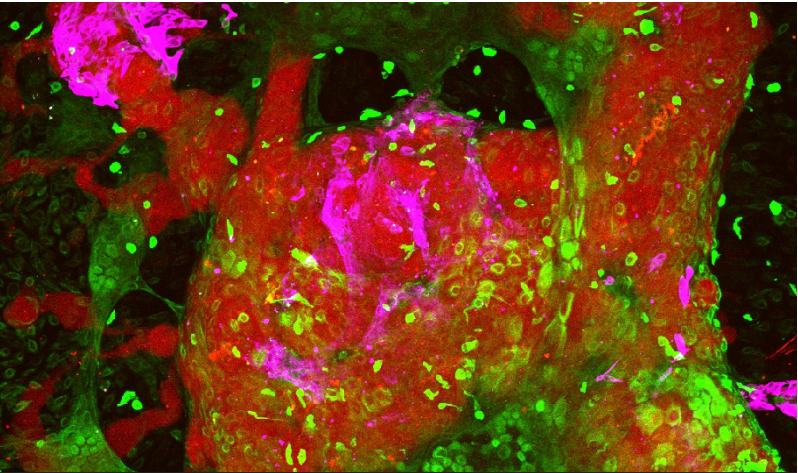


Light Microscopy



umass.edu/ials/light-microscopy

Located on the 5th floor in the Life Science Laboratories the Light Microscopy Facility (LMF) provides powerful resources for imaging model organisms, tissues, cells, biomaterials, and artificial structures and houses state-of-the-art equipment including almost every light microscopy imaging modality currently available. Cell culture facilities are also available nearby, as well as other routine needs for biological imaging. This facility is one of a few designated Nikon Centers of Excellence providing a unique opportunity for training, demonstration, instrument development, and research.

The LMF accepts samples and will perform requested acquisition as well as image analysis. We also offer tele-microscopy in which your scientist can remotely assist and monitor imaging with our staff without the need for traveling to Amherst. Our expert staff provides training to users to conduct experimentation for use on a fee for service basis to both internal and external researchers from both academic and industry clients.

ACCESS

To request access, training, or additional information please contact James Chambers at jjchambe@umass.edu or (413) 577-4580.

Our rates are highly competitive and are updated annually. Visit our website at umass.edu/ials/light-microscopy for current offerings and prices.

TRAINING

Training for new users consists of:

- lab safety training
- operation of the instrument and associated software
- determining correct acquisition settings for quantifiable data
- use of data analysis software
- exporting and presenting data
- clean-up and shutdown of the instrumentation.

Once the training is complete, researchers may schedule their experiments through our online booking system (CORUM) at corum.umass.edu.

UMassAmherst | Core Facilities

Institute for Applied Life Sciences
University of Massachusetts Amherst
Life Science Laboratories
240 Thatcher Road
Amherst, MA 01003



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UMass Core Facilities Inquiries

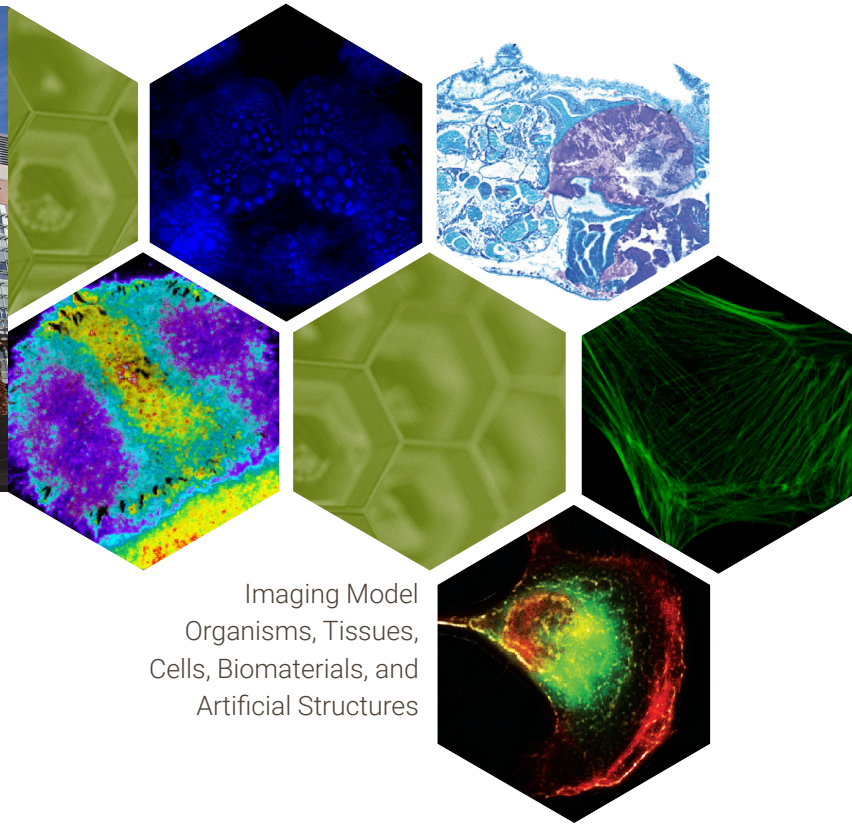
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Light Microscopy

Institute for Applied Life Sciences
University of Massachusetts Amherst



Imaging Model
Organisms, Tissues,
Cells, Biomaterials, and
Artificial Structures

Revision (07/18/22)

UMassAmherst

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Industry Sponsorship

The benefits of working with Nikon as an industry collaborator are that LMF users receive formal and informal training from Nikon engineers, frequent on-site technical support, access to new hardware and software technology, and assistance with cutting-edge experimental set ups.

