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Spring 2023 Newsletter

Oklahoma Microscopy Society

Established 1977

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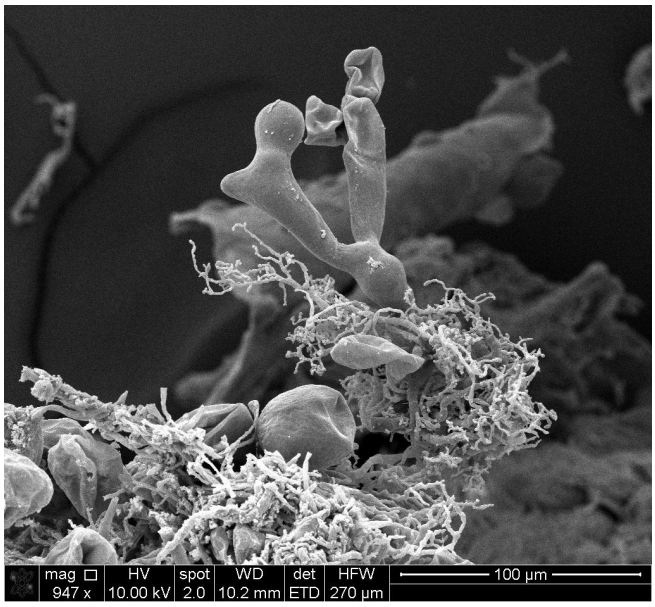
Student Micrograph 2022 Contest Winner
Carrie Pratt, OSU



The image depicts a novel strain of microscopic anaerobic gut fungi. These fungi were previously known only from the digestive tracts of mammalian herbivores, where they break down the complex sugars that make up plant biomass. This strain was cultured from the feces of a tortoise, representing a novel host for anaerobic gut fungi and expanding our knowledge of where AGF reside. The strain represents the novel genus, Astrotestudomyces, which we now know evolved around 112 million years ago. The large branching sporangia are a type of fruiting body and threadlike hyphae extend down and to the left. The image was taken with an FEI Quanta 600 field-emission gun Environmental Scanning Electron Microscope with the help of the Oklahoma State University Microscopy Facility.

About Carrie:

I am currently a PhD student working with Dr. Mostafa Elshahed (left) and Dr. Noha Youssef (right) from the Microbiology & Molecular Genetics department. My research is centered on culturing, identifying, and characterizing novel anaerobic gut fungi and studying their communities in novel hosts like tortoises.

A Letter from

Michael Brian Anderson

OMS President

Dear Oklahoma Microscopy Society Members,

It is with great pleasure that I welcome you to another edition of our Oklahoma Microscopy Society (OMS) Newsletter. As we move into another year, I am honored to serve as the President of this esteemed organization and work with our dedicated and talented members to promote the advancement of microscopy and its applications in various fields.

Our society has been active in promoting the use of microscopy in research, education, and industry in Oklahoma for many decades, and we continue to provide opportunities for our members to learn and grow in this exciting field. We have a range of activities planned for this year, including workshops, seminars, and panel discussions.

As an organization in rural America, we hope to inspire young minds who may one day lead scientific innovation in Oklahoma. OMS is committed to fostering an inclusive and diverse community, where all members feel welcomed, respected, and supported. We encourage you to participate actively in our events and activities and to share your ideas and suggestions for ways we can improve and better serve our community.

For my Presidency, I am honored to work with an amazing group of people who have brought me on board and prepared me for the challenges of positioning OMS for growth and innovation. As a cohesive organization we work towards:

Outreach in public schools to **inspire young minds** and engage in the fascinating world of microscopy

Collaborations in microscopy with Oklahoma business and academic labs, **advancing research** in Oklahoma

Continued expansion of OMS to become a **hub of resources** for microscopists in Oklahoma

From continued support in programs like The Ugly Bug Contest, we encourage student outreach in public schools, hopefully planting seeds of inspiration for future careers and industry leaders in Oklahoma. Through programs like our interactive Image Analysis Workshops, we discuss modern and efficient ways of quantitative image analysis in a friendly and open environment, learning, while making contacts and building networks. In addition to traditional image analysis techniques, we also discuss cutting edge three-dimensional visualization techniques and the reasoning behind using certain techniques to address specific scientific questions. We plan to continue these workshops, teaching new techniques while building a professional network of microscopists in Oklahoma.

The Oklahoma Microscopy Society is a non-profit academic and professional organization established in September of 1977 by a group of electron microscopists, and becoming the 18th local affiliated society of Microscopy Society of America (MSA). This momentous event became the foundation for the State of Oklahoma to develop local advanced microscopy hubs, composed of professors and local industry leaders, such as Phillips 66, to share ideas and grow together. We encourage the knowledge of microscopy, promoting the free exchange of ideas, techniques, and data among interested individuals and encouraging interdisciplinary interactions. OMS is a local affiliate society of MSA, the Microbeam Analysis Society (MAS), and the Oklahoma Academy of Sciences (OAS).

As the current President of OMS, I feel it important to embrace new technologies, from new equipment to customized algorithms, and strategies for using artificial intelligence in image analysis. However, with all these new technologies on the horizon, we will primarily serve as a forum for education and professionals and continue to promote basic and advanced science at all levels. Through public outreach in Oklahoma elementary schools, OMS established and continues to host the Ugly Bug contest. A fascinating contest designed to engage young minds in Oklahoma by searching for unique bugs and internally vote for the best one. Once a school has a bug to submit, it is processed for scanning electron microscopy and stunningly visualized for OMS-sponsored voting. Each year, the Oklahoma public schools with the most popular bugs win a new professional microscope, with camera. We are proud to host this each year and I have recently worked with a Master's degree student who participated in the contest as a child in school, amazing!

