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FALL NEWSLETTER

Oklahoma Microscopy Society

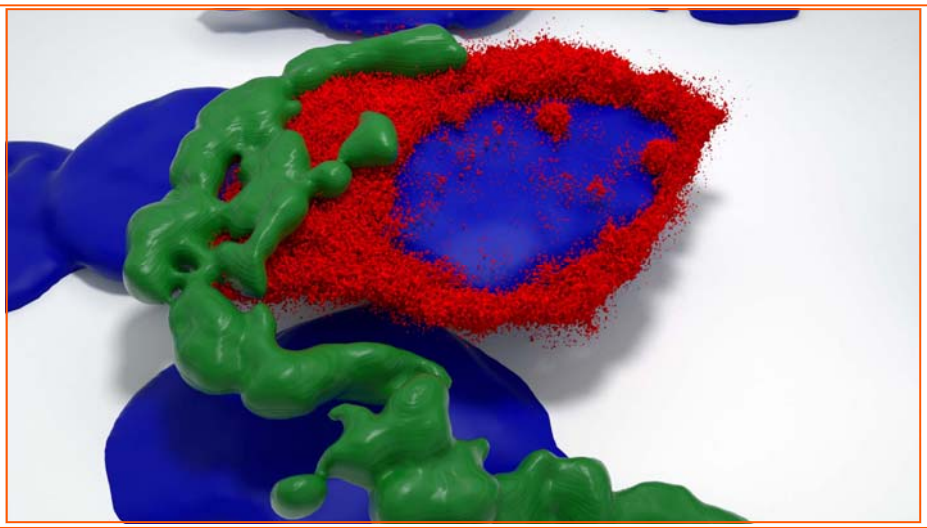
Established 1977

About the cover . . .

1st Place Image
Anaerobic fungal sporangium
Radwa Hanafy

An anaerobic fungal isolate showing the sporangium opening and releasing a zoospore. The sporangium is very peculiar with a mid constriction.

2nd Place Image—Michael Anderson



"Tissue was prepared by transcardial perfusion of a rat, post fixation of colon and cut at 30 um on a cryostat for immunohistochemistry. Pan-neuronal marker, protein gene product 9.5 (green), was used to label nerves in the colon of a rat. Lymphocyte activation marker, CD44 (red), was utilized to label activated lymphocytes. Nuclei have been labeled using DAPI (blue). 3-dimensional (3D) reconstruction attained by a series of captured confocal microscope images through the z-depth of one field-of-view, deconvoluted and then compiled in 3D. A geometric mesh was then generated around the objects and imported intoa 3D computer graphics software for rendering. Images were taken at 100X with a resolution of 2048 X 2048."

Table of Contents

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President's letter

Dear OMS Members and Friends,

I hope you will consider presenting your work (oral or poster) at the Oklahoma Microscopy Society's (OMS) Fall Meeting on **Friday, November 4th** at the Oklahoma State University Center for Health Sciences (1111 W. 17th St. Tulsa, OK 74107). The meeting will be held in conjunction with the Technical Meeting of the Oklahoma Academy of Sciences (OAS), Section K: Microscopy. Both biological and physical science presentations are welcome.

To register for an *oral* or *poster* presentation, please follow the instructions on the OAS website: http://www.oklahomaacademyofscience.org/technical-meeting1.html
The deadline for online submission is October 28th by noon. Please contact Matt Lundwall or Lisa Whitworth (see contact info below) if you cannot meet this deadline or if you have any questions about the submission process.

The OMS fall meeting will host a number of contributed talks, competition for the 2016 Timpano Award, and the voting for the 2016 Ugly Bug Contest.

Our keynote speaker will be Daniela Nicastro from UT Southwestern Medical Center: "Daniela Nicastro, M.S., Ph.D., is a structural cell biologist with almost 25 years of experience in electron microscopy of cellular structures. Driven by important biological questions, she develops and applies innovative imaging techniques that allow visualizing the 3D structures of native macromolecular machines and organelles inside cells with a resolution that is sufficiently high to accomplish goals such as detecting structural changes between conformational states. This is important for understanding how proteins interact, work, and are spatially arranged to perform normal cellular functions, and how their dysfunction leads to diseases".

Student presenters will have the opportunity to compete for the Timpano Award for the best student presentation. The first prize winner receives an **expense-paid trip** to the 2017 Microscopy & Microanalysis meeting in St Louis, Missouri, to present his/her research, and the second prize receives a **$100.00 cash scholarship**. OAS will also present awards for Best Graduate Student Presentation and Best Undergraduate Student Presentation (see the OAS registration form for further details).

As always, if you know of anyone that is interested in becoming a member of OMS, please forward them to the OMS website http://www.ou.edu/research/electron/oms/. Membership can be paid via snailmail or paypal.

A full program and directions to the OSU Health Sciences Center will be forthcoming.

I am also pleased to present our OMS Executive Board for this year (2016-2017):

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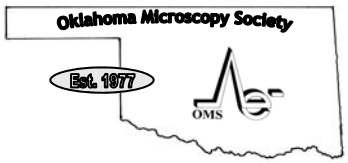
I look forward to meeting all of you at the Fall Meeting and hearing about the wonderful research endeavors involving microscopy and micro-analytical methods in the state of Oklahoma.

Sincerely,
Matt Lundwall
OMS President (2016-2017)

Officers 2015-2016



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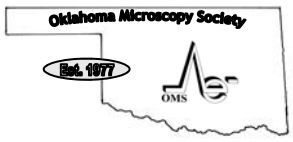

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Upcoming microscopy meetings . . .

