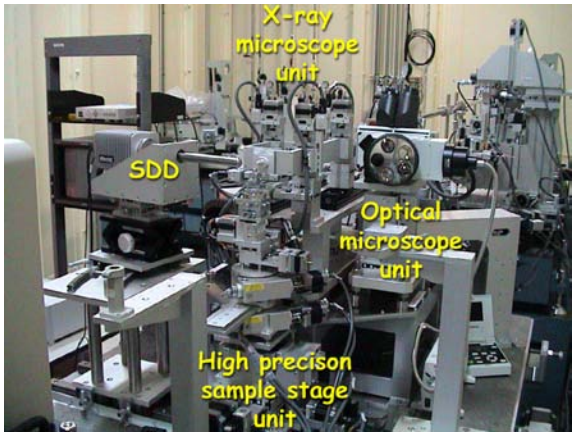
[NTT]



Hutch C1

X-ray microscope. It is used for a scanning microscope for 2D mapping of trace elements in samples, an imaging microscope with/without Zernike's phase-contrast optics, a micro-interferometer for microscopic phase measurements, micro-CT, measurements of strain distribution with θ-2θ micro-diffraction arrangement and structural analysis of micro-area in polymers using imaging plate detectors.

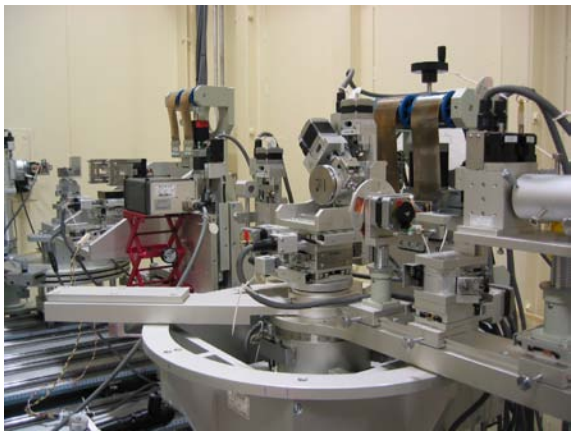
[Himeji Institute of Technology/Hyogo Science and Technology Association]



Hutch C2

High resolution X-ray diffractometry in a very local area less than several μm^2

[Himeji Institute of Technology/Hyogo Science and Technology Association]



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