In addition to public outreach, we believe it is vitally important to create a collaborative and corporative environment for microscopists in Oklahoma. We have several major corporations in Oklahoma that reply on microscopy techniques, for example, oil companies (Phillips 66, Continental) use microscopy to evaluate pipeline microstructures for strength and resiliency. It is my hope that we can one day bridge the academic and business work in Oklahoma. So that students may be trained in applicable microscopy skills, valuable to Oklahoma industries. Internally, OMS has discussed the creation of a public internet forum for all attendees of past and future image analysis workshops. We plan to deploy this in 2023 with hopes it becomes a valuable hub for group problem solving, collaborations and job opportunities.

Giving back to the community has always been a founding principal for OMS. We are strengthened by our amazing members and inspired by the stunning science and visualization that emerges from our research! I am honored to have been nominated President of OMS for 2023 and I appreciate the thorough support that I have received from previous OMS Presidents: Tingting Gu, Preston Larson, Lisa Whitworth, and Bill Meek, among several other amazing people. Thank you for brining me on-board and giving me a chance to contribute to a society that has giving me so many opportunities. It is an honor to push it forward to new members, maybe even members who's first exposure to microscopy was the Ugly Bug Contest.

I look forward to working with each of you in the coming year to advance the field of microscopy and to promote the growth and success of the Oklahoma Microscopy Society. Thank you for your continued support and commitment to our organization.

Sincerely,

Michael Brian Anderson
President, Oklahoma Microscopy Society
Research Scientist, Anatomy & Cell Biology
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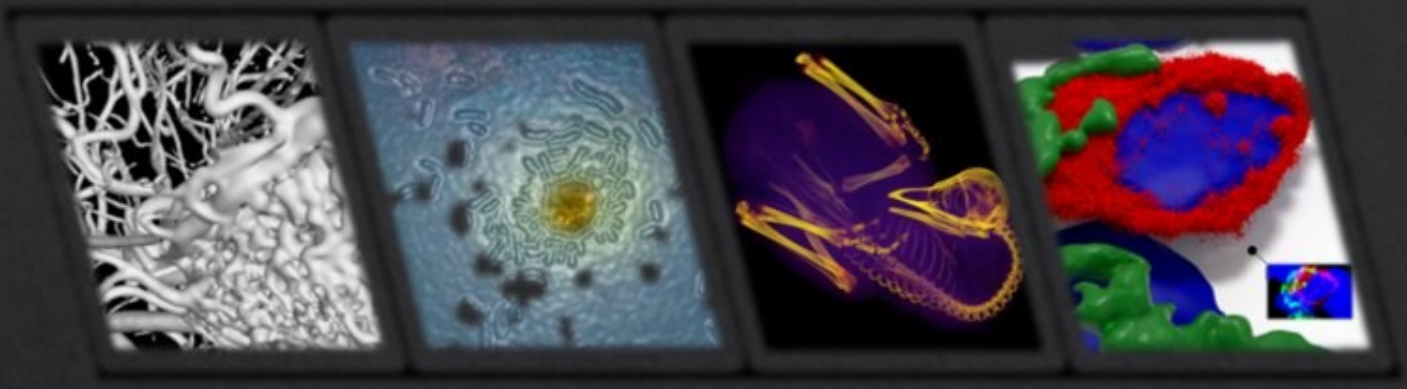
Oklahoma Microscopy Society 2023 Spring Meeting

April 13th & 14th, 8:45 AM – 5 PM, Oklahoma State University Center for Health Sciences, Founder's Hall and D-107



Keynote Speaker: Sangpil Yoon, Ph.D., Ultrasound Molecular Imaging and Targeted Therapy Laboratory, The University of Oklahoma, Tweet: YoonLab

Timpano best student oral presentation:

1st : All-expense-paid trip to present research at a national meeting of the Microscopy Society of America, and $100 cash scholarship for research
2nd : 100.00 cash scholarship

- Student Abstract Deadline: March 24th
- Student must be OMS member (student registration fee: $5.00)
- https://okmicroscopy.org/membership/ (register here)

Posterboard sessions: Student poster presentation (deadline March 24th) submit posters to michael.b.anderson@okstate.edu (email title: OMS Poster)

Image Analysis Workshop: 2-hour interactive FIJI workshop covering several aspects of general quantification and intro to FIJI scripting.

Panel Discussion: Life after graduation: a forum discussion with industry professionals, as well as other talks.

General Admission: $15.00, includes lunch

Website: https://okmicroscopy.org/

https://okmicroscopy.org/2023-oms-spring-meeting-registration-form/

Oklahoma Microscopy Society (OMS) 2023 Spring Meeting

April 13th (Thursday) and 14th (Friday) – 8:45 AM – 5:00 PM
Oklahoma State University Center for Health Sciences
1111 W 17th Street, Founders Hall and D-107

Conference Admission (includes OMS membership, 1 yr.)

