

Reflection Mode Imaging with High Resolution X-ray Microscopy

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We report on the first demonstration of imaging microstructures with soft x-ray microscopy operating in reflection geometry. One of the limitations of soft x-ray microscopy has been the requirement that samples be prepared thin enough for x-ray transmission. With the reflection geometry, thin multilayered samples on thick substrates can be imaged. For the demonstration experiments, the sample was illuminated with 500 eV x-rays at an incident angle of 6 degrees. The image formed from the reflected light was magnified by a zone plate onto a CCD. In transmission mode, this geometry would have provided a 10 by 10 micron field of view. With the shallow angle reflection geometry, the image is squeezed in one direction, so the resultant field of view was approximately 10 by 100 microns, but only approximately 10 by 3 microns was within the depth of focus. Future experiments with this geometry will include tuning the incident angle to obtain depth resolution in grazing incidence geometry. In combination with XMCD as magnetic contrast mechanism this mode will allow studies of deep buried magnetic interfaces with respect to the local variation of magnetic roughnesses and to obtain a magnetization depth profile with lateral resolution. This will provide important information to characterize the magnetization behaviour at interfaces.