

BL38B1

RIKEN Structural Biology I

1. Introduction

BL38B1 is a beamline, which was reclassified from a public beamline to a new RIKEN beamline in FY2019. BL38B1 employs a bending magnet as the light source. Unlike BL45XU, BL38B1 is not suited for dynamic small-angle X-ray scattering (SAXS) experiments using high-intensity microbeams. However, it is the successor to static SAXS experiments, which were mainly conducted at BL45XU until last year. In FY2019, with the cooperation of JASRI, we evaluated the existing BL38B1 X-ray optics, the relocation, and remodeling of the SAXS devices, which were previously used at BL45XU, to restart the SAXS experimental system.

2. Recent activities

In the transport channel, asymmetric diffraction crystals for the monochromator were implemented to enhance the X-ray beam intensity. A 1-m long cylindrical bent mirror was installed to realize a focused beam near the detector and to reject higher-order reflections from monochromator crystals. For the SAXS camera at the experimental station, we adopted an incident optical system, which combines two sets of scatterless slits and a pinhole in front of the sample to reduce parasitic scattering in the small-angle region. The vacuum path of the SAXS camera and the two-dimensional detector, PILATUS 3X 2M, were relocated from BL45XU and installed in BL38B1. We started the commissioning of the camera with the intent to use a 2.5-m fixed camera distance.

The initial target of development of BL38B1 was

solution-scattering measurements from biomacromolecules. A SEC (size exclusion chromatography)-SAXS system using a flow cell and an online HPLC (high-performance liquid chromatography) system was developed with the cooperation of Prof. Shimizu's group of KEK/PF (Fig. 1). The SEC-SAXS system, which uses monodisperse fractions separated by SEC to obtain the scattering curves of components in solution, enables a more accurate intermolecular interaction analysis. We used this system to support the correlation structure analysis of the BINDS (Basis for Supporting Innovative Drug Discovery and Life Science Research by AMED) project.

In FY2020, we plan to study the feasibility of SAXS/WAXS measurements not only for bio-SAXS but also for materials science such as polymer science. In the future, BL38B1 will be open to RIKEN and public SAXS users in the fields of bio-SAXS and polymer science.

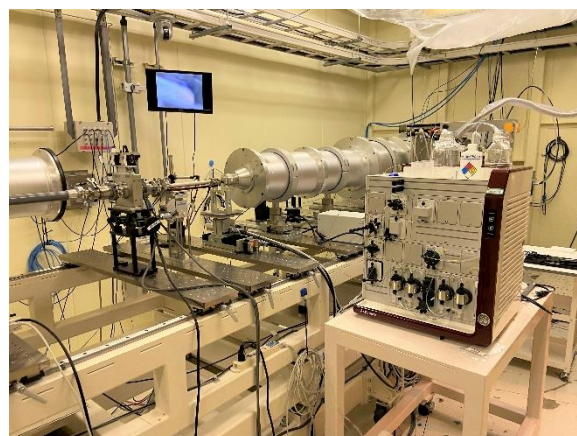


Fig. 1. SEC-SAXS system set in BL38B1.

Masaki Yamamoto

Advanced Photon Technology Division, RIKEN
SPring-8 Center