Student membership: $5.00 Membership: $30.00 Membership renewal: $15.00

https://okmicroscopy.org/2023-oms-spring-meeting-registration-form/

Graduate Student Competitions + Prize Money

- Timpano Award: Oral presentation (involving microscopy)

  1st prize: up to $1000.00 towards presenting research at a national meeting of the Microscopy Society of America

  2nd prize: $100.00 cash scholarship for research

- Best Poster board presentation - 1st prize: $100.00

* Email abstracts/posters to: michael.b.anderson@okstate.edu, ATTN: OMS Submission
* Soft deadline for abstracts: April 1st

Events and Speakers

- Keynote Speaker: Sangpil Yoon, Ph.D., Ultrasound Molecular Imaging and Targeted Therapy Laboratory
- Interactive Image Analysis Workshop
- Speaker: Jacob Manjarrez, Ph.D., Functional Logic of Neural Circuits: A Tale of the same Circuit
- Panel Discussion: Life after graduation: a forum discussion with industry professionals.
- Vender presentations
- Timpano Competition (oral presentation) (prize money)
- Poster Competition (prize money)

ImageJ/Fiji Interactive workshop

April 14th, 2023

Oklahoma State University, Tulsa Campus, center for Health Sciences
1111 W. 17th St. Tulsa, OK 74107
Tandy conference center

Instructor: Dr. Michael Anderson and Dr. Tingting Gu

Workshop description: This workshop provides a basic foundation of ImageJ/Fiji (Fiji is just ImageJ), an open-source image analysis package you should be using to open, process, and export your microscopy images from. It uses real imaging data to address common image processing and analysis problems. It also provides hands on activities for attendees to practice

Section one: for beginners: 9 – 10 am

Focus on the effective use of ImageJ/Fiji It is intended for people who have never used the ImageJ/Fiji before or have very little knowledge on how to use this program.

Topic covered: Introduction to digital imaging, basic ImageJ functions, various types of image analysis, defining regions of interest (ROI) and taking general measurements for qua.

Section two: for intermediate level: 1– 2 pm

It's intended for experienced users who would like to learn methods that will take your ImageJ/FIJI analysis to the next level.

Topic covered: Defining regions of interest (ROI), thresholding, segmentation, cell counting, particle analysis, background subtraction, introduction of macros and FIJI scripting for automated tasks.

Scan to Register: https://forms.gle/UDjm5AyCbrzhuTvS9

Thank you for the generous support from the Oklahoma Microscopy Society (OMS). The workshop is part of the OMS annual spring meeting and is completely free. Light refreshment and lunch will be provided. Please sign up for OMS meeting for lunch and beverage. *https://okmicroscopy.org/2023-oms-spring-meeting-registration-form/*

Please contact OKMicroscopy@gmail.com for any questions.

OMS Spring 2023 Meeting

Schedule Friday, April 14, 8:45-5pm

8:45 – 9:00 Open Remarks by Dr. Michael Anderson, President, OMS, OSU, Tulsa

9:00 – 10:00 ImageJ/Fiji Interactive workshop Section One (Beginner)

10:00 – 10:20 Morning coffee break/Networking, Meeting with Vendors

10:20 – 11:20 Keynote Speaker: Dr. Sangpil Yoon, Assistant Professor, University of Oklahoma, Norman OK

11:20 – 11:40 Vendor Talk: Dylan Wood, Protochips

11:40 – 12:00 Vendor Talk: Sonika Robertson, Oxford

12:00 – 1:00. Lunch/Networking/Career Development Discussion Panel

1:00 – 2:00 ImageJ/Fiji Interactive workshop Section Two (Novice, Advanced)

2:00 – 2:20 Vendor Talk: Dawn Bender, Nikon

2:20 – 2:40 Afternoon coffee break/Networking, Meeting with Vendors

OMS Spring 2023 Meeting

Schedule Friday, April 14, 8:45-5pm

2:40 – 3:40 Keynote Speaker: Dr. Jacob Manjarrez, Assistant Professor, Oklahoma State University Center for Health Sciences, Tulsa OK

3:40 – 4:00. Student Timpano Presentation: Mason Rhue, University of Oklahoma, Norman, OK. *Title: Commercial and laboratory MWCNTs subject to ball milling and compounding in polymers: A microscopic perspective.*

4:00 – 4:20 Student Timpano Presentation: Mason Hochstetler, OSU-Center for Health Sciences, Tulsa, OK. *Title: Prelimbic cortical neurons expressing genetically-encoded calcium indicator.*

4:20 – 4:40 Student Timpano Presentation: Christy Eslinger, OSU-Center for Health Sciences, Tulsa, OK. *Title: Validation of Colon Inflammation Biomarkers Using Immunohistochemistry.*

4:40 – 4:50 Break

4:50 – 5:00 Closing remarks and Award ceremony

OMS Spring 2023 Meeting Keynote Speaker
Dr. Songpil Yoon
University of Oklahoma

Ultrasound and molecular biology for precise imaging and targeted therapy

Abstract

Tumor microenvironment (TME) is comprised of tumor cells, the tumor stroma, vessels, various substances such as chemokines and cytokines and a variety of tumor-associated infiltrating immune cells. Immune regulation is a dynamic and complex network maintained through a myriad of signaling on/off switches. Cancer cells change TME by expressing immune suppressive proteins and recruiting cells that can turn off immune surveillance of immune system, resulting in immune suppression. To find the underlying mechanism of immune suppression in TME and develop innovative approaches to increase therapeutic efficacy, my laboratory is developing multiplexed and super-resolution ultrasound imaging technique, non-viral intracellular delivery platform, and remote immune-priming agents using ultrasound and genetically encoded contrast agents, known as gas vesicles. In this talk, I will describe a multiplexed imaging approach to differentiate two types of contrast agents using gas vesicles isolated from *Serratia* and mid-band fit spectral imaging. Then, L1-homotopy based compressed sensing algorithm will be introduced to improve image acquisition time and image quality for super-resolution ultrasound imaging. Finally, remote gene and protein regulation involved in lipolysis and autophagy via low intensity pulsed ultrasound will be introduced as a potential approach for cancer therapy.

