BL16XU Industrial Consortium ID

This beamline, together with its sister beamline BL16B2, is designed by an industrial consortium of 13 companies to characterize various materials developed for industrial purpose.
The main experiments are fluorescence X-ray analysis of trace elements on Si wafer surfaces, X-ray diffraction experiments on thin films with nanometer-scale thickness, microscopic observation of materials and micro-fabricated devices by using X-ray microbeams with spot sizes of 1 μm or less.

Area of research

Characterization of thin films for VLSI and magnetic devices, catalysts, functional materials, and structural materials

Keywords

Scientific field

Fluorescence X-ray analysis with total-reflection X-ray fluorescence (TXRF), X-ray diffraction experiments of thin films in out-of-plane and in-plane configurations, Scanning X-ray microscopy by using X-ray microbeams.

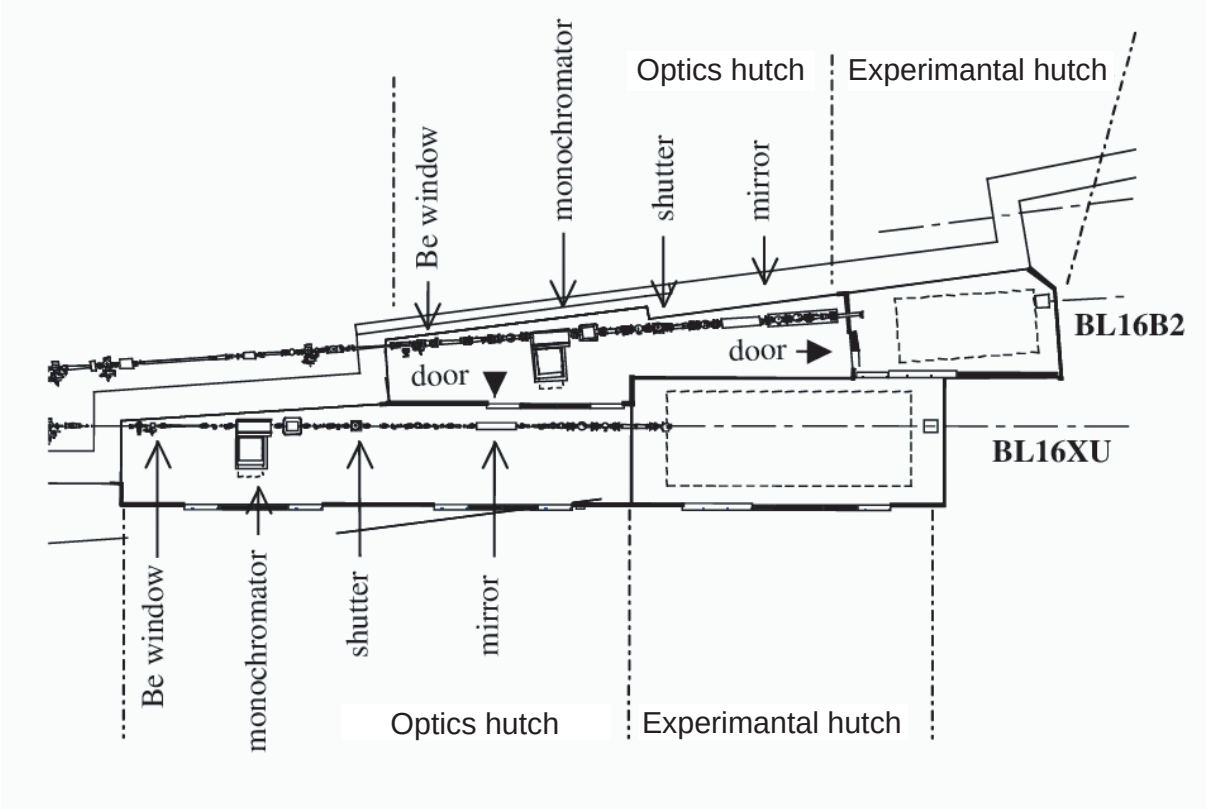
Equipment

X-ray fluorescence-analysis system with a wavelength-dispersive and an energy-dispersive detector, Four-circle diffractometer with a YAP (Ce) or a NaI (Tl) scintillation counter, Scanning X-ray microscope with fluorescence, diffraction, transmission detection mode.

Source and optics

X-rays at sample

Energy range		4.5 ~ 40 keV
Energy resolution		$\Delta E/E \sim 10^{-4}$
Photon flux	normal	$> 10^{12}$ photons/s less than 1 mm beam size
	focusing	$\sim 10^{9}$ photons/s less than 1 μm beam size



Schematic view of beamline

Photograph of beamline BL16XU and BL16B2

Experimental stations

Apparatuses for diffraction, fluorescence analysis, and microbeam experiments are installed in tandem.

- Fluorescence analysis system (fig.1)
  - Analyzer crystals for wavelength-dispersive spectrometry
  - Silicon drift detector or solid-state detector for energy-dispersive spectrometry
- Diffraction system (fig.2)
  - 4-circle diffractometer with an automatic software
  - NaI (Tl) or YAP (Ce) scintillation counter
- Microbeam experiment system (fig.3)
  - Two elliptic mirrors (Kirkpatrick-Baez configuration)
  - XZ table (resolution : 10 nm/pulse, stroke : 20 mm)
  - Imaging plate for micro-diffraction experiments

Fig.1. Fluorescence analysis system

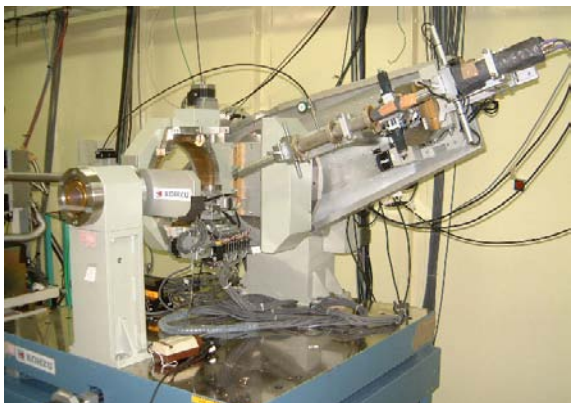


Fig.2. Diffraction system

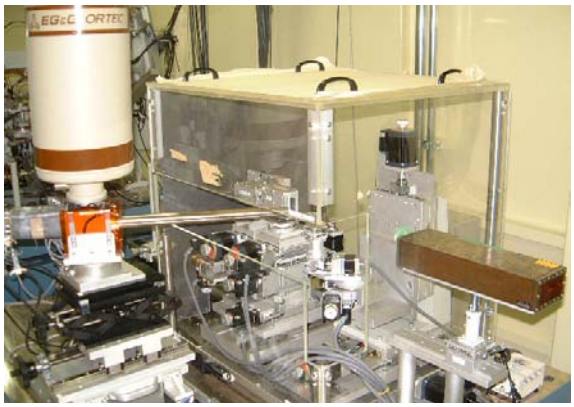


Fig.3. Microbeam experiment system

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