Oklahoma Microscopy Society

Spring 2017 OMS Workshop

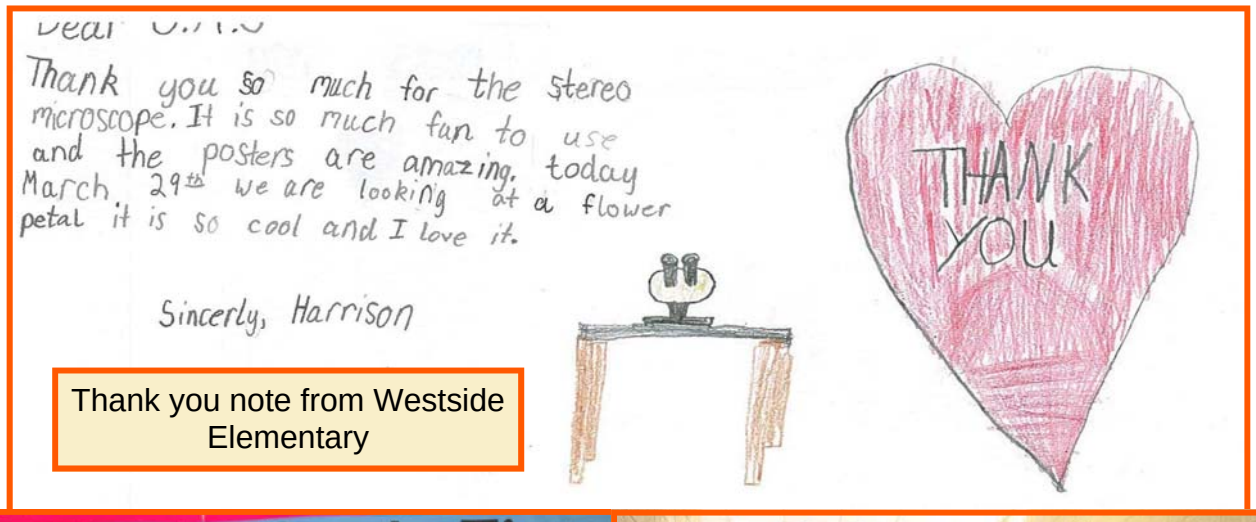
INTERNATIONAL Meetings

Microscopy and Microanalysis

St Louis
Missouri
July 23 - July 27, 2017

Baltimore
Maryland
August 5 - 9, 2018

OMS Ugly Bug Scope Deliveries



Thank you note from Westside Elementary

Bill Meek and student with winning bug at Shiloh Christian in Talequah

Sapulpa Middle Schooll Celebrates their win

Matt Lundwall talks to the winning class at Sapulpa Middle School

Thanks…

A special thanks to the following for their unflagging support of the Ugly Bug Contest…

Phillips 66

For providing grants to fund the contest and printing of posters delivered to classrooms

Justin Meek

For his work designing the beautiful OMS Ugly Bug Contest logo

Leica

For providing generous subsidies toward the purchase of stereomicroscopes given away to schools as a part of the contest

and

the Microscopists

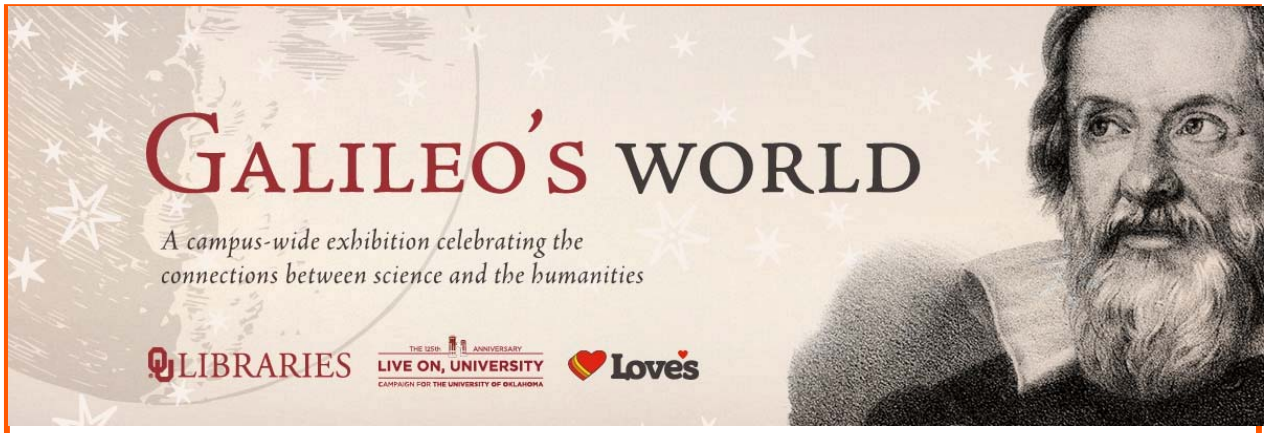
who make the images that are the heart of the contest

Phillips 66 — Matt Lundwall

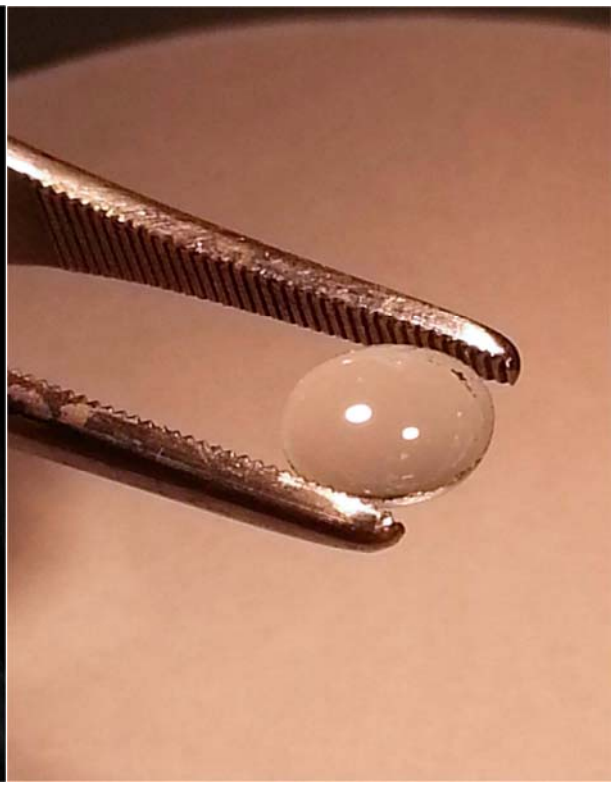
Oklahoma State University—Lisa Whitworth

