

The recent progress of the TPS 31A Projection X-ray Microscopy Beamline and Endstation

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Abstract

For the high speed x-ray imaging, the time resolution can be as high as several tens of micro second, and the tomography time resolution can be as high as 10 Hz [1,2]. For the projection x-ray microscope (PXM), the phase contrast can be obtained by grating interferometry [3] or propagation based [4], and method with one single shoot were proposed [5].

This year, at Taiwan Photon Source (TPS), a beamline projection for PXM with above functionality is going to be accomplished. The wiggler W100 is the source for PXM beamline because its flux is 100 times higher than bending magnet at 50 keV photon energy. The PXM beamline is designed for the energy range of 5 to 50 keV. The brilliance and photon flux is 4.9×10^{17} - 5.8×10^{16} photons sec^{-1} mrad^{-2} mm^{-2} $0.1\% \text{BW}^{-1}$ 0.5A^{-1} and 2.6×10^{14} - 8.9×10^{12} photons sec^{-1} mrad^{-1} $0.1\% \text{BW}^{-1}$ 0.5A^{-1} for the energy range of 5-50 keV, respectively.

The designed energy range is from 8 keV to 50 keV and the targeting resolution is 0.5 μm . The image rate can be as high as 10,000 images per second or faster. The high-speed tomography is done by the precise air bearing stage with slip ring. The estimated tomography can be as fast as 8Hz (limited by the slip ring) or faster (with other stage). The general sample can be automatically processed since a robot is installed and can be processed by the speed of 1 minute per sample with on-the-fly scheme for the tomography.

At the time of writing, the double crystal monochromator or double multilayer monochromator (DCM/DMM) is finished and will be installed at TPS 31A. The PXM system, which was partially assembled and tested in TPS 31A. This beamline will be ready for commission at end of 2020. The status of beamline TPS 31A and PXM endstation will be reported in this presentation.

Keywords – Projection X-ray Microscopy, High Speed Tomography.

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