Dr. Sangpil Yoon is an Assistant Professor at the School of Electrical and Computer Engineering, the University of Oklahoma. He received a doctorate degree in mechanical engineering from the University of Texas, Austin. His laboratory uniquely combines techniques from synthetic and tumor biology and innovative techniques in ultrasound that break the diffraction-limit to address the need for imaging modalities and barriers to engineer and manipulate cells for immunotherapy. These interdisciplinary approaches are broadly applicable to research laboratories for mechanistic understanding of disease and hold significant translational potential of identifying disease biomarkers and improving therapeutic efficacy for cancer and other diseases. His current research interests and goals are the development of deep tissue and single cell resolution ultrasound imaging with multiplexed imaging capabilities using super-resolution ultrasound imaging technique and genetically encoded gas vesicles and the next generation intracellular delivery platform for T cell engineering. He is a recipient of an NIH pathway to independence award (K99/ R00) and an NSF Career Award.

OMS Spring 2023 Meeting Keynote Speaker
Dr. Jacob Manjarrez
Oklahoma State University

The *Caenorhabditis elegans* Reversal Circuit: A Tale of the Same Circuit

Abstract:

Caenorhabditis elegans is a small nematode (roundworm) that has been extensively studied in the fields of neuroscience, development, genomics, and aging. Despite its cellular simplicity (only 302 neurons), the *C. elegans* nervous system is capable of relatively complex behaviors, such as integrating multiple sensory inputs and associative learning. This is achieved through the activation of specific neural circuits that process sensory information and generate appropriate motor responses.

A well-studied *C. elegans* neural circuit is involved in locomotion reversal. The animals usually crawl forward in a sinusoidal manner, but they will stop and go backward in response to the activation of several types of sensory neurons. The speed and duration of the backward locomotion can be modulated, as well as the subsequent reorientation prior to resuming forward locomotion. The reversal speed and duration, and the reorientation depend on the nature and intensity of the sensory input and the internal metabolic state and the previous experience of the animal.

Despite its simplicity, the reversal circuitry is highly effective. Our research has revealed several unexpected features of the circuitry, including the role of synaptic plasticity in shaping the responsiveness of the circuit, the role of individual members of bilateral neuron pairs, the involvement of specific neurotransmitters in modulating the circuit's activity, and the regulation of the circuit by multiple signaling pathways.

In essence, *C. elegans* reversal behavior provides an informative example of how the interplay and modulation of a limited number of circuit elements contribute to a set of relatively complex and adaptive behaviors. By understanding the intricacies of this circuit, we gain insight into the basic principles of neural circuit design and the mechanisms underlying sensory processing and motor control in simple organisms.

Dr. Jacob R. Manjarrez, PhD, is a research scientist and educator at Oklahoma State University Center for Health Sciences. With a background in Biochemistry and Neurobiology, Dr. Manjarrez is committed to advancing our understanding of how nervous systems function in health and disease. As a faculty member at Oklahoma State University Center for Health Sciences, he has contributed to the development of innovative research strategies to understand the functional logic of neural circuits. Dr. Manjarrez's research is focused on two main areas, using the model organism, *Caenorhabditis elegans,* as a drug discovery model and measuring neural activity in the *C. elegans* nerve ring to decipher the neural networks associated with decision making.

In addition to his research and teaching, Dr. Manjarrez is committed to service and outreach. He participates in SACNAS, as a member and Faculty advisor, which allows him to share his knowledge and passion for science.

2023 OMS Spring Meeting

April 14th, 2023 Tulsa, Oklahoma

A.R. and Marylouise Tandy Medical Academic Building
Tandy Conference center, 4th floor

Oklahoma State University, Tulsa Campus
Center for Health Sciences
1111 W. 17th St.,Tulsa, OK 74107

OSU Tulsa campus map:
https://medicine.okstate.edu/about/campus-map.html

Event building: The A.R. and Marylouise Tandy Medical Academic Building is identified by black rectangle on the map shown below. Tandy Conference center is on the 4th floor of the Tandy building.

Timpano Award

This Award, commemorating the late Dr. Peter Timpano, is based on student presentations at the OMS meeting. All applicants for the Timpano Award must be members of OMS at the time that they declare themselves as candidates for the Award and must be enrolled in a degree program in an institution of higher learning in Oklahoma.

First Prize:

All-expense-paid trip for the first place winner to present a paper or poster on his or her research at the national meeting of the Microscopy Society of America (MSA) or Microbeam Analysis Society (MAS) or another national meeting focusing on microscopy related technologies. The total travel allowance (including MSA or MAS contribution or other funding sources, if any) will be $1,100.00, with all reasonable expenses reimbursed upon presentation of receipts. In addition, a $100.00 cash scholarship to be used toward the student's research career will be awarded. (If the student is selected as a finalist in the MSA Presidential Student Awards Competition, then MSA will provide registration and airfare, and OMS will provide an additional $200.00 bonus.)

Second Prize:

A $100.00 cash scholarship will be awarded to the second place winner for use toward the student's educational/research expenses. This and the above award are tax exempt if used for educational/research expenses.

The best student paper will be evaluated on the basis of the following criteria:

Quality of presentation
Quality of slides and micrographs
Scientific approach
Materials and methods
Value of contribution to scientific knowledge
Merit of microscopic work
Quality of submitted abstract

Timpano Award

Rules for the Competition:

This competition shall be judged by a committee of at least 3 OMS members appointed by the OMS Executive Board; those having a conflict of interest will be excluded. Votes shall be cast by secret-ballot and will be accepted by the Secretary-Treasurer (or designated OMS Officer) after the final competing presentation. (OMS reserves the right to set minimum standards for the best paper and may choose to select a second place winner without selecting a first place winner, at its discretion.)

