Specification of XTM beamline

Specification	
Source	Multipole wiggler, 2.18 Tesla
X-ray energy	5 – 20 keV
2 Operations	1) Monochromatic beam: Ge (111), approx. 10^{12} ph/s/0.1% BW @8 keV 2)(Filtered) White beam
Beam size	Unfocused, (H) 10mm x (V) 4mm
Detection	Scintillator-coupled X-ray microscope (Optique Peter, France) PCO.edge camera, 2560x2160 pixels
Resolution	1.5 µm spatial resolution 0.72 µm pixel size
Imaging	Absorption-contrast microtomography Propagation-based phase contrast microtomography Laminography

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For technical detail of XTM beamline
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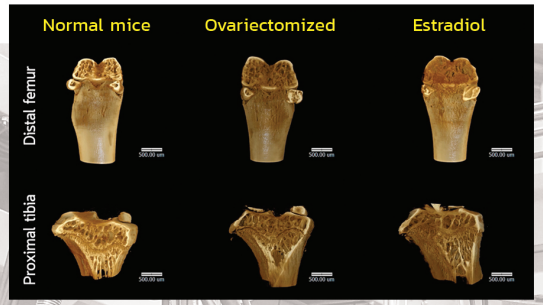
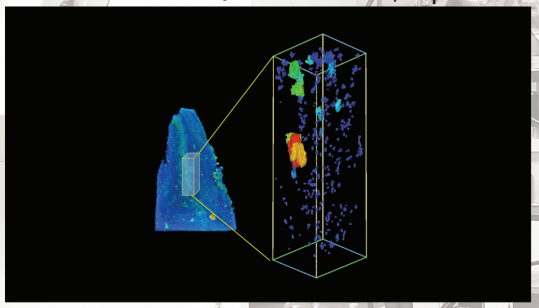
Examples of SRXTM images



Femurs and tibias from mouse models

Star-shaped sand (tiny protists known as Foraminifera) from Okinawa, Japan



Porosity of sandstone

3D structure of a rice bug

BL1.2W XTM

X-ray Tomographic Microscopy

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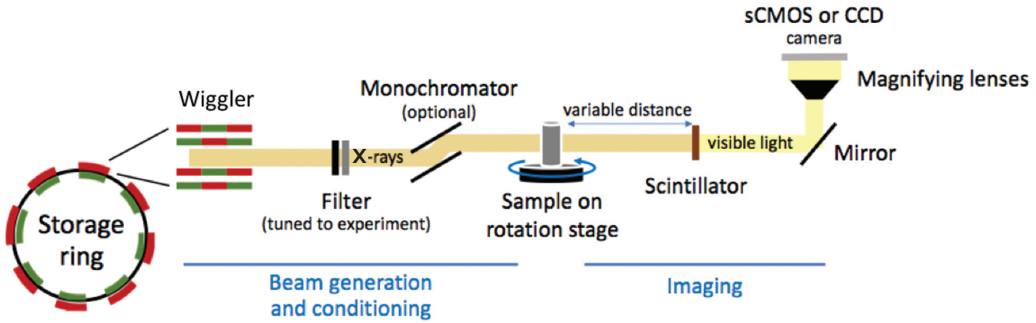
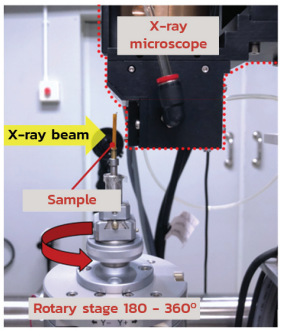
X-ray Tomographic Microscopy XTM

XTM beamline (BL1.2W) provides the experimental station for synchrotron radiation X-ray tomographic microscopy in a range of 5 – 20 keV. SRXTM is a non-destructive visualization technique, which reveals the microstructure inside opaque sample without thin sectioning. 3D structure is reconstructed from X-ray projections. Image contrast is based on differential X-ray absorptions inside that are varied by mass attenuation, thickness, and density. SRXTM is widely used for microstructure, porosity, cracks, and phase distribution. At XTM beamline, tomographic imaging can be achieved at 1 micron-resolution in 16 minutes.





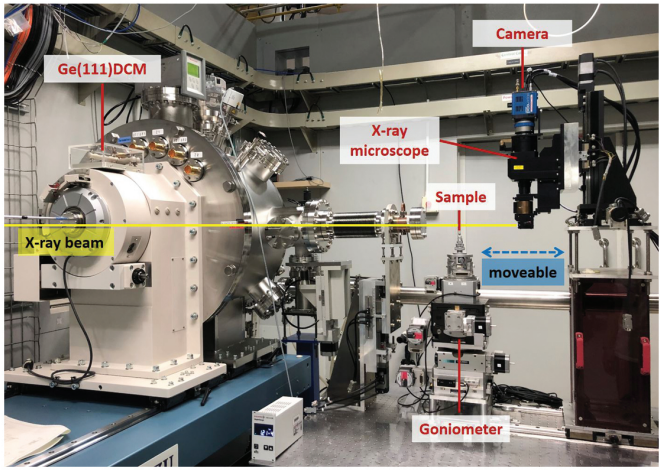
Optical performance

PCO.edge sCMOS chip (2560 x 2160 pixels)	Magnifying lens		
	2X	5X	10X
Horizontal field of view (mm)	9.24	3.70	1.85
Vertical field of view (mm)	7.80	3.12	1.56
Pixel size (μm)	3.61	1.44	0.72
Maximum resolution (μm)	5	3	1.5

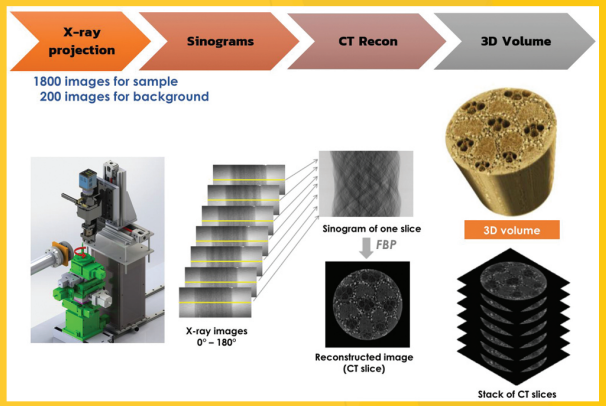
Sample preferences

- Rodent femur or tibia, size < 1-2 cm
- Insect, size < 2 cm
- Polymer, ø < 3 mm
- Stainless steel, thickness < 0.05 mm.
- Cement, ø < 0.05 mm
- Sandstone/Shale, ø < 2 mm

XTM Experimental station & Setup



SRXTM procedure



A tomographic scan (or CT scan) is carried out by taking 1800 X-ray images for 180° rotation of sample. When the X-ray beam generated from the synchrotron is projected on the sample, the X-rays that can pass through the sample will be collected on a scintillator and a lens-coupled microscope to create an X-ray image recorded by a high-resolution camera. These X-ray images are used in reconstructing cross-sectional images (CT slices), which are subsequently combined together to present 3D volume of the sample.