

The Chemical Crystallography Beamline P24 - Status and Future Developments

Christian W. Lehmann¹, Christian Schäfer¹, Carsten Paulmann²

¹MPI für Kohlenforschung, Mülheim an der Ruhr, Germany;

²Universität Hamburg, Hamburg, Germany;

lehmann@kofo.mpg.de

Since 2016 the Chemical Crystallography beamline P24 at the synchrotron Petra III located at DESY Hamburg is offering user operation. The two experimental hutches EH1 and EH2 are equipped with a large kappa-geometry diffractometer and a four circle eulerian-craddle diffractometer respectively. In recent years several improvements have been added in order to facilitate small molecule chemical crystallography in particular the determination of routine crystal structures from extremely small single crystals unsuitable for home laboratory X-ray diffractometers.

At present the available energies (wavelengths) encompasses an small window at 8 keV (1.54 Å) and the range from 17 to 30 keV (0.73 to 0.41 Å). Higher energies up to 40 keV are technically possible. A Pilatus 3R 1M cadmiumtelluride hybridpixel detector in addition to a Mar 165 CCD are available in either experimental hutch, together with low temperature gas flow coolers, down to helium temperatures. A set of recently installed compound refractive lenses (CRLs) allows to focus the beam to below 100 µm. Presently in EH1 a sample changing collaborative robot is being tested, together with a new fixed Chi sample stage, which allows for omega scans exceeding 180° in combination with predefined Phi-settings. An automated goniometer head allows to centre the crystal remotely.

A low temperature sample storage accessible for the robot is planned for the near future. This will complete the setup for possible remote operation of the beamline by EH1 users including a mail-in service for air, humidity and temperature sensitive samples.

Keywords: Instrumentation, High-Throughput, Synchrotron