Conditions of Award:

Upon winning first place, the awardee must, by June 30th of the current year, submit a letter of intent or declination regarding attendance at the MSA or MAS meetings or another national meeting focusing on microscopy related technologies. If the awardee notifies OMS that he or she declines to attend the meeting listed above for any reason, a $100 prize will be awarded in lieu of the trip to the meeting, provided that the declination is received within the stated time limit. If the winner declines the first place prize, the second place winner will be offered the opportunity to attend the meeting and present a paper as provided above. A student may compete for the Timpano Award throughout his or her career, but may attend an MAS or MSA meeting or another microscopy related meeting at OMS expense only once. Students winning additional Timpano competitions will receive a $100 cash scholarship.

Timpano Speaker Abstract

Mason Rhue

University of Oklahoma

Commercial and laboratory MWCNTs subject to ball milling and compounding in polymers: A microscopic perspective"

Mason Rhue

University of Oklahoma

School of Chemical, Biological, and Materials Engineering

Dr. Brian Grady (PI)

Carbon nanotubes (CNTs) possess very intriguing mechanical, electrical, and thermal properties, which have made them prime targets for polymer nanocomposites over the last three decades. The percolation behavior of CNTs in polymers has been proven to be superior to other carbon-based additives with respect to high electrical conductivities and low percolation thresholds due to their high aspect ratios. However, widespread use of CNTs in industry is still limited due to comparatively low synthesis process yields and high costs. In this talk, I highlight the microscopic techniques employed in my research group to aid in the development of high yield and industrially relevant CNT synthesis, preparation, and compounding processes. Our CCVD nanotube synthesis process focuses on using a lamellar catalyst support material, rather than a traditional monolayer substrate, to increase overall process yield. A consequence of this high yield synthesis is extremely high CNT aspect ratios (>5000), which can cause processing difficulties when compounding with polymers. So, we have also systematically studied the effects of ball milling on the length degradation of CNTs. By carefully observing and measuring nanotube lengths (SEM) and diameters (TEM), we have directly correlated nanotube size and wall morphology to the impact energies required to break the nanotubes. We also find that the length degradation behavior of commercial CNTs of different sizes and wall morphologies (TEM) can be simplified to a single master curve based on cumulative impact energy of milling, which will be essential to industrial implementation. I conclude by discussing the macrodispersion of CNT agglomerates (LM) and nanodispersion of individual CNTs (SEM/TEM) in thermoplastic matrices. Recent results on the comparison of commercial versus laboratory grown CNT percolation behavior in polycarbonate are previewed, for which our laboratory grown nanotubes possess a percolation threshold nearly an order of magnitude lower than the commercial counterpart

Timpano Speaker Abstract

Mason Hochstetler

Oklahoma State University

Prelimbic cortical neurons expressing genetically-encoded calcium indicator

Mason J. Hochstetler[1], Jake D. Layne[1], Brandon M. Curry[1], Liming Fan[1], Michael Anderson[1], Craig T. Werner[1]

[1]Oklahoma State University Center for Health Sciences, Department of Pharmacology and Physiology, Tulsa, OK 74107

The prevalence of opioid use disorder (OUD) and overdose deaths has reached epidemic proportions and constitutes a global crisis. In 2019, synthetic opioids, most notably fentanyl, were being used by 1.2% of the worldwide population and contributed to more than 70% of the record-breaking number of overdose deaths. Fentanyl, often used clinically for anesthesia and analgesia, is commonly administered intravenously or by inhalation (smoking/vaping), resulting in rapid drug bioavailability in the brain. The neurobiology of OUD remains poorly understood, which is, in part, due to limitations in pre-clinical models and technical challenges. Intravenous drug self-administration is the "gold standard" for studying substance use disorders. However, the drug tether creates a technical issue when attempting to perform calcium imaging due to the tangling of the tether and technology cable. To overcome this challenge, our lab utilizes vapor chambers that allow the mice to freely behave with a miniscope mounted. We injected AAV1-*CamkIIa*-GCAMP6f-WPRE-bGHpA into the prelimbic cortex (PrL), and then implanted a gradient index (GRIN) lens aimed at the PrL. When we mount a miniscope, we are able to record calcium activity from hundreds of neurons in real time and track them longitudinally. This data allows us to examine how neuronal ensembles are recruited for various drug-related tasks (e.g. drug seeking). Through confocal microscopy, we identified virus expression and lens placement. Moreover, we digitally reconstructed the virus-expressing neurons to create a 3D model. Next, we plan to leverage retrograde viruses to image neurons that only project to specific regions, and also plan to express GCaMP6 in astrocytes for miniscope imagining.

Timpano Speaker Abstract

Christy Eslinger

Oklahoma State University

Validation of Colon Inflammation Biomarkers Using Immunohistochemistry

Christy Eslinger, Radhika Pande, and Subhas Das

Department of Biochemistry and Microbiology, OSU-Center for Health Sciences, Tulsa, OK.

Ulcerative colitis is a chronic dysregulated inflammation of the colon that results in abdominal pain, rectal bleeding, and decreased quality of life. The exact cause and biogenesis of ulcerative colitis is not known. There are many different models that are targeted to study ulcerative colitis and the most widely used preclinical model is the induction of colon inflammation in model animals using a chemical called, 2, 4, 6, trinitrobenzenesulfonic acid (TNBS). TNBS treatment results in localized colon inflammation that mimics Ulcerative Colitis in patients and therefore provides the opportunities to explore in detail the cellular pathways involved in this severe disease.

Many studies have shown that genetic, epigenetic, social, and other factors contribute to the development of Ulcerative Colitis. Inflammatory bowel diseases, in general, have a very high rate of incidence in developing countries, and the developing countries are alarmingly, not far behind. Our lab is interested in finding out how colon inflammation alters the epigenetic landscape of certain biomarker genes and the effect of epigenetic interventions of the colon inflammation. We study TNBS -induced colitis leading to localized colon inflammation that results in changes in DNA methylation status of many biomarker genes. We have previously established that the pain biomarkers are overexpressed in colon inflammation and blocking these biomarkers pharmacologically alleviated the pain response in these animals. These biomarkers are epigenetically regulated in colon inflammation and epigenetic interventions not only regulate these biomarker genes but also alleviate colon inflammation.

