

# JAERI Actinide Science (BL23SU)

BL23SU [1] is the only soft X-ray undulator beamline among Japan Atomic Energy Research Institute beamlines. It has been constructed for soft X-ray spectroscopy studies in a wide variety of applications at the SPring-8. An insertion device (ID23) has been installed (in 1997 [2]) in the storage ring of SPring-8 at BL23IN as a light source. This is a double-array variable undulator of APPLE-2 (advanced planar polarized light emitter) type which produces both linearly and circularly polarized soft X-rays. The energy range of the soft X-rays from 0.5 keV and 1.5 keV in the circular polarization mode is covered by the first harmonic. The ID23 has been studied for polarization switching.

Below the front-end components, we have constructed a Hettrick-Underwood type monochromator [3]. This consists of an entrance slit, spherical mirrors, varied-line-spacing plane gratings, an exit slit, a post-focusing mirror, and refocusing toroidal mirrors. The beamline is a multipurpose beamline and partly specialized for studies of actinides and radioactive materials. The experimental stations for actinide samples will be placed in a hot sample area that is separated from the common experimental hall. The X-rays are guided over a very long distance across the two areas and the last focus-point is located over 120 m from the undulator. The first beam was guided into the second building in December 1999.

The beamline has four experimental stations in a tandem fashion: a surface chemistry station (installed in 1999 [4]), an electron paramagnetic resonance on

biological molecule station (installed in 1999), a photoelectron spectroscopy station, and a magnetic circular dichroism station (tested in 1999 in the common experimental hall). The beamline scientist in charge has changed from Dr. A. Yokoya to Dr. A. Agui since the end of 1999.

## References

- [1] A. Yokoya *et al.*, J. Synchrotron Rad. **5** (1998) 10.
- [2] T. Bizen *et al.*, J. Synchrotron Rad. **5** (1998) 465.
- [3] Y. Saitoh *et al.*, Nucl. Instr. and Meth. to be published.
- [4] Y. Teraoka and A. Yoshigoe, Jpn. J. Appl. Phys., **38** Suppl. 38-1 (1999) 642.

Light Source	
Type	variably-polarizing undulator
Undulator period, $\lambda_u$	120 mm
Number of periods, $N_{\text{period}}$	16 poles
Overall length	1920 mm
Tunable energy range	0.5~1.5 keV (circular polarization) 0.3~1.5 keV (horizontal polarization)
Peak brilliance	$2 \times 10^{17}$ ph/s/mrad <sup>2</sup> /mm <sup>2</sup> / 0.1% b.w. at 500 eV (I=100mA)
Phase swithching	0.5 Hz
Total power	2.1 kW (at K=5.5)
Power density	35 kW/mrad <sup>2</sup>

X-rays at Sample	
Energy resolution	$\Delta E/E < 10^{-4}$
Photon flux	$> 10^{11}$ ph/s
Beam size	$< 0.5$ mm