April 2025: Volume 2, Issue 2

THE IRF INSIDER

University of South Carolina School of Medicine
Instrumentation Resource Facility
RRID:SCR_024955

In Case You Missed It

- The IRF has hired Alexandra (Ali) Sigmon as their new Research Specialist focused on Electron Microscopy! She is quickly getting acclimated to our internal processes, and will be fully proficient and ready to help all EM users in the upcoming months.
- The IRF has upgraded it's EM preparation by introducing a brand-new Leica UC Enuity ultramicrotome! Its intuitive user interface and automated functions ensure consistent, high-quality results while reducing the need for extensive user training. If you have questions, please reach out to Ryan Ball or Ali Sigmon.
- The IRF has unveiled a new travel grant (sponsored by the Dr. Robert L. Price Instrumentation Resource Facility Endowment Fund). To date, we have only had a single applicant. Apply now for the Spring cycle of awards!
- The IRF is advancing its microscopy offerings with the Leica Stellaris 8 with TauSTED technology. It delivers sharper images, deeper insights, and exceptional performance for your most demanding applications. This was installed the week of March 24th, with internal training happening until June 1st. Location: Main Campus Microscopy Core until new HSC is completed.

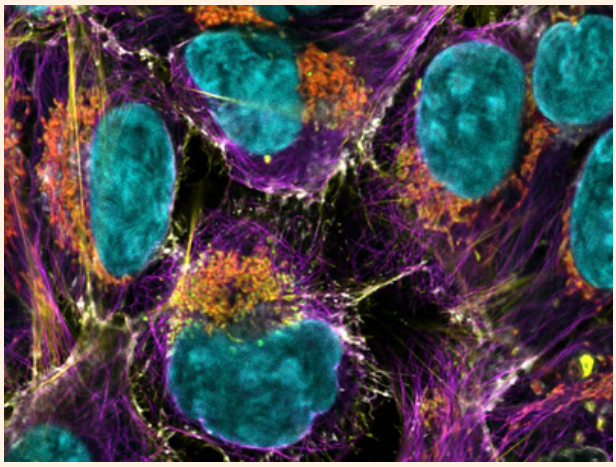
An image of fluorescently labeled stem cells taken by our own Dr. Worden in the IRF when he was a BMSC PhD candidate, was chosen as the Microscopy and Microanalysis journal cover for the April issue!

Be the First to Know!

Welcome to the IRF Insider, brought to you by the USC Instrumentation Resource Facility. In this newsletter, we recap what you may have missed, give updates on upcoming events, highlight our state-of-the-art equipment, and give you bits of knowledge. We hope you enjoy!

- Join us on Thursday, April 10th at 12:00pm in the B1 Classroom for a Lunch & Learn seminar focused on the **Echo Revolution microscope**—a hybrid, automated system that easily switches between upright and inverted configurations. This powerful tool supports live cell imaging, time-lapse studies, mosaic imaging, and multi-well plate screening, offering flexibility and a sleek design. Whether you're imaging delicate samples or conducting high-throughput experiments, the Echo system redefines the microscopy experience. Lunch will be provided!
- Join us (tentatively) on Tuesday, April 29th at 12:00pm in the B1 Classroom for a Lunch & Learn seminar highlighting our new **Leica Stellaris 8 with TauSTED**, a cutting-edge super-resolution confocal system. This advanced microscope enables researchers to visualize subcellular structures with remarkable clarity, pushing beyond the limits of traditional light microscopy. With TauSTED technology, you'll gain access to enhanced resolution, sensitivity, and precision for imaging dynamic biological processes at the nanoscale. Don't miss this opportunity to explore how super-resolution can elevate your research. Lunch will be provided.
- Don't miss this exciting opportunity to attend—and even present—at the upcoming **Southeastern Microscopy Society meeting,** happening May 14–16, 2025 at the Courtyard by Marriott in Columbia, SC. This nationally recognized conference is open to all microscopists—whether you work with biological or material samples at the light, confocal, or electron microscopy level. Abstracts are being accepted for talks, posters, and the Ruska Student Competition (now extended to April 11, 2025). The meeting features engaging workshops (including Zeiss Lightsheet and Leica TauSTED), expert speakers, and competitions for student presentations and stunning micrographs. Plus, our own Dr. Bob Price and Dr. Austin Worden are leading the charge as Program and Local Arrangements Chairs! Learn more and submit your abstracts at southeasternmicroscopy.org and reach out to Dr. Worden with any questions.

