

Small-angle X-ray scattering beamlines at the photon factory

N. Shimizu, H. Takagi, Y. Nagatani, K. Yonezawa, T. Mori, K. Yatabe, M. Takahashi, K. Oyama, N. Igarashi

Institute of Materials Structure Science, High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki, Japan

nobutaka.shimizu@kek.jp

Three small-angle X-ray scattering (SAXS) beamlines, BL-6A, BL-10C, and BL-15A2, are in operation at the Photon Factory, a synchrotron radiation facility in Japan, and are commonly utilized for versatile application to carry out the structural analysis and the structure-property correlation studies for soft and hard materials including biological macromolecules. The light source of BL-6A is a bending magnet, and the available X-ray energy is fixed at 8.3 keV (1.5 Å). The maximum camera length is 2.5 m, and SAXS/WAXS (wide-angle X-ray scattering) measurements are performed using PILATUS3 1M (Dectris) for SAXS and PILATUS 100K for WAXS as detectors, respectively. BL-10C is also the bending magnet beamline, and the available X-ray energy range is generally 7.0-14.0 keV (0.89-1.77 Å). The Max. camera length is 3.0 m, and SAXS/WAXS measurements can be performed with PILATUS3 2M for SAXS and PILATUS3 200K for WAXS. BL-15A is the short-period undulator beamline, and 15A1 and 15A2 are dedicated to XAFS and SAXS, respectively. BL-15A2 has two dedicated diffractometers, one for hard X-rays (5.7-15 keV, Max. camera length: 3.5 m) and the other for tender X-rays (2.1-5.4 keV, Max. camera length: 0.8 m), and these are tandemly installed against the beam in BL-15A2. PILATUS3 2M for SAXS and PILATUS3 300K-W for WAXS are installed as detectors. Because this PILATUS3 2M is vacuum compatible, it can be directly connected to the dedicated vacuum diffractometer for tender X-rays use under the vacuum condition. We have also installed a special setting to connect the hard X-ray system to the tender X-ray system. The max. camera length is 6.5 m at that time, and the SAXS resolution reaches 1500 nm using 2.1 keV. The devices for BioSAXS are installed in BL-10C and BL-15A2, which can be used not only for SEC-SAXS but also for titration-SAXS and time-resolved SAXS using microfluidic cells. We will introduce the latest measurement and analysis environment at these beamlines in this presentation.



Figure 1. Photos of PF SAXS beamlines.

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