Soft X-ray ptychography imaging at Taiwan photon source

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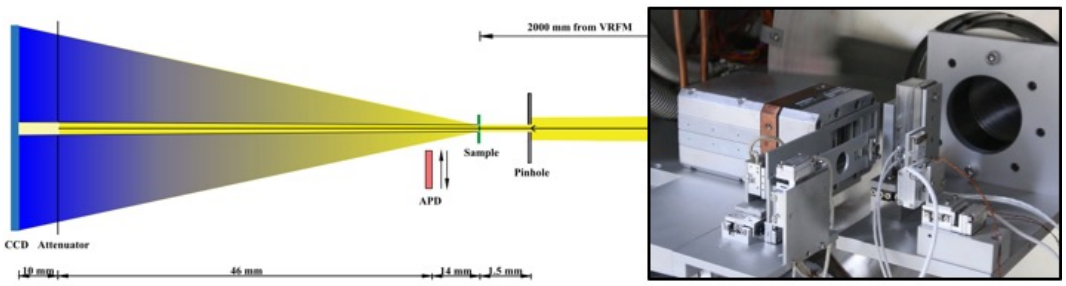
Soft X-ray spectromicroscopy is a powerful tool which can provide 2D or 3D imaging with chemical, electronic and structural information at the nanoscale. Scanning transmission X-ray microscopy (STXM) is one of the most useful and productive of all synchrotron based microscopes in a broad range of sample systems. It is particularly powerful for the radiation sensitive soft materials compared with the other soft X-ray microscopies. The spatial resolution was limited by the zone plate lens. In order to improve the spatial resolution, a coherent diffraction imaging (CDI) based technique named Ptychography is developed. It is done by scanning a sample through a coherent X-ray spot created by KirkPartrick-Baes (KB) optics, pinhole or zone plates with overlapping steps and the scattered pattern was collected on a CCD camera. With suitable iterative algorithm, the phase and amplitude of the object can be reconstructed. A spatial resolution below 4 nm was achieved in the soft X-ray region.

The CDI branch line at TPS41A is a multi-purpose beamline which can measure the soft X-ray diffraction, Bragg CDI and ptychography through the combination of scanning system and diffractormeter. The beamline was designed to deliver high coherent flux in the energy range from 400 eV to 1200 eV. The presentation will discuss the design, expectation, current status, recent commissioning results and future upgrade plan for the ptychography imaging at TPS 41A.



Schematic view of ptychography imaging endstation at TPS