Mammalian cells, 6 fluorescent markers: membranes (white, CF405S, WGA), nuclei cyan, SPY505 DNA), mitochondria (green, MitoTracker Red), mitochondrial outer membrane (red, AF750), tubulin (magenta, AF555), actin filaments (yellow, SiR700).



Have You Used This Yet?

Leica Stellaris 8 with TauSTED

Location: Main Campus Microscopy Core (CLS711) until the new HSC is completed.

- We're excited to introduce the Leica Stellaris 8 with TauSTED, a cutting-edge addition to our imaging capabilities that brings super-resolution confocal microscopy to a whole new level. The Stellaris 8 is engineered for researchers who demand high performance and flexibility, offering TauSTED nanoscopy —a powerful technique that combines STED (Stimulated Emission Depletion) with lifetime-based imaging to push resolution beyond the diffraction limit with greater clarity and reduced photobleaching.
- Key features include:
    - Super-resolution down to 30 nm with TauSTED technology
    - FLIM (Fluorescence Lifetime Imaging Microscopy) integration for functional imaging
    - White Light Laser (WLL) for tunable excitation across the visible spectrum
    - Power HyD S detectors for unmatched sensitivity and speed, with 5 detectors enabling simultaneous 5-color acquisition
    - Near-infrared imaging capabilities for deeper tissue visualization and expanded fluorophore options
- Whether you're visualizing dynamic subcellular processes or mapping molecular interactions with nanoscale precision, the Stellaris 8 with TauSTED empowers you to go deeper, see clearer, and explore further. Training and access information coming soon!

Read This Today!

The practice of combining imaging modalities emerged from the quest to discover novel insights into the structure and function of various samples. As these techniques merge, so do their names, creating a plethora of unique acronyms that can seem like an alphabet soup. Highlighted here are several notable combination techniques such as Correlative Light and Electron Microscopy (CLEM), Atomic Force Microscopy (AFM), Total Internal Reflection Fluorescence (TIRF), Selective Plane Illumination Microscopy (SPIM), and Two-Photon Excited Fluorescence – Second Harmonic Generation (TPEF-SHG). Each of these methods extends beyond the capabilities of their individual components to significantly advance scientific research. This article, Part 3 of our "Alphabet Soup of Microscopy" series, seeks to distinguish these popular combination techniques from their standalone predecessors.

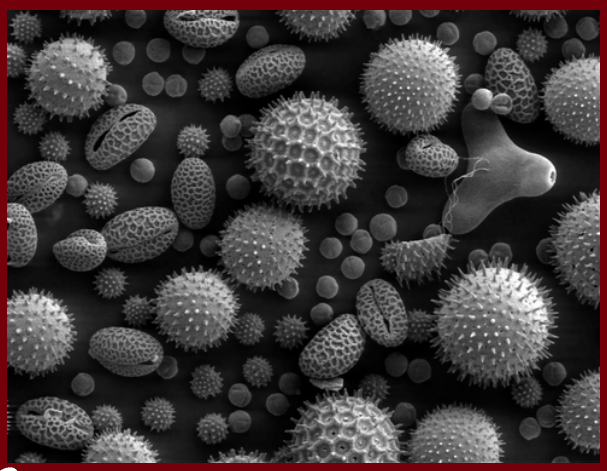
Austin N Worden, The Alphabet Soup of Microscopy: An Introduction to Advanced Imaging Techniques. Part III: A Combo Platter of CLEM, AFM, TIRF, SPIM, and TPEF-SHG, *Microscopy Today*, Volume 32, Issue 6, November 2024, Pages 57–62, https://doi.org/10.1093/mictod/qaae083