University of Oklahoma—Preston Larson

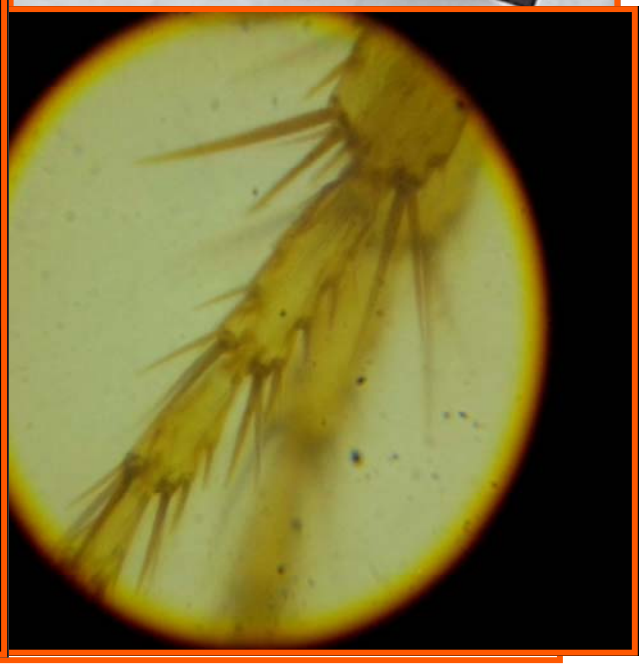
Culpeper Microscope Inspection and Cleaning



Earlier this year we had the opportunity to inspect and clean a Culpeper microscope that was part of the exhibit *Through the Eyes of the Lynx: Galileo and the Microscope"* an exhibit presented in conjunction with *"Galileo's World: A Exhibition without Walls,* a series of exhibits, events, and programs at the Bizzell Memorial Library, Sam Noble Museum, National Weather Center , Fred Jones Jr. Museum of Art, Headington Hall, Robert M. Bird Health Sciences Library and OU-Tulsa Schusterman Library in celebration of OU's 125th anniversary. The microscope is from the late 18th or early 19th century. It comes mounted on its own mahogany case with a drawer containing exchangeable lenses of varying powers , samples in ivory slides , and other accessories.



Culpeper Microscope cleaning and Inspection



In conjunction with the 105th Annual Technical Meeting of the Oklahoma Academy of Science

Oklahoma State University
Center for Health Sciences
Tulsa, OK
Friday, November 4, 2016

Plenary Speaker

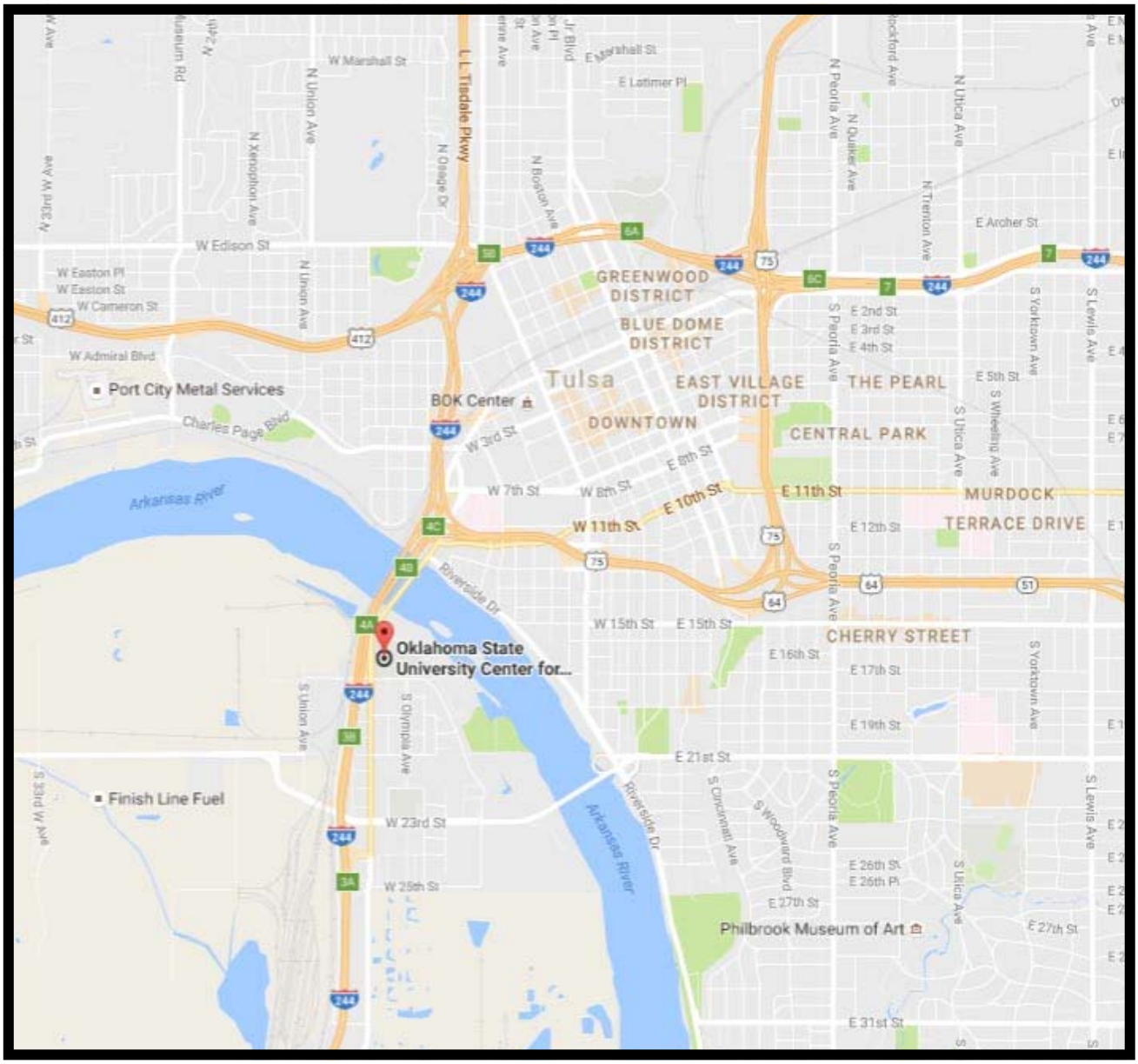
Dr. Daniella Nicastro
University of Texas Southwest,
Dallas
TX

"Probing the Molecular Organization of Cells and Organelles using Cryo-Electron Microscopy

