World Class Imaging at Your Fingertips

Electron and light microscopy technologies for measurement in four dimensions

“These instruments enable an unprecedented opportunity for multi-scale molecular microscopy.”
— Joe W. Gray, Ph.D.
Chair, Department of Biomedical Engineering
Director, OHSU Center for Spatial Systems Biomedicine

Multiscale Microscopy Core (MMC)
3181 SW Sam Jackson Park Road
Portland, OR 97239

Please direct any inquiries regarding services, instrument capabilities, training, or pricing to MMC@ohsu.edu

Tecnai™ Spirit with iCor™ images of Mouse small intestinal crypts stained with an antibody that recognizes Lysozyme. Specimen and prep courtesy of M. Wong and N. Smith at OHSU, imaged by D. Keene in the MMC at OHSU.

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All academic and commercial users are welcome to access the instruments and utilize the MMC imaging services, technical support, and training. More information is available at: www.ohsu.edu/mmc

The MMC is affiliated with the OHSU Center for Spatial Systems Biomedicine (OCSSB) and the OHSU-FEI Living Laboratory for Cell Biology. Users are encouraged to interact with the multidisciplinary faculty that comprise the OCSSB. More information is available at: www.ohsu.edu/ocssb www.ohsu.edu/FEILivingLab

Materials Science, Natural Resource & Electronic Applications
- Materials Qualification
- Soft Matter
- Nanoscale Metrology
- Forensics
- Prototyping for MEMS and NEMS
- 3D Metrology
- Defect/Failure analysis

Focused Ion Beam (FIB) sample preparation is able to section metals and alloys, composite materials or organic materials rapidly. Additionally, combining the electron or ion beam with a gas enables material deposition at the nanoscale.

Multi-scale Microscopy Core at OHSU

The MMC provides access to state-of-the-art electron microscopy (EM) imaging platforms including a Helios NanoLab™ 650 DualBeam™ (used for high resolution 3D, automated 3D image acquisition); a Titan™ Krios™ Cryo-Transmission Electron Microscope (which is an automated TEM platform optimized for Single Particle Acquisition, 3D and cryo tomography), and a Tecnai Spirit with iCorr (the world’s first commercially available microscope which integrates light and TEM capabilities).

These instruments meet the changing needs of life scientists while dramatically advancing multi-scale imaging technologies to improve management of human disease.

Front cover: Helios DualBeam image of Mid-brain axons from a Drosophila fly with mutation in Microtubule-Associated Protein. Photo courtesy D. Kretzschmar at the OHSU’s Photo courtesy D. Kretzschmar at the OHSU’s

Below: Auto Slice & View™ data reveals vesicles (dark blue, purple and orange) lining the intersection of three normal breast epithelial cells (yellow, coral and cyan) grown in 3-dimensional cell culture. Within the crowded inter-cellular space, membrane bound actin-rich protrusions are observed to interact with each other and opposite facing cells. Sample preparation and image analysis performed by D. Jorgens, W. Tsai, and M. Auer in the MMC at OHSU.

Life Sciences Applications
- Correlative Microscopy
- Structural Biology
- Cellular Biology
- Tissue Biology
- Biometrics
- Forensics

The microscopes in the MMC allow scientists to visualize the molecular and cellular compositions and architectures of cells and tissues at sizes from Angstroms to millimeters. Studies might focus on single proteins, intracellular locations of signal transduction complexes, cellular compositions of normal and diseased tissues and pathway activities of individual cells within tissues. The Helios NanoLab also offers fast 3D visualization of biological samples such as brain tissue using Auto Slice & View technology.

Collaborations with OCSSB faculty and private sector partners are encouraged. These interactions will enable MMC users to collaborate with scientists with expertise in genome analysis, electron microscopy, super resolution and conventional fluorescence microscopy, high throughput, high content imaging, sample preparation, new chemistries for cell staining, statistics, petabyte scale data management and analysis, image visualization, and feature extraction. Use of the MMC and collaboration with OCSSB scientists will enable scientists to understand the multi-scale compositions of normal and diseased tissues and to study how genomic and epigenomic changes disrupt this organization in ways that lead to diseases including cancer, cardiovascular disease, neurodegeneration, and immune system dysfunction.

Helios NanoLab DualBeam
- Isotropic 3D data acquisition
- High efficiency detectors
- Precision 5-axes motorized stage
- Cryo capability
- < 1.0 nm SEM resolution at all keVs
- < 4.0 nm ion beam resolution
- High throughput FIB milling up to 65 nA
- Low kV FIB imaging down to 500 V

Titan Krios Cryo-TEM
- Cryo autoloader for robotic sample handling and simultaneous loading of up to 12 samples
- Parallel illumination
- Dual axis stage (±-70 degrees) enabling dual axis tomography
- Single particle acquisition
- Electron crystallography
- FEI Falcon™ II 16 Megapixel Direct Electron Detector with Back-Thinned Sensor Technology and multi-frame readout capabilities
- Information Limit: <,.14 nm at zero tilt
- STEM capabilities
- Thermal & acoustic shielding

Tecnai Spirit with iCorr
- Easy to use TEM with high level of automation
- High contrast TEM for 20 kV to 120 kV operation
- Sharp imaging of thick specimens
- Locate precise regions of interest quickly
- Wide field excitation (470-490 nm)
- Optimized for green fluorescence
- Objective Lens (NA 0.5, 0.65 µm resolution)
- 5 Mpixel CCD
- Fluorescence & reflection mode

In association with