

THE MICRO TOME

University of Vermont
College of Medicine

HSRF 203 | Voice: (802) 656-0813 | Fax: (802) 656-8892



MICROSCOPY IMAGING CENTER

<http://www.uvm.edu/medicine/MIC>

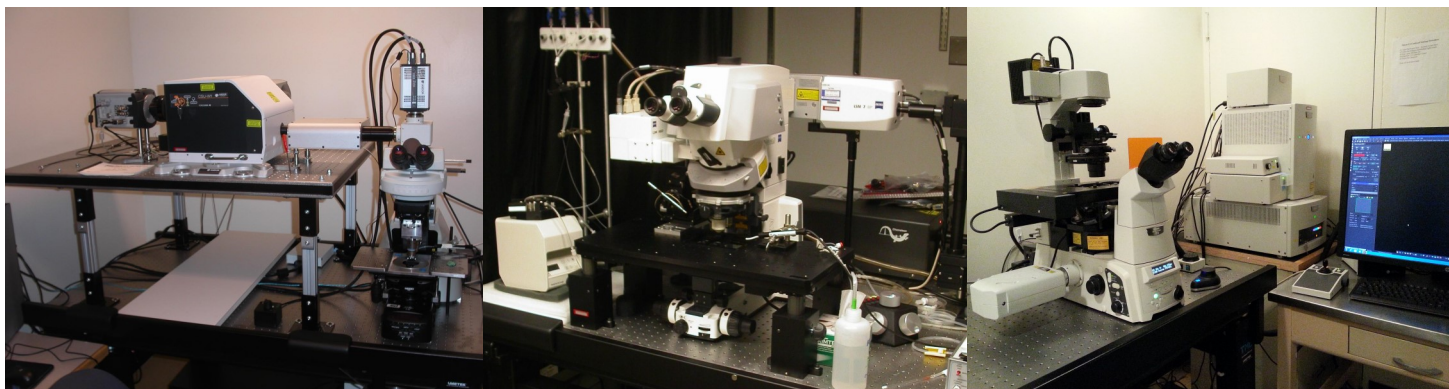
<https://www.facebook.com/The-Microscopy-Imaging-Center-786501598145292/>

Fall 2019

The MIC constantly seeks to provide a state-of-the-art imaging facility for our clients. Therefore this issue of the “MicroTome” will be devoted to introducing and describing additions to the technologies available in the MIC which have occurred during 2019. We hope you enjoy learning about these new capabilities, and we encourage you to speak with any of the MIC staff regarding how they may help enhance and advance your research!

MIC Welcomes Three Confocal-based Imaging Systems

In line with recent NIH initiatives aimed at enhancing the efficiency of core facilities via consolidation, in December of 2018 we finalized a memorandum of understanding (MOU) with the Departments of Neurological Sciences and Pharmacology to absorb the sunseting Neuroscience COBRE Imaging & Physiology Core under the umbrella of the MIC. This consolidation of core facilities added the following confocal microscopy-based imaging systems to the MIC: (1) Zeiss LSM7 Multiphoton microscope; (2) Yokagawa CSU-W1 Spinning Disk microscope; and (3) Nikon C2 point-scanning confocal microscope. Taken together, the MIC now can offer users the *unique* option of choosing any aspect of confocal microscopy for both live and fixed samples: single-photon point scanning, multiphoton point scanning, and spinning disk, enhancing the local and regional appeal for this popular form of microscopy imaging.



Cryo-TEM Brings an Early Winter Chill

The Chair of the Department of Molecular Physiology and Biophysics (Dr. David Warshaw) recently requested that the FEI Tecnai T12 (cryo) transmission electron microscope (cryoEM) in his department be absorbed into the MIC due to faculty retirement. This is the only cryoEM located in the northern New England states, and thus will



serve as a *unique* regional resource. A current staff member in the MIC, Mr. Todd Clason, previously worked as a research technician in the cryo-EM lab, and will assume the technical duties in this facility once again.

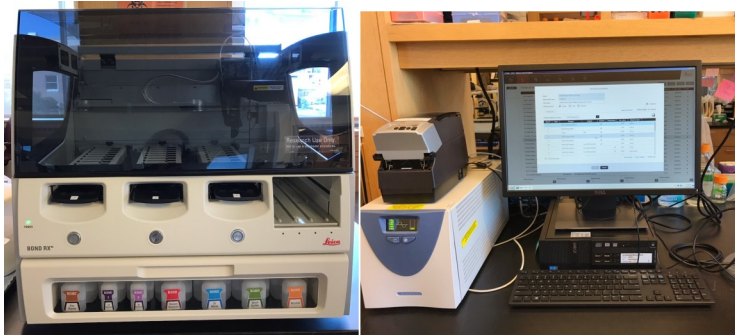
MIC Goes to the Asylum, Again!

The Dean of the College of Engineering and Mathematical Sciences at UVM (Dr. Linda Schadler) recently purchased a state-of-the-art Asylum Research Cypher atomic force microscope to be housed in the MIC and offered as a core facility-available instrument for all investigators. This instrument was installed in September 2019, and is operational.