Direction to Fall Meeting

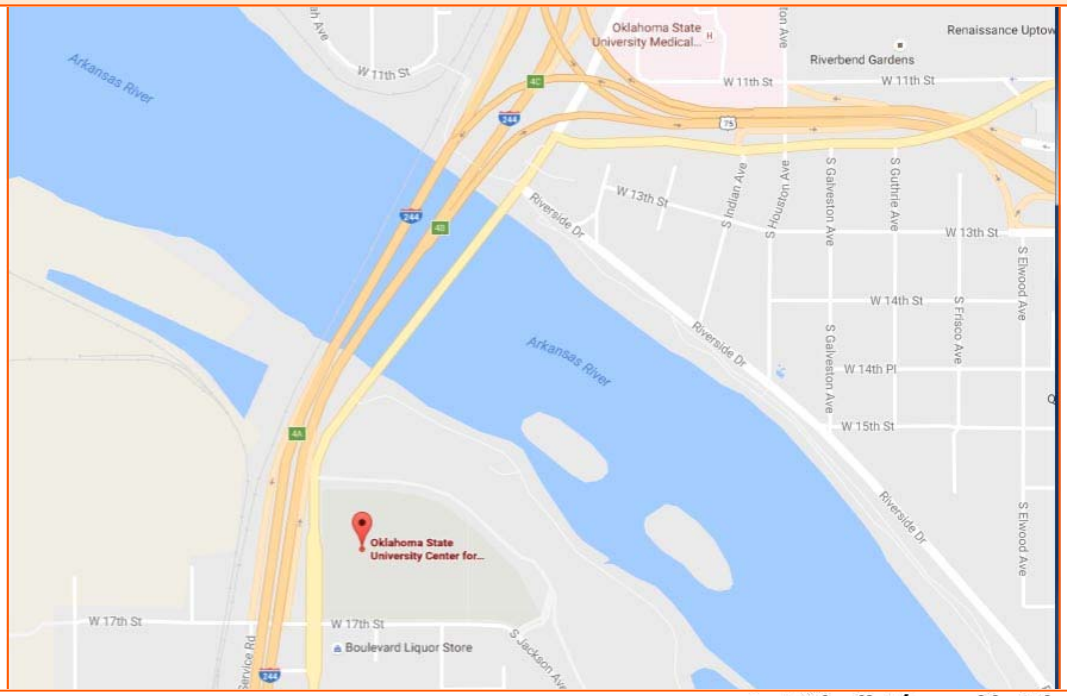
Tulsa Area Map

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



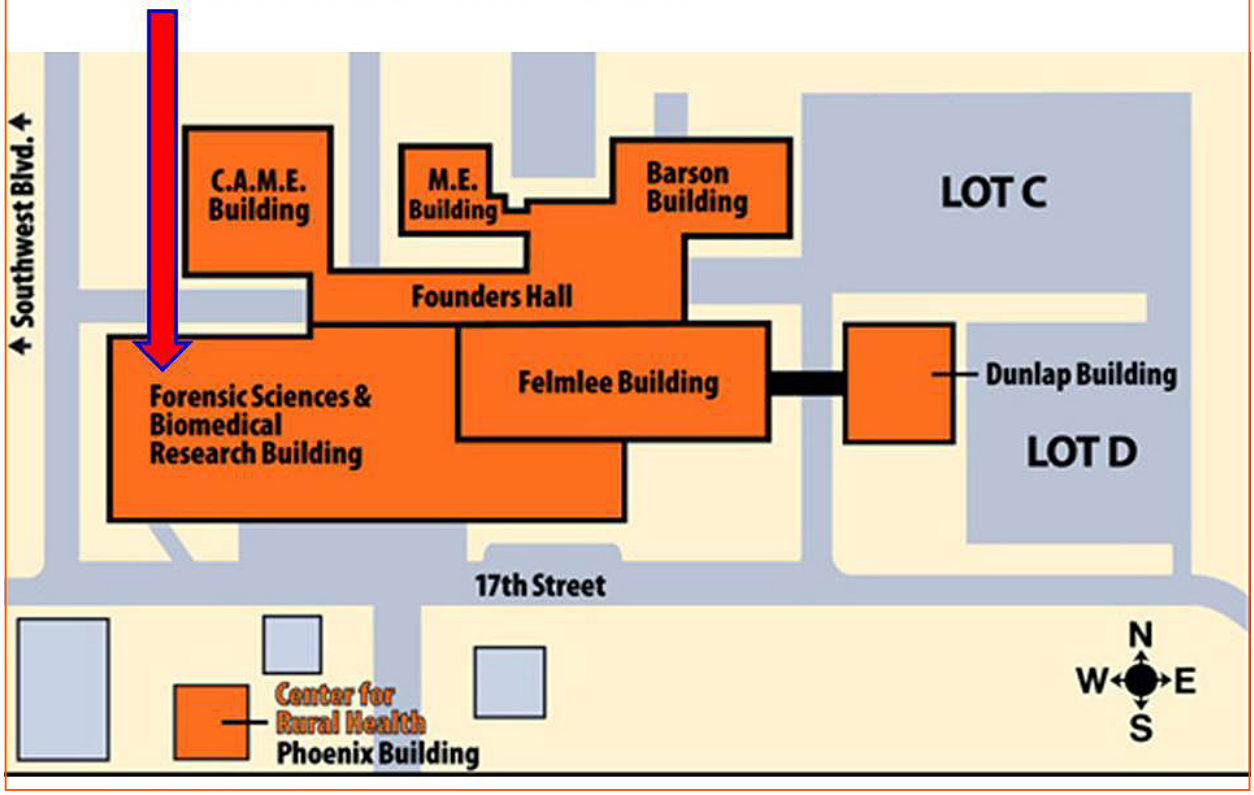
Direction to Fall Meeting

OSU Center for Health Sciences Campus Map and Parking for the meeting



Lot C is dirt/gravel but is okay to park there.

OMS/Section K Meets in this Building, Room 378



Direction to Fall Meeting

From Cimarron Turnpike To OSU Center for Health Sciences:

- The Cimarron Turnpike (US 64, US 412) becomes the Keystone Expressway as you approach Tulsa from the west
- Exit on I-244 West (Oklahoma City)
- Once on I-244, immediately merge to the left before it becomes the downtown exit
- Continue on I-244
- As you approach the I-244 Arkansas River Bridge, merge right
- After you cross the river, take the first exit Seventeenth Street and Southwest Blvd (4A)
- At the bottom of the exit ramp, turn left (east) onto 17th Streeet
- Continue east through the stoplight
- The College is the tall building to the left
- Turn left into the first entrance

To OSU Health Care Center:

- The Cimarron Turnpike (US 64, US 412) becomes the Keystone Expressway as you approach Tulsa from the west
- Exit on I-244 West (Oklahoma City)
- Once on I-244, immediately merge to the left out of the right lane before it becomes an exit
- Continue on I-244
- As you approach the I-244 Arkansas River Bridge, merge right
- After you cross the river, take the second exit Southwest Blvd. (3A)
- At the bottom of the exit ramp, turn left onto Southwest Blvd.
  The OSU Health Care Center is on the right