To further study the expression of biomarkers at the cellular level, we performed a series of immunohistochemical studies. Two tissues, colon and dorsal root ganglia (DRG) were selected to study the expression of respective proteins during colon inflammation. Immunoreactivity specificity was achieved by using protein-specific antibodies and secondary antibodies conjugated with different fluorophores. The immunohistochemistry studies suggested overexpression of biomarkers in TNBS-induced colon inflammation while the demethylating agent pretreatment reduced TNBS-induced protein expression. More importantly, Methylated CpG binding protein2 (MeCP2) is a nuclear protein that binds to the hypermethylated DNA. In our earlier studies, MeCP2 localization was observed in cytoplasm but not in nucleus. Changing the supplier helped us establish that MeCP2 protein is localized in nucleus.

Overall, the immunohistochemical analysis confirmed our previous results that TNBS-induced colitis resulted in increased expression of biomarker proteins and epigenetic interventions by demethylating agent reduced the TNBS-induced effect.

OMS Spring 2023 Meeting Vendor Abstract

Sonika Robertson, PhD

Oxford Instruments

Changing X-ray microanalysis workflows from emerging technological advancements

Traditional X-ray microanalysis work has been limited by the sensitivity of the detectors; acquisition of quantitative data or element maps with acceptable resolution under ideal conditions often required careful deliberation due to time constraints and this is further challenged when working on non-conductive samples or samples prone to damage that warrant using low accelerating voltages. This presentation will review how the technological advancements, with an emphasis on improved sensitivity, in analytical equipment over the last decade are completely redefining the design of experiments and workflows around X-ray microanalysis and what is possible with the latest generation of analytics.

Sonika Robertson, Ph. D.
Territory Sales Manager – Mountain States
Houston, TX

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OMS Spring 2023 Meeting Vendor Abstract

Dylan Wood, PhD

Protochips

Scaling Bulk to Nano with Machine Vision In-Situ TEM

Dylan Wood

The transmission electron microscope (TEM) has long been the gold standard for high resolution imaging, providing atomic level detail about a sample's structure. In a conventional setup, the sample is deposited onto a 3 mm copper grid which contains a layer of amorphous material, such as carbon. The sample is then inserted into the high vacuum environment of the TEM for imaging and/or elemental analysis. One significant limitation of this setup is the expectation that the sample must be stable in a high vacuum environment. In-situ transmission electron microscopy (in-situ TEM) techniques were developed to overcome this limitation, enabling samples to be imaged with TEM in non-vacuum environments, and simultaneously introduce real-time stimuli, such as temperature or electrical currents, during a TEM imaging session. Thus, users can record dynamic processes in real-world conditions at resolutions not obtained using non-TEM techniques. In-situ studies require the use of designated sample holders which protect the sample from the high-vacuum TEM column, deliver stimuli, and accurately measure signal output. The concurrent development of advanced detectors, cameras, software and designated in-situ holders has enabled researchers across diverse fields to unravel previously impossible results which range from observing viral transcription in physiological relevant, liquid environments, to changing the gas environment of catalyst particles from oxidizing to reducing during a single experiment.

State-of-the-art in-situ tools and software enable users to observe real-time reactions and behavior under a variety of conditions, such as liquid, gas and high temperatures and introduce a range of stimuli to the sample in those environments. These systems incorporate semiconductor MEMs technology into the sample support. MEMs technology enables vacuum-sensitive samples to be encapsulated between ultrathin electron transparent windows for imaging in liquid and gas, provides exceptionally low drift rates at high temperatures, and allows patterning of a variety of features such as electrical contacts. Here, we will review the functionality and use in situ systems developed by Protochips Inc. for dynamic in-situ studies including high-temperature and electrical studies, nucleation and material growth in liquid, electrochemistry, catalysis, and corrosion.

Shown in Figure 1 is an example of one such study. Here, a catalytic reaction, the reduction of iron oxide nanoparticles under 10% H_2 in argon, is observed over a temperature ramp. As the temperature is increased the reduction rate increases, resulting in the morphological changes observed in the nanoparticles. Combined with powerful, machine vision software, these systems enable the TEM to be converted to a real time laboratory merging high resolution images and movies with multiple data streams from both the sample environment and the microscope/detector.