Grateful Grants Supporting a State-of-the-Art MIC



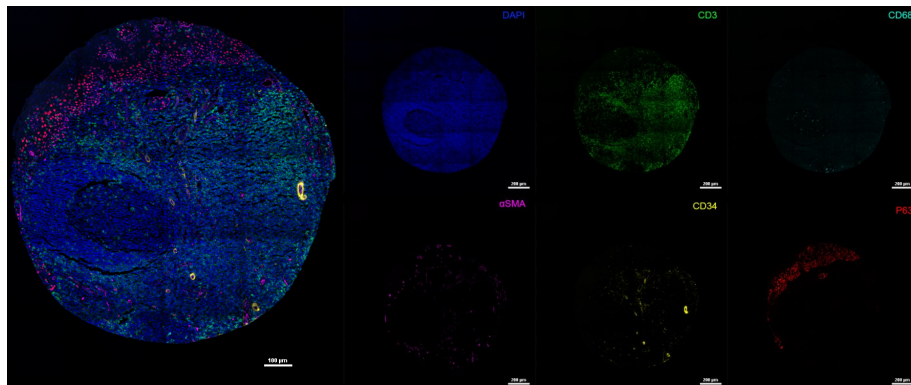
Grant support will continue to be an important mechanism both for upgrading current equipment as well as purchasing new state-of-the-art imaging systems. In the past year we received grant funds to:

- (1) Purchase a state-of-the-art Nikon A1R HD point-scanning confocal microscope (NIH S10 Shared Instrumentation Grant)
- (2) Upgrade the Nikon A1R HD

confocal microscope for high-throughput multidimensional 3D imaging (UVM Larner College of Medicine New Methodologies Grant; Cunniff, Ghule, Taatjes, Co-I's)

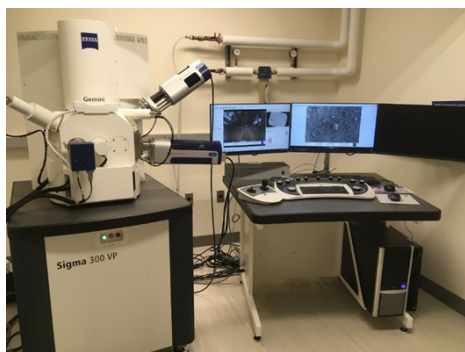
(3) Very generous funding from the NIGMS-supported Northern New England Clinical Translational Research Network grant to support the purchase of:

- a spectral detector upgrade for the Nikon A1R HD confocal microscope
- a Leica BOND RXm Autostainer for automated processing for IHC, ISH, and RNAscope
- Indica Labs HALO image analysis software for quantitative tissue analysis in digital pathology
- two Zeiss sCMOS cameras for the Olympus BX50 upright and IX70 inverted microscopes



New STEM Discoveries at Discovery Hall

UVM has recently invested in STEM disciplines, with a new building (Discovery Hall) devoted to its activities. A part of the basement of the building was designed to house a core microscopy research suite for the physical sciences, and affiliated with the MIC. As a result of successful NSF grant proposals, the facility now includes a Zeiss Sigma 300 VP Field-Emission Scanning Electron Microscope and, soon to be added, a Horiba LabRAM Evolution NANO AFM-TERS Raman Microscope. The two new instruments will be maintained, and users trained by long-time MIC staff members. The instruments will be listed under the MIC iLab account for scheduling, billing, and tracking purposes.



The Zeiss Sigma 300 VP Field-Emission Scanning Electron Microscope (FE-SEM) features both high vacuum and variable pressure mode and 20V to 30 kV operation resulting in 1.2 nm resolution (at 20kV). The microscope is equipped with secondary electron, back-scattered electron, energy dispersive spectroscopy, and energy back-scatter diffraction detectors along with software enabling analysis of morphology, elemental composition, and grain orientation mapping.

The instrument is available to researchers on campus and from the wider region in the fields of physics, chemistry, engineering, geology, biomedicine and materials science to characterize materials such as nanostructures, crystals, elec-

tronic devices, optical filters, minerals, and more.

The system is supported by the National Science Foundation, Award # 1828371, awarded to Principal Investigator Matthew White (Physics) and Co-Is Randall Headrick (Physics), Christopher Landry (Chemistry), Frederic Sansoz (Mechanical Engineering), and Laura Webb (Geology).

Equipment Available:

- JEOL 1400 TEM
- FEI TECNAI T12 Cryo-TEM
- JEOL JSM 6060 SEM with Oxford INCA EDS system
- Nikon STORM Super Resolution
- Nikon A1R HD & C2 Confocal
- AR MFP-3D BIO & Cypher Atomic Force Microscopes
- Yokogawa Spinning Disk Confocal
- Zeiss LSM7 Multiphoton Microscope
- Arcturus XT-Ti Laser Microdissector
- Leica VERSA8 Whole Slide Imager
- Leica BOND RXm Autostainer
- IVIS Whole Animal Imager
- Olympus BX50 & IX70 Microscopes
- Olympus & Leica Stereo Microscopes
- Deltavision Restoration Microscope
- Applied Biophysics ECIS System
- Image Analysis - MetaMorph, Volocity 3D Software, HALO, MBF Stereo Investigator
- RNAscope—HybEZ Oven for ISH
- Microtomy—Paraffin, Cryostat, Ultramicrotomes

MIC Services Provided:

- Morphologic services and consultation at the light and electron microscopy level
- Light and electron microscopic immunocytochemistry
- Confocal scanning laser microscopy
- Atomic force microscopy
- Scanning and transmission electron microscopy
- Laser capture microdissection
- Super resolution microscopy
- Preparation of paraffin and frozen sections
- Whole animal imaging
- Image analysis and processing
- Training for use of the above equipment
- Special histological staining
- Testing of new antibodies and developing new staining techniques
- Manual and automated staining - RNAscope ISH, OPAL multiplex, IHC and IF antibody staining