From US 75/244 from the North To OSU Center for Health Sciences:

- Going south on US 75/244, pass over North Peoria Avenue
- Exit I-244 West to Oklahoma City
- After crossing the river, exit on Seventeenth Street and Southwest Blvd. (4A)
- At the bottom of the exit ramp, turn left on 17th Street
- Go straight through the stoplight
- The College is the tall building to the left
- Turn left into the first entrance

To the OSU Health Care Center:

- Going south on US 75/244, pass over North Peoria Avenue
- Exit for I-244 West to Oklahoma City
- After crossing the Arkansas River Bridge, take the second exit for Southwest Blvd (3A)
- At the bottom of the ramp, turn left onto Southwest Blvd
- The OSU Health Care Center is on the right

Direction to Fall Meeting

US 75/244 from the North
To OSU Center for Health Sciences:

- Going south on US 75/244, pass over North Peoria Avenue
- Exit I-244 West to Oklahoma City
- After crossing the river, exit on Seventeenth Street and Southwest Blvd. (4A)
- At the bottom of the exit ramp, turn left on 17th Street
- Go straight through the stoplight
- The College is the tall building to the left
- Turn left into the first entrance

To the OSU Health Care Center:

- Going south on US 75/244, pass over North Peoria Avenue
- Exit for I-244 West to Oklahoma City
- After crossing the Arkansas River Bridge, take the second exit for Southwest Blvd (3A)
- At the bottom of the ramp, turn left onto Southwest Blvd
- The OSU Health Care Center is on the right

US 75/244 from the South
To the OSU Center for Health Sciences:

- Proceed north on US 75
- Pass over I-44 and continue north (about 1 mile)
- Exit on Southwest Blvd. (3A)
- At the bottom of the ramp, turn left onto Southwest Blvd.
- Go to second light, turn right on 17th Street
- The College is the tall building to the left
- Turn left into the first entrance

To the OSU Health Care Center:

- Proceed north on US 75
- Pass over I-44 and continue north (about 1 mile)
- Exit on Southwest Blvd. (3A)
- At the bottom of the ramp, turn left onto Southwest Blvd.
- The OSU Health Care Center is on the right

Direction to Fall Meeting

Broken Arrow Expressway
To the OSU Center for Health Sciences:

- Travel west on the Broken Arrow Expressway (SH 51, US 64)
- Go past the exit for Houston Avenue
- Tulsa Regional Medical Center is on the right
- Exit left on I-244 West to Oklahoma City
- Immediately merge into the far right lane
- After crossing the river, exit on 17th St. and Southwest Blvd. (4A)
- At the bottom of the exit ramp, turn left (east) on 17th St.
- Continue east through the stoplight
- The College is the tall building to the left
- Turn left into the first entrance

To the OSU Health Care Center:

- Travel west on the Broken Arrow Expressway (SH 51, US 64)
- Go past the exit for Houston Avenue
- Tulsa Regional Medical Center on the right
- Exit left on I-244 West to Oklahoma City
- After crossing the river, take the second exit on Southwest Blvd. (3A)
- At the bottom of the ramp, turn left (east) onto Southwest Blvd.
- The OSU Health Care Center is on the right

Turner Turnpike/I-244 (Oklahoma City)
To the OSU Center for Health Sciences:

- After leaving the Turner Turnpike, proceed north toward Tulsa Downtown (left road of the intersection of I 44 and I 244) on I 244
- Exit on Southwest Blvd. (3A)
- Turn left onto Southwest Blvd.
- At the second stoplight, turn right onto 17th St.
- The College is the tall building to the left
- Turn left into the first entrance

To the OSU Health Care Center:

- After leaving the Turner Turnpike, proceed north toward Tulsa Downtown (left road of the intersection of I 44 and I 244) on I 244
- Exit on Southwest Blvd. (3A)
- Turn left onto Southwest Blvd
- The OSU Health Care Center is on the right

Timpano Competition…

OMS Best Student Paper Award:

THE TIMPANO AWARD

This Award, commemorating the late Dr. Peter Timpano, is based on student presentations at the Fall OMS meeting, which is held annually in conjunction with the meeting of the Oklahoma Academy of Science (OAS). 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 the national meeting of the Microscopy Society of America (MSA) or Microbeam Analysis Society (MAS) to present a paper or poster on his or her research. The total travel allowance (including MSA or MAS contribution, 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:

1. Quality of presentation
2. Quality of slides and micrographs
3. Scientific approach
4. Materials and methods
5. Value of contribution to scientific knowledge
6. Merit of microscopic work
7. Quality of submitted abstract

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 December 15 of the current year, submit a letter of intent or declination regarding attendance at the MSA or MAS meetings. If the awardee notifies OMS that he or she declines to attend MSA or MAS 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 at OMS expense only once. Students winning additional Timpano competitions will receive a $ 100 cash scholarship.

SECTION K: MICROSCOPY E-378

Moderator: Lisa Whitworth
Oklahoma State University

8:30 **Microstructure and Texture Characterisation of Linear Friction Welded Titanium Alloys.** Yina Guo1, YuLung Chiu2, Moataz M. Attallah2, Simon Bray3. 1Materials & Surface Science Institute, University of Limerick, Ireland, 2School of Metallurgy and Materials, University of Birmingham, Birmingham, B15 2TT, UK, 3Rolls-Royce plc, Derby, DE24 8BJ, UK.

9:00 **Probing the Molecular Organization of Cells and Organelles using Cryo-Electron Microscopy.** Daniela Nicastro . UT Southwestern Medical Center.

10:00 Break and Voting on 2017 Ugly Bug Contest

10:25 ****Polyester or Epoxy: Assessing product efficacy in paleohistological methods.** Christian Heck and Gwyneth Volkmann. Oklahoma State University Center for Health Sciences.

10:45 **Survey of Polyethylene Oxide Polymer Electrolyte using Microscopic Methods, for Solid State Battery Applications.** John Ostrander, Dale Teeters Ph.D., University of Tulsa Dept. of Chemistry and Biochemistry.

11:05 ***Tissue Clearing with PACT, Fluorescent Immunohistochemistry and 3-Dimensional Reconstruction for the Spatial Evaluation of Protein Interactions.** Michael B. Anderson and Kenneth E. Miller. Oklahoma State University Center for Health Sciences.

