4 International Collaboration

4-1 Overview

Two beamlines are operated by foreign countries at the Photon Factory. One is the Australian National beamline BL-20B, which was constructed by the Australian Nuclear Science and Technology Organization (ANSTO) and has been operated since 1992. The ANSTO was reorganized as the Australian Synchrotron in 2007 and this new organization continues to operate the PF beamline. The other is the Indian beamline BL-18B, which is leased by the Photon Factory to the Department of Science and Technology (DST), the Government of India. This beamline has been operational since 2009. In addition to these beamlines, the Photon Factory collaborates with synchrotron communities mainly in Asia. Major collaborative projects are accepting the Pohang Accelerator Laboratory (PAL) users during the shutdown period, the Synchrotron-Light Experimental Science Application Middle East (SESAME) workshop, and the core university program.

4-2 Australian Beamline

Based on an agreement between the Photon Factory and the Australian Nuclear Science and Technology Organization (ANSTO), the Australian National Beamline Facility (ANBF) was constructed at BL-20B in 1992. This program supported the growth of synchrotron activities in Australia and resulted in a new third-generation Australian Synchrotron in 2007.

In FY2009, 31 experiments were carried out at BL-20B, of which 28 used the XAFS technique and the remainder were powder diffraction experiments. The experiments covered a wide range of fields including Earth Science (3), Material Science (8), Chemistry (3), Biochemistry (10) and Environmental Science (7). Topical experiments included studies on biotransformation products of Ru and V based drugs in biologically relevant media, structural studies of metal binding to amyloid-beta peptide related to Alzheimer's disease, speciation of Zn in aqueous ammonia at elevated temperatures, in-situ studies of Mn-based water oxidation catalysts, and studies of temperature-dependent phase transitions of doped metal oxides. With the opening of the Australian Synchrotron facility, the Australian partner of the agreement changed from ANSTO to the Australian Synchrotron, but the beamline at the Photon Factory will continue to function in order to support the above-described activities. (http://www.synchrotron.org.au/index.php/about-us)

4-3 Indian Beamline

In 2008, KEK and the DST of India signed a memorandum of understanding (MOU) on scientific and technological cooperation between the two parties in order to strengthen cooperation between the two countries. Setting up an Indian beamline at the Photon Factory is included in this MOU. BL-18B is leased to DST as it is and DST has set up two diffractometers and related detection systems. The Photon Factory leases the diffractometer and related equipment to DST to enable the commissioning of the beamline and preliminary experiments to start earlier.

Commissioning of the beamline and end-station started in June 2009. Some preliminary experiments are being carried out on the powder diffraction patterns of ZnO, Fe, and ZnO nanowires grown on sapphire by

(a)

(b)

Figure 1
Experimental apparatuses: (a) for fluorescent XAFS and (b) X-ray powder diffraction experiments at Australian Beamlien (BL20B).

Figure 2
Photograph of researchers from Saha Institute of Nuclear Physics India and staff of PF at KEK.

using 2D detectors, CCD and imaging plates. After the control system of the diffractometer was installed, test experiments were carried out by some Indian users.

Two diffractometers are to be installed in FY2010, which will enable scattering/reflectivity experiments to be carried out on liquid surfaces, which is a new research activity at the Photon Factory. This beamline will be made available to non-Indian users when it is opened for public use. In order to support the research activities of beamline scientists of BL-18B and Indian users, the Indian beamline office was opened in March 2010.

4-4 Support for Korean Synchrotron Users during the Shutdown of PLS

Some 2,800 Korean synchrotron users will lose their research tool in Korea during the construction and commissioning phase of the Pohang Light Source II (PLS II) between December 2010 and July 2012. The Pohang Accelerator Laboratory (PAL) requested some synchrotron facilities in Asia-Oceania region and other countries to provide beam time for PLS users while they cannot use PLS. Since the Photon Factory is one of the nearest synchrotron facilities and has many beamlines with similar research purposes, an MOU was signed by both directors. The Photon Factory will provide beam time to PLS users and PAL will send some beamline scientists to support the experiments of PLS users. Discussions between the beamline scientists in both facilities is expected to lead to new cooperation.

4-5 Core University Program

FY2009 was the final year of the five-year “core university” program supported by Japan Society for the Promotion of Science (JSPS). The partner countries of this program are China and India. Some Chinese scientists learned synchrotron techniques such as protein crystallography, phase contrast imaging, XAFS, and X-ray diffraction. A joint research on the orbital order by using resonant X-ray scattering has started from this program. In the last five years, the Photon Factory contributed to the construction and commissioning of some synchrotron facilities, especially the Shanghai Synchrotron Radiation Facility.

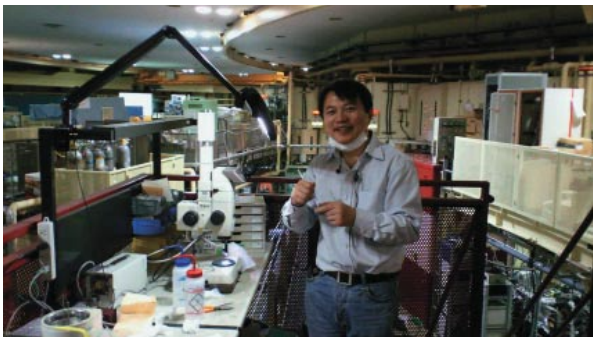

Figure 3
Photograph of a scientist from Shanghai Institute of Applied Physics, China, studying in PF.

4-6 Cooperation to SESAME Project

The SESAME-JSPS-KEK-Sabanci Synchrotron Radiation Workshop was held between March 1 and 6, 2010, in Antalya, Turkey. The workshop consisted of seminars, lectures and practices in materials science, structural biology, electronic structure, XAFS and X-ray fluorescence analysis. The number of students was limited to approximately 80 in order to allow practice work to be done effectively.

In addition to this cooperation, KEK co-organized the third Asia Oceania Forum for Synchrotron Radiation Research (AOFSRR) summer school “Cheiron School” held between November 2 and 11, 2009, at SPring-8. Fifty-five students attended the school from nine countries in Asia and Oceania: Australia, Korea, China, Singapore, Taiwan, Thailand, India, New Zealand and Japan.

Figure 4
Commemorative photograph taken at Antalya. One third of participants were women.