Coherent Diffraction Imaging in Simultaneous Transmission-Bragg Geometry at Taiwan Photon Source

Yu-Shan Huang*, Jhih-Min Lin, Chun-Yu Chen, Yi-Wei Tsai, and Hong-Yi Yan

National Synchrotron Radiation Research Center, Taiwan

**jade@nsrrc.org.tw*

The 3 GeV Taiwan Photon Source (TPS) with low emittance 1.6 nm-rad, which provides the extremely brilliant and highly coherent X-ray beam, is open to general users with e-beam current of 400 mA at the National Synchrotron Radiation Research Centre, Taiwan. The coherent X-ray Scattering (CXS) beamline is one of the seven phase-I beamlines at TPS. This beamline equipped with an in-vacuum undulator provides coherent photon flux greater than 10^{10} photons per second at 6 keV X-rays. The X-ray beam is monochromated by a double crystal monochromator with energy resolution 2×10^{-4} by using Si(111) crystals. Kirkpatrick-Baez (KB) mirrors are used to focus the X-rays down to 2×2 μm^2 in the energy range from 5.6 keV to 20 keV. The sample-to-detector distance can be varied with a range of 0.7-12 m. State-of-the-art detectors of Eiger X 16M and 1M are equipped for data collection of 133/750/3000 Hz frame rates with region-of-interest technique.

Combined the highly coherent X-rays and state-of-the-art detectors, the CXS beamline at TPS provides advanced microanalysis techniques for millisecond and nanometer scales using X-ray photon correlation spectroscopy (XPCS), coherent diffraction imaging (CDI) and Bragg CDI techniques. Especially, CDI in simultaneous transmission-Bragg geometry developed at the CXS beamline permits opportunities for imaging crystal strain and 2D/3D structure of a non-crystalline material.