EXPERTISE

Full time, LMF staff members are PhD-level scientists and bring to the lab decades of experience in photochemistry, optics, neurobiology, electrophysiology, and of course, microscopy imaging. They have and continue to publish scientific works in top-tier journals individually and in collaborative efforts with LMF users. As of July 2022, they have trained well over 1,000 individuals on the correct usage of the LMF microscopes. LMF staff are active participants in quality control and data managements working groups for both BioImaging North America as well as Quality Assessment and Reproducibility for Instruments and Images in Light Microscopy. Director Chambers is also heavily involved in the Association of Biomolecular Resource Facilities (ABRF).

EQUIPMENT

A1R18: Nikon A1 Resonant Scanning Confocal

This microscope is highly versatile and can be used for live or fixed samples. The resonant scanner allows for very fast acquisitions and the GaAsP detectors are extremely sensitive. This microscope has 6 lasers and the full gamut of objectives and software modules.

A1R25: Nikon A1 Resonant Scanning Confocal

This new microscope with a larger field of view is also great for live or fixed samples. The resonant scanner allows for very fast acquisitions and the GaAsP detectors are extremely sensitive. This microscope has 4 lasers and the full gamut of objectives and software modules.

A1SP: Nikon A1 Spectral Detector Confocal with FLIM Module

This microscope is great for fixed samples and is especially useful when experimenters may have overlapping emissions from fluorophores or auto-fluorescence. The 32-channel spectral detector can be implemented with the click of a button and allows for 32 x 2.5 – 10 nm bins of fluorescence identification. The FLIM module opens up a new dimension of measurements related to molecular environment.

A1R-SIMe: Nikon A1 Resonant Scanning Confocal with Structured Illumination Super-Resolution

This microscope is very versatile and can be used for live or fixed samples. The resonant scanner allows for very fast acquisitions and the GaAsP detectors are

extremely sensitive. The SIM side of the microscope is extremely easy to use with no special sample preparation required for super-resolution imaging.

A1MP: Nikon A1 Resonant Scanning Multi-Photon Confocal

This microscope is an upright, manual microscope that is suited for in vivo, intra vital imaging as well as imaging in and through thick tissues and samples. It uses a tunable infrared pulsed laser to excite fluorophores at the focal volume and features a resonance scanner that can image very quickly along with a fast moving piezo nose piece. We also have visible lasers for standard upright confocal microscopy.

SD: Nikon with Yokogawa Spinning Disk Confocal and Orthogonal Stimulation

This microscope is great for live cells as it is a low-light technique. With four laser lines and an additional mini-scanner for PA/FRAP/etc., we can easily image dynamic movements in live cells, stimulating/bleaching in real time.

Crest: Nikon with Crest V2 Spinning Disk Confocal and Two-Camera TIRF

This microscope is great for live cells as it is a low-light technique. With seven laser lines and a super-sensitive camera., we can image very quickly even in the z-direction. The two camera TIRF system allows for simultaneous 2 color imaging without compromising field size nor time.

HCA: Nikon with High Content Analysis

This microscope is truly amazing for its ability to collect and automatically analyze data from live or fixed samples. The intuitive and adaptive software can be programed to count cells, monitor growth, take high-resolution pictures when a certain feature is found, scan slides, scan multi-well plates, etc. A robot can even load your multi-well plates. It is infinitely useful. When it is done, you can have the microscope send you a text message that contains any key variables that you need to know right away.

N-STORM: Nikon STORM

This microscope makes doing 3D STORM imaging straightforward. This has STORM-4.0 which includes a cylindrical lens to provide z-information on your molecules of interest. This also has the option to change not only the TIRF angle with the click of a button, but also the direction of the laser entering the back aperture of the objective.

SMZ-18: Nikon stereoscope

This microscope makes is great for macroscopic samples (bugs, leaves, etc.) and can do brightfield and fluorescence imaging.

Ephys: Nikon inverted microscope with patch clamp electrophysiology

This microscope allows for simultaneous imaging and patch clamp recordings from appropriate sample types. It has a fast camera for recording events and a super-sensitive amplifier for recording the tiniest of voltages and currents.

LCMD: Nikon with Arcturus Laser Capture Micro-Dissection

This microscope is really a cellular robot. You can find cells or regions using bright field or fluorescence that you are interest- ed on tissue slices and draw a line around them, cut them out, move them to a cap and then process the cap for downstream experiments (sequencing, proteomics, etc.).

Keyence: Eye-piece-free microscope

The Keyence is a simple to use widefield fluorescence and brightfield microscope that is a great choice for occasional imagers or people that do not need some of the complex features of our other offerings. While it looks like a coffee maker, it does not make coffee.

Workstations

- Numerous PC workstations with NIS-Elements and other analysis/computational software available for remote access and usage.

Incubators

- Tokai Hit on-stage incubator with CO₂, heat, and humidity
- Oko Lab on-stage incubator with CO₂, heat, and humidity
- Ibidi on-stage incubator for heat control (all microscope bays are piped with 5% CO₂ taps for live cell work)
- 4 full size incubators available for use (one has O₂ control).

TESTIMONIAL

“

I have only been using the SIM and STORM microscopes at the UMass light microscopy facility for a few months and already it seems like my data has the potential to transform my thesis project. Thanks to the guidance and help from the facility director (Jim) I have been collecting images that have changed my approach completely and might lead to some pretty exciting findings in my field. The facility manager has been more than patient while training me, has provided valuable advice and makes the facility a pleasant and productive environment, constantly striving to improve it. I am excited to continue to work and collect data that can impress any audience, and of course push my field forward!”

– Emily Melzer



A significant portion of core equipment has been purchased through MLSC grant funding support.