Science MEME Quarterly

Quote Corner

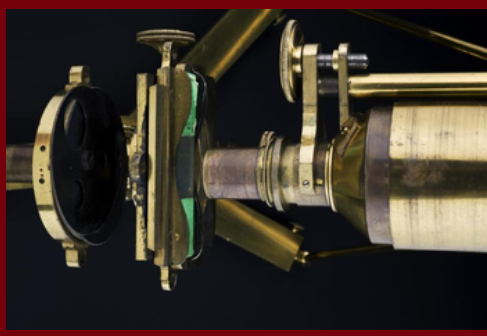
"People believe that art and science are two distinct realms. It is far from the truth because, if you look at science from a microscope or from a different lens, you can see the beauty in science. It is very artistic."
-Kiran Mazumdar-Shaw

Bonus Image: How are you doing with this year's pollen? Here's a scanning electron microscope image of that annoying yellow dusting that is EVERYWHERE!



Microscopy History

1826: Joseph Jackson Lister was an English amateur opticist whose discoveries played an important role in perfecting the objective lens system of the microscope, elevating the instrument to the status of a serious scientific tool. He was deeply interested in natural history, and realized that the microscopes available in the early 19th century did not provide adequate resolution to reveal the structure of plant cells and animal cells in sufficient detail. He therefore set out to improve the design of the objective and achromatic lenses by altering the spacing of the elements. The resulting compound lens not only provided better correction for chromatic aberration, but minimized spherical aberration as well. Lister published his work in 1830 in a paper entitled "On Some Properties in Achromatic Object-Glasses Applicable to the Improvement of the Microscope", and collaborated with James Smith and Andrew Ross, who had established what was to become one of the finest microscope manufacturers in 1832. Lister's law of aplanatic foci remained the underlying principle of microscopic science. Even with all of this, JJ Lister is still best know for being the father of Lord Joseph Lister, British surgeon who created surgical sterilization techniques and is known as the father of modern surgery.



JJ Lister's 1826 Microscope Preserved by the Science Museum Group London, England

In Other News

- **Coming Soon: Cryo-EM Capabilities on the Hitachi 7800 TEM:** Thanks to a generous offer from Hitachi, the Hitachi 7800 transmission electron microscope in our EM Center will receive a temporary field upgrade—at no cost to USC—to include a new camera and cryo-EM capabilities for the months of May, June, and July. This is an exciting opportunity to explore advanced cryo-electron microscopy workflows on-site. As part of the Southeastern Microscopy Society (SEMS) meeting being hosted here in Columbia, we'll also be holding a workshop on cryo-EM technology on Wednesday, May 14th, and throughout the trial period, Hitachi applications expert Heather Berensmann will be available to provide hands-on support and training. This is a unique opportunity to expand our core imaging capabilities—contact Dr. Bob Price if you're interested in doing work on the system while it's here.
- **Reminder: Select Core Facilities in USCeRA Grant Submissions:** When submitting a grant through USCeRA, don't forget to select the IRF (Instrumentation Resource Facility)—and any other core facilities involved in your work—within the submission portal. This simple step is crucial for tracking how many proposals utilize each core, helping us demonstrate impact, justify resources, and improve support for your research. Your selection ensures that core facilities are accurately credited and can continue to grow alongside your needs.
- **IRF Conference Room Renovation Begins March 31:** Starting March 31, the IRF conference room will undergo renovations to improve functionality and create a more modern, flexible meeting space. The project is expected to take approximately 3–4 weeks to complete. During this time, the room will be unavailable for use—thank you for your patience as we upgrade this shared space for future seminars, trainings, and meetings!

Want more information? Scan or Click the QR Code!

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Acknowledgement Guide

IRF Resources

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