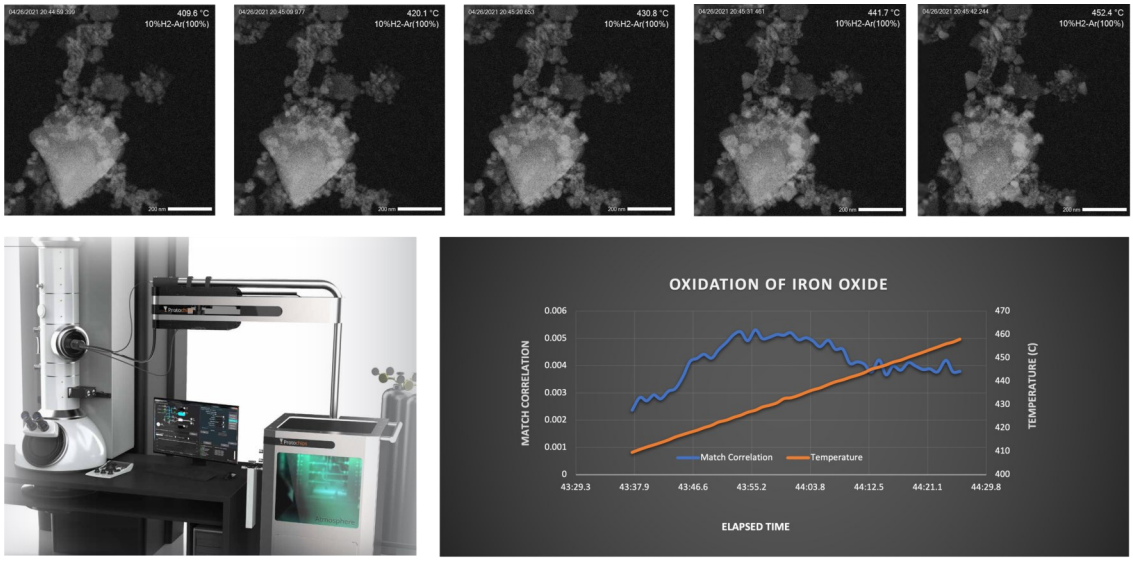

Figure 1: Reduction of Iron Oxide Nanoparticles Using a Commercial In-Situ Gas TEM System. Top Row: STEM images showing the morphological change in iron oxide nanoparticles during a heating ramp from 409 °C to 452°C under a 10% hydrogen atmosphere. Bottom Left: Setup of the Protochips Atmosphere in-situ system on a TEM. Bottom Right: Metadata analysis using Protochips' machine vision AXON software.

OMS 2022 Events

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OMS 2022 Events

2022 Summer Image Analysis Workshop

August 1st to 3rd
9 am – 4 pm
University of Oklahoma
OU Bizzell Library Collaborative Learning Center classroom (LL123)
Instructor: Dr. Tingting Gu and Dr. Michael Anderson

Workshop description: This workshop uses real imaging data to address common image processing and analysis problems. It also provides hands on activities for attendees to practice.

August 1st: for beginners
Introduction to digital imaging, basic ImageJ functions, measurement, ROI, thresholding, segmentation, cell counting, particle analysis, background subtraction, basic filters, working with plugins, 3D object counting, single particle tracking, ethics on image processing, etc.

August 2nd : for intermediate level
Image analysis strategy, protocol, image calculator, basic filters, morphological filters, the Fourier transform filter, co-localization, other common software, and more.

August 3rd : for advanced level
Introduction to Macro language, variables, common build-in Macro functions, error messages, workflow recording, workflow normalization, for-loops, batch processing.

Who to attend: Faculty, postdocs, graduate/undergrad students, and researchers who are interested in imaging processing and analysis.

What to bring: a computer and a workshop program will be provided. You may also bring your own computer.

Scan to register: Limited seats available.

Light refreshment will be provided.

Please contact Dr. Tingting Gu (Tingting.Gu-1@ou.edu) for any questions.

Samuel Roberts Noble
SRNML
Microscopy Laboratory

Mica.

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One User Friendly Platform
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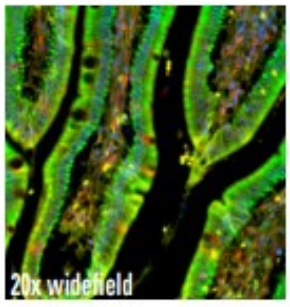
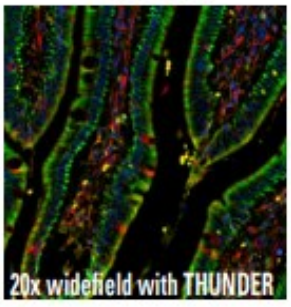
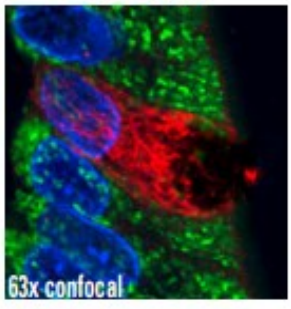
Widefield



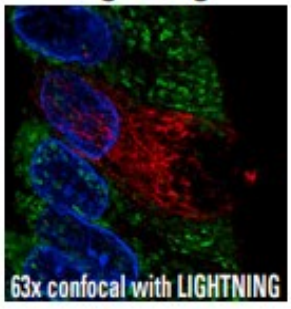
Thunder



Confocal



Lightning



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Corporate Sponsors

Constitution & Bylaws of the OMS

Article I. NAME

The name of this organization shall be the Oklahoma Microscopy Society. The acronym shall be OMS. OMS is a non-profit organization.

Article II. PURPOSE

The purpose of OMS shall be the advancement of the science of microscopy in Oklahoma and nationally by:

encouraging the dissemination of knowledge of microscopy including its technology and instrumentation.

promoting the free exchange of ideas and data among interested individuals and

encouraging interdisciplinary interaction between microscopists.

Article III. MEMBERSHIP

Section 1. Types:

Regular membership shall be open to any person who has an interest in microscopy.

Corporate membership shall be open to any commercial or non-profit

organization that has an interest in microscopy. A member organization may designate one representative to receive all privileges of membership. Other members of the same organization may become regular members.

Honorary membership may be given to a person named an Honorary member by vote of the Executive Committee.

Section 2. Enrollment: Any eligible person or organization may make application for membership to the Executive Committee of OMS. Completed application forms shall be submitted to the Secretary-Treasurer of OMS with one year's dues.

Section 3. Privileges: All members have the right to vote at any business meetings held by OMS and to hold elective office.

Section 4. Dues:

Annual dues shall be five dollars for Regular membership for students, fifteen dollars for Regular membership for non-students, and fifty dollars for Corporate membership.

Dues shall become payable on July 1 of each year for the following twelve months.

