

Hard X-ray Microscopy with sub-30 nm Spatial Resolution in Taiwan

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With the advances in synchrotron radiation and the mature in fabricating high performance X-ray focusing optics, X-ray microscopy has been realized recently as a nano-scale probe that can compete with light and electron microscope on the common ground of a nondestructive manner. In 2004, under the *NSRRC X-ray Microscopy Project*, we have installed a full-field transmission X-ray microscope (TXM) to the BL01B end station of an advanced X-ray source generated by a superconducting wavelength shifter. The X-ray microscope equipped with capillary-type condensers and objective Fresnel zone-plates (outermost width 50nm) can provide 2D imaging and 3D tomography at X-ray energy 8-11 keV with spatial resolution 60 nm, and with the Zernike-phase contrast capability for imaging light materials such as biological specimens. While operating the Fresnel zone-plate in third order diffraction, the microscope has almost reached the theoretical resolution limit sub-30nm (Fig.1). In this presentation, we would demonstrate the actual setup of the beamline and microscope. Commissioning results, including the characterization of the microscope, preliminary studies in IC failure, fault rocks, and biological specimens will be presented.

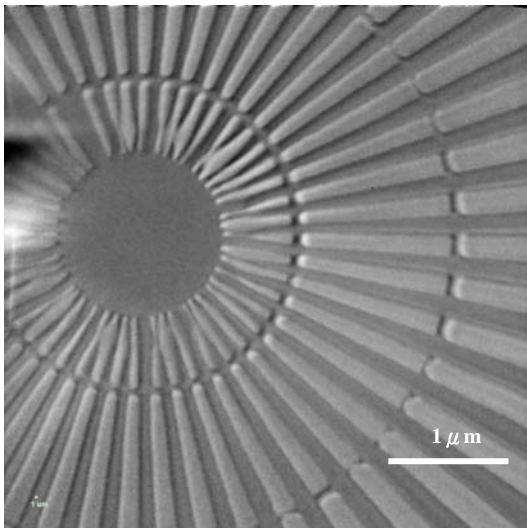


Figure 1: The gold spoke-pattern imaged at BL01B at NSRRC by using 3rd order diffraction of Fresnel zone plate at X-ray energy 8 keV. The spatial resolution is estimated better than 30nm. Exposure time was 10 minutes.