

Large-format imaging plate and Weissenberg camera

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To collect accurate data at high resolution from large unit cell protein crystals, we made screenless large Weissenberg cameras with cylindrical type cassettes [1,2,3]. Recently we have developed a user-friendly type Weissenberg camera for TARA (Tsukuba Advanced Research Alliance) and installed it at BL6B at the PF. The cassette radius of this new camera is 575.7mm and two large format (400x800mm) imaging plates (IP) can be fixed into the cassette by suction from the outside.

The data collection system at the PF using the screenless Weissenberg camera for macromolecular crystallography is very accurate up to a higher resolution region, however, the system is not automatic and the reading speed of the IPR4080, specially developed by our group, is rather slow; it takes about 13 minutes including manual operation to read one sheet of large format IP while the exposure time is normally 1-3 min for one image. Even though we installed two IPR4080 for each camera, the IP reading is still the bottleneck of the data collection. Therefore, an increase in the number of IP readers for each camera increases the number of manual tasks to be performed. Therefore automation of the system is very urgent to maintain accuracy and resolution.

We are now developing a high accuracy, high resolution and high speed automated data collection system. This fully automated system consists of a camera, an IP reader equipped with 8 reading heads, an IP eraser, and a cassette transportation mechanism. In the new system, one imaging plate is fixed inside of a movable cylindrical cassette. The cassette presenting 16 rectangular holes, direct beam injection of e.g., 1.0Å x-rays would produce 8 images of data at 2.6Å resolution. Two cassettes can be used simultaneously on the cassette transportation system, one cassette is being read while the other one is being exposed, by completely removing the reading bottleneck problem. This system therefore permits one to use the radiation with a maximum of efficiency and reduce the manpower necessary for data recording.

We will explain the usefulness of the large camera with large format imaging plates for protein crystallography, and we will describe in detail the new automatic system that we are developing now at the PF.

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