Any member that is delinquent in payment of dues for a period of six months shall be dropped from membership. Members thus dropped may be reinstated thereafter by paying one year's delinquent dues and the current year's dues.

Article IV. MEETINGS

At least one business meeting per year shall be held. The time(s) and place(s) of such meetings shall be designated by the Executive Committee and duly announced. Business meetings shall be conducted according to Robert's Rules of Order.

Article V. OFFICERS

Section 1. The officers of OMS shall be a President, a President-Elect, a Secretary-Treasurer, a Member-at Large for Biological Sciences, a Member-at Large for Physical Sciences, and a Member-at Large for student members. These officers shall perform the duties prescribed by these bylaws and by the parliamentary authority adopted by the Society.

Section 2. Duties:

a. The President shall preside at all meetings of the Executive Committee and business meetings of the OMS and promote the interests of OMS both within the state and nationally.

b. The President-Elect shall assist the President, substitute for him/her

when necessary, perform any duties assigned by the President and be responsible for organizing the regular spring workshop/seminar.

c. The Secretary-Treasurer shall maintain records of OMS and

communicate with members. This officer shall be custodian of OMS funds, collect all dues, notify members delinquent in membership and account for OMS funds in accordance with accepted business practice.

d. Members-at-Large shall represent their respective constituents.

Section 3. Term of Office:

The President, President-Elect, and Members-at-Large shall each serve for one year beginning July 1 and ending June 30 of the following year.

The Secretary-Treasurer shall serve for two consecutive years beginning July 1 and ending July 30 of the second following year.

Section 4. Election: Officers shall be elected as prescribed in Article VII of these bylaws.

Section 5. Vacancies: If the President cannot serve, the President-Elect shall immediately succeed to that office. If the President-Elect or any other officer cannot serve for any reason, the Executive Committee shall appoint a person to serve pro tem in the vacant office. Any such appointed officer shall be replaced by one duly elected at the next annual election in May.

Article VI. EXECUTIVE COMMITTEE

Section 1. Composition: The Executive Committee shall consist of the officers of OMS, plus the Newsletter Editor ex officio who shall be without vote.

Section 2. Duties:

The Executive Committee shall conduct the business of OMS as specified herein and otherwise as necessary, and shall advise the membership on matters concerning the management of OMS. It shall appoint the Newsletter Editor.

The Executive Committee shall hold not fewer than two meetings annually, on call of the President or a majority of its members.

Article VII. ELECTIONS

Section 1. Nominations of officers except the President shall be made by a nominating Committee appointed by the President and approved by the Executive Committee. This Committee shall consist of five persons, at least one of whom is from the field of Biological Sciences and one from the field of Physical Sciences. Nominations may be solicited from the membership at any time.

Section 2. The Nominating Committee shall present a slate of consenting candidates (two for each office) to the President prior to the spring general business meeting. The President and Secretary-Treasurer shall announce this list to the membership at the spring general business meeting. Additional nominations of persons willing to serve may be solicited from the floor at this time.

Section 3. The Secretary-Treasurer shall prepare and mail ballots to all members by May 15 and shall accept ballots until May 31.

Section 4. Ballots shall be counted by at least two Executive Committee members and may be reviewed by the entire board if deemed necessary. In each case the candidate receiving the largest number of votes shall be declared elected. Any tie shall be resolved by vote of the combined Executive and Nominating Committees. Results shall be announced by the Secretary-Treasurer at the next business meeting or by mail to all members.

Article VIII. AD HOC COMMITTEE

The President shall appoint ad hoc committees as necessary or helpful in managing affairs of OMS. Committee members shall be considered automatically discharged at the end of the appointing President's term of office unless the new President specifically requests that they continue. The committee itself shall continue until its purpose has been fulfilled or it is dissolved by vote of the executive board or the membership at large.

Article IX. AMENDMENTS

Section 1. Amendments may be suggested at any OMS business meeting. However, amendments to these bylaws may be formally proposed in only two methods:

By the Executive Committee or

By petition of ten percent of the members.

Section 2. The proposed amendment shall then be promptly submitted by mail to the membership by the Secretary-Treasurer, along with the signed statement of reasons for support and/or opposition. Returned ballots shall be accepted by the Secretary-Treasurer for three weeks after the date of mailing. The Executive Committee shall count the ballots and the amendment(s) shall be declared ratified if a two-thirds majority of the votes cast is favorable.

Section 3. Any member who so desires may be present at the counting of such ballots.

Article X. DISSOLUTION

In the event of the dissolution of the OMS, upon the discharge of all its debts and obligations, any remaining assets shall be given to such tax-exempt scientific organization as the Executive Committee may determine. In no case shall any assets be used for the direct benefit of any member of OMS.

Oklahoma Microscopy Society

Membership Application/Renewal Form

for 2023-2024

NOTE: For USPS, please return this form with a check. (for Paypal option see bottom of page.)

Name: _____

Business Phone: _____

FAX: _____

Email: _____

Institution: _____

Address: _____

_____

Check here if Address is New/Revised: _____

Membership in Affiliated Societies:

MSA _____

MAS _____

OAS _____

Microscopy Interests:

Physical Sciences _____

Biological Sciences _____

Other _____

Membership Dues:

Type:

Corporate ($100.00) _____

Professional ($15.00) _____

Student ($5.00) _____

Amount Enclosed: _____

Please enclose a check for one year's dues (**July 1, 2023 - June 30, 2024**) made out to: "Oklahoma Microscopy Society" and mail to address below:

Tingting Gu, OMS Secretary-Treasurer
Samuel Roberts Noble Microscopy Lab
770 Van Vleet Oval, GLCH rm 136
University of Oklahoma
Norman, OK 73019

Email: tingting.gu-1@ou.edu (use also for any address or membership information updates)