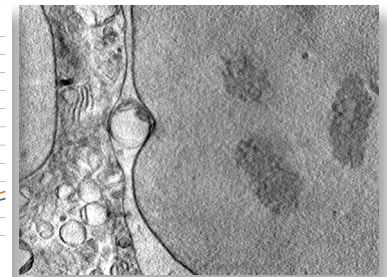
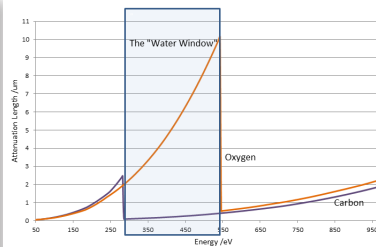
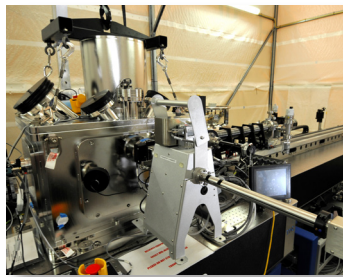


B24 – Cryo-Transmission X-ray Microscopy

B24 is a Full Field Cryo Transmission X-ray Microscope (cryo-TXM) designed specifically to meet the rising demand for tomographic imaging of biological cells and other specimens under near physiological conditions. Full field X-ray imaging of biological cells provides the opportunity to fill a resolution gap that exists between the high resolution achievable with electron microscopy and the lower resolution of light microscopy. Coupled with this is the ability to collect data on intact (unsectioned) and unstained cells including penetrating through the nucleus which can be a limitation in electron microscopy.

The beamline is designed to operate at low (soft) X-ray energies in the region termed the “water window” although it has also the capability of operating at higher energies. The water window is the region between the K-absorption edges of carbon at 284 eV and oxygen at 543 eV. Between these two energies oxygen is virtually transparent to X-rays whereas carbon is highly absorbing. Thus there exists a natural contrast between the vitreous ice surrounding a frozen biological cell and the carbon containing structures making up the cell.

Initially B24 will operate in absorption contrast mode within the water window. In time, phase contrast imaging will be developed and the beamline upgraded to allow the study of samples designated as requiring containment level 3 facilities.



Beamline Specification

Energy range	200 eV – 2600 eV
Techniques available	Cryo soft X-ray tomography Absorption contrast imaging in the water window (~500 eV)
Field of view at sample	10-20 μm x 10-20 μm (square)
Feature resolution	20-30 nm (depending on feature)
Sample mount	3 mm TEM grid

For further information please contact the Diamond Industrial Liaison Office on



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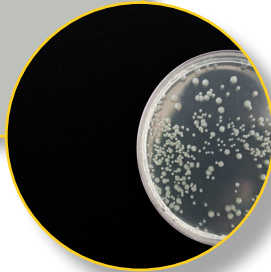
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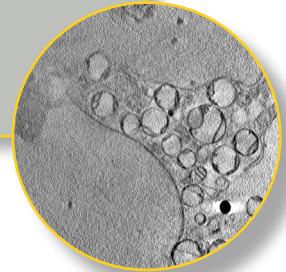
Living Cell Imaging

- Generate 3D slices through the sample;
- Collect data on intact and unstained cells through entire cell thickness (up to 8 μm);
- Probe a wide range of sample types from bacteria to whole mammalian cells.



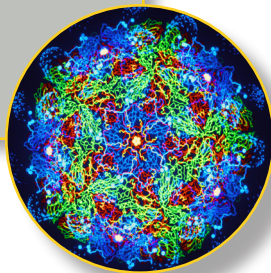
Structural Cell Biology

- Study the effect of drugs on living cells;
- Follow the effects of biological processes on the cell e.g. starvation;
- Monitor cell regulation processes;
- Investigate impact of nanoparticles on cells.



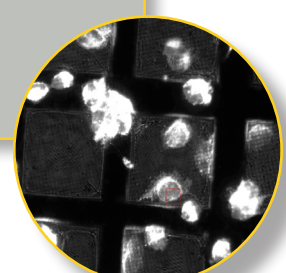
Cell Infection Process

- Study cell infection;
- Image viral particles within infected cells;
- Examine changes to cell organelles post infection;
- Explore host-pathogen interactions.



Functional Studies of Cellular Processes

- Perform correlative studies with cryo-fluorescence microscopy;
- Reveal localisation of fluorescent proteins within complex organelles;
- Capture processes of dynamic membrane trafficking.



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