ESRF	**Experiment title:** Interference contrast x-ray microscopy with sub-200nm spatial resolution at 4 KeV	**Experiment number:** MI-409
Beamline: ID21	**Date of experiment:** from: Feb, 13, 2000 to: Feb, 18, 00	**Date of report:** Feb, 25, 2000
Shifts: 15	**Local contact(s):** Burkhard Kaulich	*Received at ESRF:*

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Report:

The following discription of the experiment is the abstract of a paper which as a result of the experiment MI-409 is in preparation for submission to Appl. Phys. Lett.,
by *T. Wilhein, B. Kaulich, and J. Susini,* entitled

High Resolution Interference Contrast X-ray Microscopy at 4 keV Photon Energy

Abstract

In this article, the setup and first succesful test of an interference contrast X-ray microscope operating at 4 kev photon energy is described. The interference microscope is based on the X-ray microscope which has been installed on beamline ID21 at the European Synchrotron Radiation Facility (ESRF). The combination of the good temporal coherence ($\lambda^2 / \Delta\lambda$) supplied by a perfect crystal such as silicon and the small beam divergence delivered by the ESRF source allows for interference experiments with finite path length differences. The necessary beam splitting is accomplished by two micro zone plates, one of them creating at

the same time a high resolution X-ray micorscope image. This image is superimposed by a fringe pattern generated by interference of the first diffraction orders of the two zone plates. Phase shifts in the specimen structure transfer into geomtrical shifts of the fringes. With a fine grating-like gold structure used as test object in the interference contrast mode, phase shift detection was demonstrated in an X-ray microscope image with sub-200 nm spatial resolution.

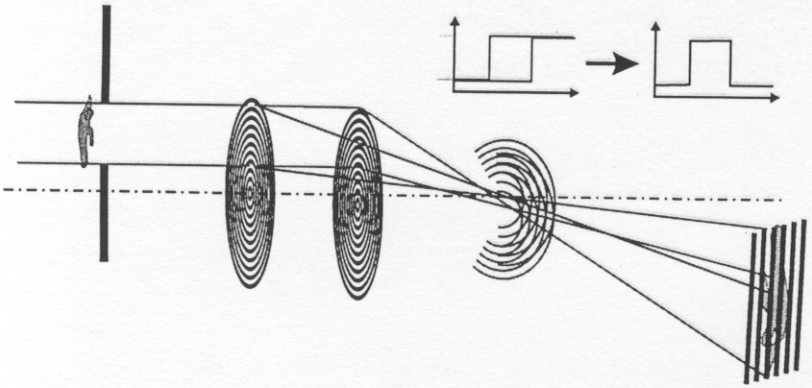

Fig. 1 shows a scheme of the setup used to generate interference contrast X-ray micrographs

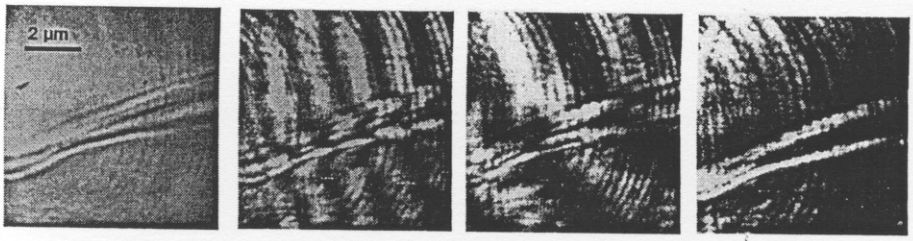

Fig. 2 displays an X-ray micrograph of a mylar foil in interference contrast. The phase jump at the foil edge is easily observed. The spatial resolution of the X-ray microscope image is better than 200nm