11:25 ****Chroride and Sulfate Exchange in Short-Term, Low Temperature Brine + Jarosite Experiments.** Kayla M. Miller (OU) Andrew S. Elwood Madden (OU), Charity M. Phillips-Lander (OU), Janice L. Bishop (SETI/NASA Ames), and Megan E. Elwood Madden (OU).

** Timpano Award Contest

OMS Fall Meeting Abstracts

OMS 2016 Fall Meeting Key Note Speaker

Probing the Molecular Organization of Cells and Organelles using Cryo-Electron Microscopy

Daniela Nicastro, Department of Cell Biology and Biophysics,
University of Texas Southwestern Medical Cener

Abstract

Rapid freezing of cells can provide outstanding structure preservation and time resolution of dynamic cellular processes. Electron tomography of rapidly frozen specimens (cryo-ET) is a powerful technique for imaging biological structures in their native state and in an unperturbed cellular environment. We integrate high resolution imaging by either cryo-ET and subtomogram averaging or TYGRESS (Tomography-Guided 3D Reconstruction of Subcellular Structures), with comparative genetics, biochemical methods and EM-visible labeling to deconstruct the *in situ* 3D structure and functional organization of macromolecular complexes. Among different model systems, we use e.g. cilia and flagella to advance techniques and approaches for high-resolution imaging of complex cellular structures. Cilia and flagella are conserved and ubiquitous eukaryotic organelles that are composed of more than 600 different proteins and have important biological roles in motility and sensation; defects in their assembly or function cause severe human diseases. Our cryo-ET studies visualize the three-dimensional structures of intact wild-type and mutant flagella, and dissect the organization of key macromolecular complexes in different functional states. Such information can provide detailed insights into the structural basis and ultimately the function of many cellular processes.

Bio

Daniela Nicastro received her Ph.D. in Biology from the Ludwig-Maximilians University in Munich, Germany in 2000. Following 3 years in the lab of Prof. Baumeister at the Max-Planck Institute for Biochemistry in Munich (1998-2001), she took a postdoctoral fellow position in the National Center for Research Resources for 3D Electron Microscopy of Cells at the University of Colorado in Boulder. From 2006-2015, she was an Assistant and then tenured Associate Professor of Biology and director of the "Correlative Light and Electron Microcopy" (CLEM) facility at Brandeis University near Boston. Since July 2015, she is an Associate Professor at the University of Texas Southwestern (UTSW) Medical Center in Dallas with appointments in the Departments for Cell Biology and Biophysics. She has almost 25 years of experience in electron microscopy of cellular structures and is a leading expert in cellular cryo-electron tomography. The research interest of the Nicastro lab is focused on studying the three-dimensional structure and function of cytoskeletal assemblies, molecular motors, organelles and cells using a combination of cutting-edge methods to elucidate the structure-function relationships of macromolecular complexes in situ, i.e. in their native environment.

CHLORIDE AND SULFATE EXCHANGE IN SHORT-TERM, LOW TEMPERATURE BRINE + JAROSITE EXPERIMENTS

MILLER, Kayla M., Geology and Geophysics, University of Oklahoma, 100 E. Boyd St., Rm 710, Norman, OK 73019, ELWOOD MADDEN, Andrew S., School of Geology and Geophysics, University of Oklahoma, 100 East Boyd St. Rm. 710, Norman, OK 73019, BISHOP, Janice L., Carl Sagan Center, SETI Institute and NASA-ARC, Mountain View, CA 94043, PHILLIPS-LANDER, Charity, School of Geology and Geophysics, University of Oklahoma, 100 E. Boyd St., Norman, OK 73019 and ELWOOD MADDEN, Megan E., School of Geology and Geophysics, Univ. of Oklahoma, 100 E. Boyd Street, Norman, OK 73019, kayla.m.miller@ou.edu

Chlorine and other halogens in high salinity brines may readily exchange with sulfate and other ionically bonded anions available in other secondary phases observed on the surface of Mars, leading to diverse mineral assemblages. We conducted short-term, low-temperature flow-through and batch reactor experiments investigating jarosite ($KFe^{3+}_3(OH)_6(SO_4)_2$) dissolution and reaction products in 50, 20 and 5 weight % $CaCl_2$ brines. Akaganeite ($Fe^{3+}OOH,Cl$)) and antarcticite ($CaCl_2 \cdot 6H_2O$) were observed via powder X-ray diffraction (XRD) in all experiments alongside Ca-sulfate minerals. Antarcticite is likely present due to excess $CaCl_2$ brine in the samples prior to analysis. However, the presence of akaganeite and Ca sulfate minerals indicate that Cl^- and SO_4^{2-} exchange readily in both flow-through dissolution and batch reactor experiments despite short durations and low temperature.

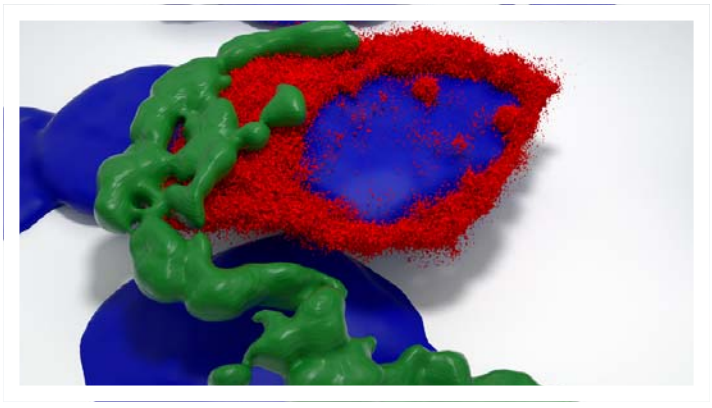
Akaganeite has been observed in association with sulfate and sulfide minerals (Peretyazhko et al., 2016) by the CheMin-XRD at Yellowknife Bay, Gale Crater, Mars (Vaniman et al., 2014) and at other locations on Mars via orbital imaging spectroscopy (CRISM) (Carter et al., 2015). Our results suggest that low temperature diagenesis in chloride brines may have produced these mineral assemblages observed on Mars. Ongoing research aims to further characterize these chloride- and sulfate-bearing reaction products using Visible and Near Infared and Raman Spectroscopy to better understand the spectral signatures of mixed sulfate-chloride assemblages, as well as Transmission Electron Microscopy to investigate the textural relationships between the reaction products.

