

X-ray Microscopy Project at NSRRC

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Very recently, under the NSRRC X-ray Microscopy Project, we have installed a transmission X-ray microscope (TXM) to the BL01B end station of an advanced, high flux (3×10^{11} photon/s) and wide energy spectrum (7-23 keV), X-ray source generated by a superconducting wavelength shifter. The state-of-art TXM can provide 2D imaging and 3D tomography for imaging light materials such as biological specimens with a spatial resolution of 30-60 nm, using the Zernike-phase contrast capability with 8-11 keV hard X-ray. To our best knowledge, such resolution achieved is unprecedented in X-ray imaging up to date. In this presentation, we would like to share the scope and the prospective of the project as well as the progress of the TXM in our center. The impact of our TXM is expected in many imaging works for buried structures, including the analysis of failure mechanisms in microelectronic devices due to electromigration, thermal breakdown or inhomogeneity, or the characterization of porous materials such as soils and rock, and the transportation behavior in these porous structures. In addition, material failures due to induced strain, crack propagation or corrosion can be studied with our modern X-ray microscope of 2D and 3D imaging capability. Currently, we aim our unprecedented X-ray microscope at the research of cells in life science. With the 3-D "virtual sectioning" capacity to be matured, we intend to view either a single cell, cell clusters, or any region of a tissue. With labeling agents, for instance, gold, for contrast variation, in-situ imaging for specific cellular functions is possible with our TXM.

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