

Kurzfassung

Name der Kandidatin:	Anicó Kulow
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Titel der Dissertation:	Spatial Resolved Dispersive X-Ray Absorption and Coded Aperture X-Ray Fluorescence Imaging

The dissertation deals with the development of two different X-ray spectroscopic methods and their implementation at the *BAMline*.

A setup for time-resolved X-ray absorption fine structure (XAFS) spectroscopy based on dispersive XAFS has been developed. An energetic broadband beam falls through a sample and is afterwards reflected by a convexly bent Si (111) wafer. Thus, the different energies are separated spatially according to their Bragg angles, and can be detected simultaneously by an area sensitive detector. An energy calibration allows the assignment of an energy to every pixel. This method is stable, easy to implement, flexible and allows the acquisition of a XAFS spectrum in a scanning-free way, so that the measurement times can be considerably reduced compared to the conventional point-by-point measurements. First tests on metal foils and a first time-resolved experiment for the investigation of the early stages of ZIF-8 crystallization have been performed.

Furthermore, a method for full-field X-ray fluorescence (XRF) imaging with coded apertures has been developed. This can reduce the measurement time for elemental distribution maps compared to scanning methods. The count rate can be increased compared to the projection through a single pinhole or the imaging with polycapillary optics. A fluorescent object is projected through multiple pinholes, yielding many overlapping images on an energy-dispersive 2D detector. A reconstruction step allows the image retrieval. Different methods for the reconstruction have been implemented, the reconstruction with an antimask, with an iterative and an algebraic algorithm, and with a neural network. First experiments were performed, and different samples could be reconstructed successfully with all four reconstruction methods.