Data Collection System for Protein Crystallography using CMOS Image Sensor

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CCD detectors are commonly used for protein crystallography at synchrotron facilities because of easy operation and high readout speed. But, the fine-slice oscillation method using highly intense X-ray of third generation synchrotron requires higher frame rate, since a large amount of diffraction images must be recorded with an exposure time of less than 1 second. Therefore, development of new detectors having higher frame rate is required. A detector utilizing a CMOS image sensor[1] is one of the promising candidates for this purpose.

We developped a data collection system for protein crystallography using a CMOS detector Shad-o-Box 4K from Rad-icon Imaging corp. It consists of 8 active-pixel CMOS sensors tiled in a 2 x 4 matrix and contains a total of 2000 x 2048 pixels of photodiodes with 48 μm spacing. Maximum frame rate of 2.7 fps is available. Images are captured into PC through a frame grabber board PXD 1000 (Imagination corp.). Server software running on Windows XP was developed using PXD 1000 frame grabber library, so that it can be controlled by client software BSS (Beamline Scheduling Software)[2], which is SPring-8 standard data collection software for protein crystallography.

We are now studying the performance of the new data collection system to use CMOS detectors as an alternative to CCD detectors.

[1] Yagi N., et al., *J. Synchrotron Rad.,* 2004, **11**, 347-352. [2] Ueno G., et al., *J. Appl. Cryst.,* 2004, **37**, 867-873.
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