Tissue Clearing with PACT, Fluorescent Immunohistochemistry and 3-Dimensional Reconstruction for the Spatial Evaluation of Protein Interactions

Michael B. Anderson, Kenneth E. Miller
Dept. Anatomy and Cell Biology, Oklahoma State University Center for Health Sciences, Tulsa, OK

Though-out the history of immunohistochemistry biomedical scientists have generally processed samples for observation in 2-dimensional (2D) images, taken from cross-sections. This process is effective for qualification and quantification, however, the percentage of the sample that can be microscopically observed is relatively small. For experimental conditions where the differences can be subtle, 2D analysis of tissue can be hit-or-miss. This may result in the need for multiple experiments and sometimes the use of many animals in the testing of any one hypothesis.

In recent years, introduction of the passive clarity technique (PACT), use of confocal microscopy, and 3-dimensional (3D) software have opened the doors for fluorescent protein labeling and whole tissue 3D reconstruction (Yang et el, 2014). These techniques further our spatial understanding of how proteins interact in a 3D environment. In the current study, visceral pleura were collected, prepared with PACT, nerves immunohistochemically labeled with protein gene product 9.5 (PGP 9.5), calcitonin gene related peptide (CGRP), and nuclei labeled with 4',6-diamidino-2-phenylindole (DAPI). Images were reconstructed in 3-dimensions for analysis.
In this preliminary experiment, full transparency of lung tissue was achieved using PACT. Nerve fibers, identified by PGP9.5 and CGRP, in the visceral sub-pleura were successfully reconstructed in three dimensions. We observed that, compared to 2D analysis of fluorescent immunohistochemistry, 3D reconstruction indeed offers a superior insight for the interaction of proteins that previously have been undetected.
These combined techniques offer immediate and previously unattainable perspectives of labeled proteins with fluorescent immunohistochemistry. Quantification in a 3D environment, however, has been largely unavailable due to limitations in current computer processing power and software. It can be expected that software will be developed that can recognize 3D clusters and categorize them based on fluorescent intensity and distance. These advances would allow for a high throughput and more accurate analysis of experimental data from histological samples.



"Tissue was prepared by transcardial perfusion of a rat, post fixation of colon and cut at 30µm on a cryostat for immunohistochemistry. Pan-neuronal marker, protein gene product 9.5 (green), was used to label nerves in the colon of a rat. Lymphocyte activation marker, CD44 (red), was utilized to label activated lymphocytes. Nuclei have been labeled using DAPI (blue). 3-dimensional (3D) reconstruction attained by a series of captured confocal microscope images through the z-depth of one field-of-view, de-convoluted and then compiled in 3D. A geometric mesh was then generated around the objects and imported into a 3D computer graphics software for rendering. Images were taken at 100x with a resolution of 2048 x 2048."

Survey of Polyethylene oxide polymer electrolyte using microscopic methods, for solid state battery applications

John Ostrander, Dale Teeters Ph.D.
University of Tulsa Dept. of Chemistry and Biochemistry

The early 1990's saw a technological change in energy storage with the advent and widespread manufacture of lithium ion battery technology. With today's increasing energy demands the next logical step in development is an all solid-state battery.

We investigate the physical, chemical, and electrical properties of Polyethylene Oxide doped with Lithium Triflate (PEO-$LiSO_3CF_3$) as a charge carrier. We review analysis methods employing several microscopic methods including Scanning Electron Microscopy, Atomic force microscopy (AFM), Tunneling AFM (TUNA), and Focused Ion Beam as methods in characterization of polymer electrolyte in conjunction with electrochemical impedance spectroscopy (EIS) and thermal analysis.

Microstructure and texture characterisation of linear friction welded Titanium alloys

Yina Guo, Tulsa, Oklahoma

Abstract: Linear friction welding (LFW) is a solid state welding process in which the heat is generated by the relative motion of two components, one is stationary and the other oscillates linearly. Throughout welding, an axial compressive force is applied to both parts to expel the softened metal from the interface to obtain a certain axial-shortening, and to consolidate the joint. It is found to be a promising way to join numerous components in aerospace application, where it has been used to attach blades to discs, to form an integrally bladed disc. It is worth mentioning that the whole welding process is completed within a few seconds. The high heating and cooling rates, as well as the extensive thermomechanical deformation, produce significant changes in microstructure, texture in the weld region, which lead to dramatic changes in mechanical properties. Over the last few decades process-microstructure-property relationships of linear friction welded titanium alloys have been investigated. However, the detailed relationship between microstructural features and mechanical properties is rarely reported and the mechanism is not clear due to the complexity of microstructural features in friction welds. This presentation will focus on the microstructure and texture of friction welded joints of between Ti64 and Ti64, Ti6246 and Ti6246, and Ti64 and Ti6246 alloys, by analysing the nature, orientation and distribution of the microstructural features and comparing the differences obtained from different welding processes and original materials.

Polyester or Epoxy: Assessing product efficacy in paleohistological methods.

Christian Heck and Gwyneth Volkmann
Oklahoma State University Center for Health Sciences.

Histological examination of bone microstructure provides insight into the physiology of modern and extinct vertebrates. Specimens sampled for histological examination are first embedded in a plastic resin which is then cut into thin sections, mounted on slides, and polished for viewing. Standard embedding procedure of fossil material involves embedding specimens in relatively inexpensive polyester resin. Small fossil material and modern tissue is embedded in a higher priced epoxy resin. Modern tissue and small fossil material often require thin sections near or below 100 micrometers thick. Anecdotal evidence suggests polyester resin thinner than 100 micrometers causes increased likelihood of sample peeling, material loss, and is unsuitable for modern tissue and small fossil material embedding. To test this assumption, three fossil bones and two modern bones were embedded in epoxy resin, while five fossil bones and four modern bones were embedded in a polyester resin. Embedded specimens were processed following standard protocol. Slides were then ground on a lapidary wheel until bone microstructure was completely discernable. Additionally, two slides, one with a polyester resin embedded specimen and one with an epoxy resin embedded specimen, were continuously ground on 600 grit paper until peeling occurred. Slide thickness at the point of peeling was measured for direct comparison of resin types and timing of specimen loss. Finished slide thickness ranged from 23-230 micrometers. We found no appreciable difference in bone microstructure visibility between polyester embedded material and epoxy embedded material, and none of the 35 finished slides exhibited signs of peeling. The specimen that was embedded in epoxy resin began peeling at 77 microns while the specimen in polyester resin peeled at 55 microns. Counter to previous assumptions, our results suggest that expensive epoxy resins can be replaced by polyester resins in histological preparation of modern bone tissue and small fossil material.

