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DEVELOPMENT OF A CRYSTALLOGRAPHY BEAMLINE FOR MICRON SIZE CRYSTALS

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A new bending magnet beamline has been built at the Advanced Light Source that produces a focused beam of monochromatic x-rays suitable for the study of very small (10μm x 20μm x 20μm) crystals. A channel-cut Si<111> monochromator is used with a special cooling system that cools the diffraction surface to around 120° K where the expansion coefficient is close to zero. Following the monochromator is a toroidal silicon mirror that collects 3 mrad horizontally and produces a 1:1 focus of the x-ray source 14 meter downstream. The beam size at the sample position is 280 μm wide by 70 μm high with a flux above 2 x 10^{11} photons per second at 12 keV. A vertically mounted goniometer with a fixed offset of 54.7° is used to rotate the crystal. A large area (300 mm diameter) optically-coupled detector (Proteum 300) is mounted on a scanning arm that allows the detector to swing up to 45° for high-resolution studies. For most crystals the detector is set at zero degree and only the sample is scanned. Examples of the range of crystals that can be studied with this system will be given and prospects for future performance improvements will be presented.

Keywords: SYNCHROTRON SMALL MOLECULE BEAMLINE

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COLLABORATORY FOR MACROMOLECULAR CRYSTALLOGRAPHY AT SSRL

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During the last few years a project aiming at creating an environment for macromolecular crystallography stations that is more efficient, easy to use and makes it possible to carry out experiments in collaboration with scientists at remote locations has been developed at Stanford Synchrotron Radiation Laboratory. The project is named 'Collaboratory for Macromolecular Crystallography' and was first funded by NIH-NCRR (National Institutes for Health, National Center for Research Resource) in 1999.
The successful implementation of such an environment can be described as the integration and adaptation of the normal data collection tools plus a set of communication tools. Automation and unification of the beam lines through an intuitive graphical user interface. An advanced computing environment with adequate resources for data storage and processing, unified access to all computational resources operating in a high performance network infrastructure. An efficient way of providing remote access to this graphics rich environment with acceptable performance is made possible with the ICA communication protocol by Citrix Inc. It provides a remote user with a computer environment which is next to identical to that of the local user. A series of web based tools like the Diffraction Image Viewer and the Beamline Video System are also provided to make remote interaction feasible. For archiving of data, access is provided to the High Performance Storage System at San Diego Supercomputing Center.
The Collaboratory project has proved to be extremely successful and is being developed to take on new challenges in the form of high-throughput structural biology.

Keywords: **SYNCHROTRON COLLABORATION MACROMOLECULAR CRYSTALLOGRAPHY**

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IMAGE-PLATE SYSTEM WITH ON-SITE READING PROCESS FOR HIGHLY EFFICIENT DATA COLLECTION IN SYNCHROTRON POWDER DIFFRACTION

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Detector systems for synchrotron powder diffraction have to be optimized with respect to high resolution or fast data collection. A very efficient use of the rather expensive beam time is realized by image-plate detectors, which combine short exposure times with intermediate resolution, i.e. half widths of reflections between characteristic values for laboratory X-ray diffractometers and for high-resolution settings with analyzing crystals at synchrotron sources. The external reading of image plates requires individual calibrations for each exposure. This procedure is very inconvenient and limits the quality of data. Significant progress is made by image-plate systems with an on-site reading procedure. In this contribution we report on the design and performance of such a system for users´ applications at beam line B2 of the Hamburger Synchrotron Strahlungs laboratory. Some experiments are shown to demonstrate the capabilities of this setup.

Keywords: **IMAGE-PLATE DETECTORS, SYNCHROTRON POWDER DIFFRACTION**

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X-RAY ANALYTICAL MICROSCOPE WITH KUMAKHOV'S X-RAY POLYCAPILLARY LENS

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Considering the experience of using earlier designed X-ray chemical micro-analyzer, a scanning X-ray analytical microscope has been developed. The axes same layout geometry of the optical microscope and Kumakhov's polycapillary lens are the same. Basic differences are as follows:
- two small-size transmission X-ray tubes with different anodes and 30 micron focal spot;
- focal lengths of the optical microscope and Kumakhov lens are within the range of 3-coordinate (X,Y,Z) field of the optical microscope. The precision characteristics of the stage's electric drive resolves the issue of matching the point of interest with Kumakhov lens' focuses, as well as scanning of the analyzed object and imaging within the energy range of the characteristic X-ray;
- the volume of passageway of the primary (exciting) and secondary (registered) radiation is permanently filled with gel. This ensures long-term compensation for gel leakages and the instrument is always ready for operation;
- the X-ray part of the instrument, including a semi-conductor detector, is integrated with a regular optical microscope ensuring high precision characteristics together with maximum convenience;
- the instrument is equipped with the latest X-ray spectrometry tools, X-ray optics as well as classical optical tools.

Keywords: **FLUORESCENT ANALYSIS**