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

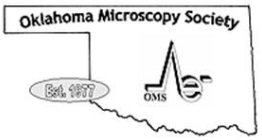
By petition of ten percent of the members.

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.



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Membership Application/Renewal Form
for 2016-2017

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Membership in Affiliated Societies:
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Microscopy Interests:
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Other _____

Membership Dues:
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Amount Enclosed: _____

Please enclose a check for one year's dues (**July 1, 2016 - June 30, 2017**) made out to: "Oklahoma Microscopy Society" and mail to address below:

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

Email: srussell@ou.edu (use also for any address or membership information updates)

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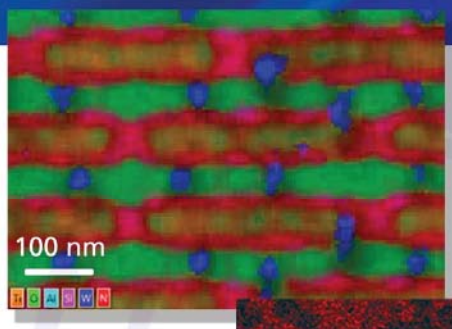
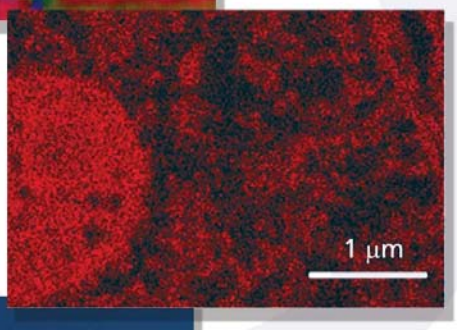
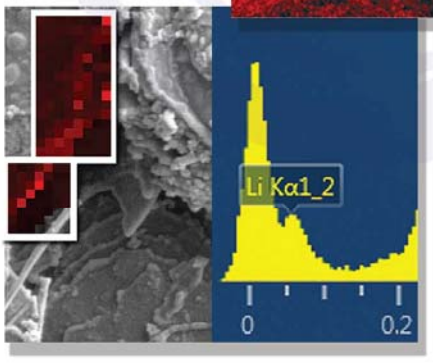


X-ray mapping of semiconductor structures at 1 kV.

Nitrogen X-ray map of cell nucleus.





Li mapping of graphite battery anode (Hovington et al. 2016).

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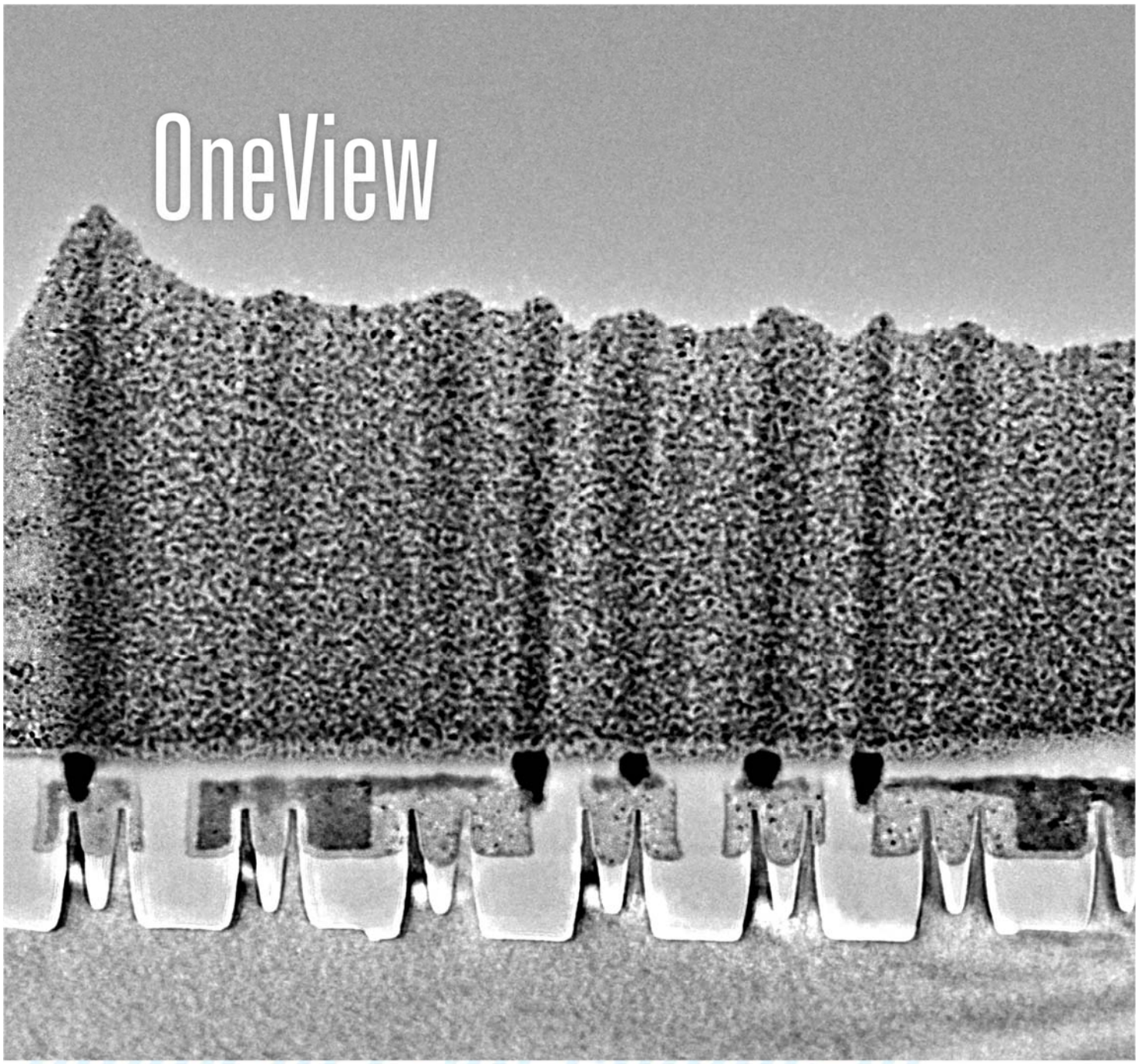

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