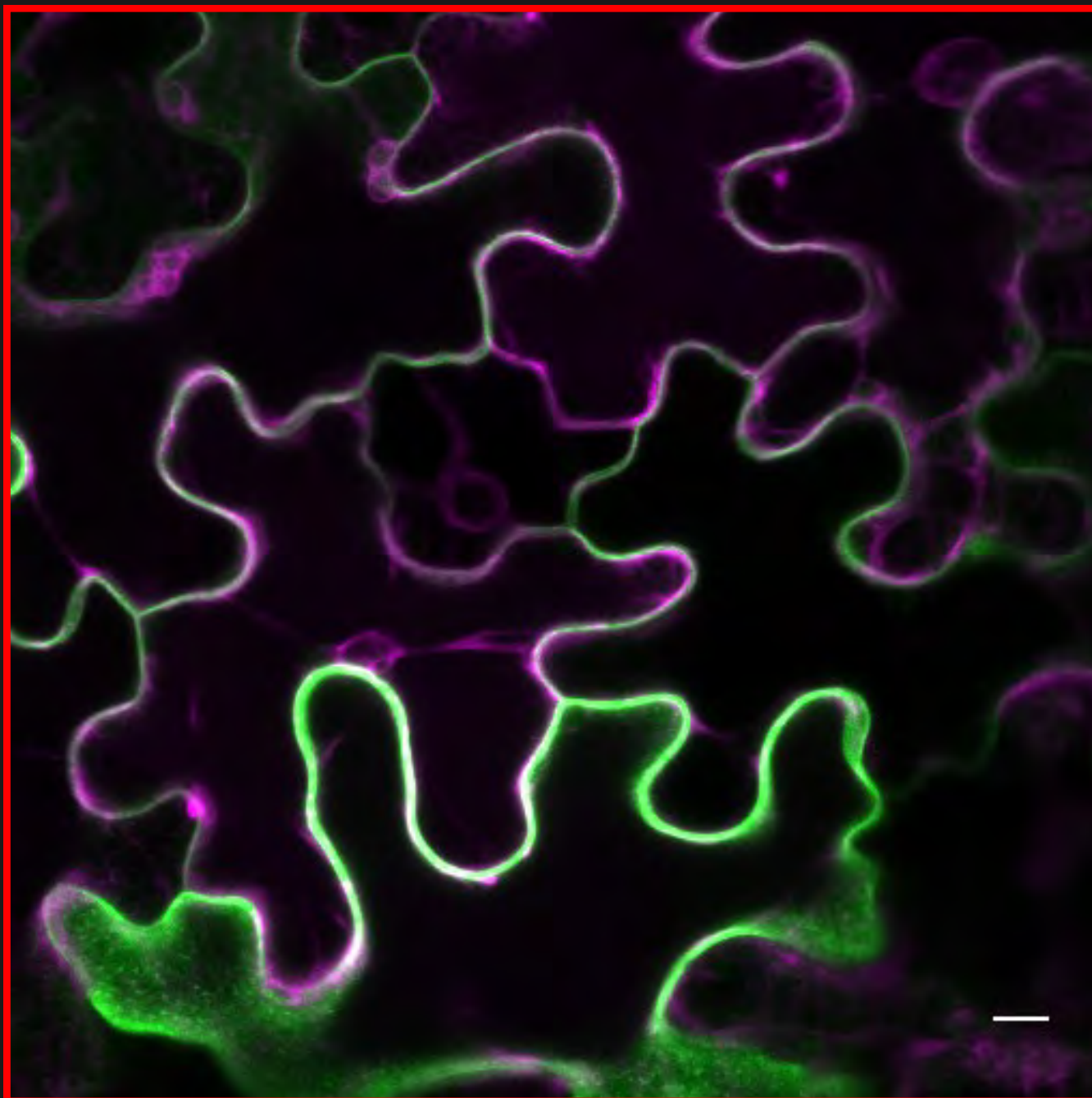


April 2016 Volume 38 No. 1 ISSN 0276-4776

# SPRING NEWSLETTER

## Oklahoma Microscopy Society

*~ This Issue dedicated to Friends and Microscopists,  
Charlotte Ownby, Kathy Kocan, and Terry Colberg ~*



## ABOUT THE COVER . . .

### Confocal image of epidermal leaf cells of *Nicotiana benthamiana* Domin (Solanaceae)

Confocal image of epidermal leaf cells of *Nicotiana benthamiana* Domin (Solanaceae), a model system for plant secretory pathways  
Daniel S Jones and Sharon A Kessler  
University of Oklahoma  
Department of Microbiology and Plant Biology

**A**verage intensity projection of tobacco epidermal cells co-expressing a plasma membrane localized GFP (green, MLO1-GFP) and an endoplasmic reticulum localized RFP (magenta, ER-rk (Nelson *et al.* 2007)). Composite image was made from a z-series of optical sections taken on a Leica SP8 CSLM and edited using ImageJ. Note perinuclear endoplasmic reticulum and transvacuolar strands within the epidermal cells at the center of the image. Scale bar 10um.

**Nelson BK, Cai X, Nebenführ A. 2007.** A multicolored set of *in vivo* organelle markers for co-localization studies in *Arabidopsis* and other plants. *The Plant Journal*. **51**:1126-1136.

Images produced at the Samuel Roberts Noble Microscopy Laboratory at the University of Oklahoma.



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# PRESIDENT'S LETTER



## Oklahoma State University Microscopy laboratory

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Dear Oklahoma Microscopy Society Friends,

The 2016 OMS Spring Workshop is now upon us! If you have not already registered, please let us know if you will be attending by emailing ([lisa.whitworth@okstate.edu](mailto:lisa.whitworth@okstate.edu)). We look forward to seeing you on Friday, March 25, 2016 at the Wes Watkins Center on the Oklahoma State University Campus in Stillwater OK. It has been many years since we have hosted the OMS meeting here, therefore we will have an optional tour of the OSU Microscopy Lab on Friday afternoon. Besides technical talks, this meeting will feature a Best Micrograph Contest for students. The student with the winning micrograph will win a cash prize and the image will be on the cover of the Fall 2016 OMS Newsletter. Please make sure to visit our vendors at the meeting. Without their support, these meetings would not be possible.

Our keynote speaker is Dr. Sara E. Miller, Professor, Pathology Department, Duke University Medical Center, and Director of the Research Electron Microscopy Laboratory. Dr. Miller's special interests include diagnostic virology, infectious diseases, immunoelectron microscopy, and correlative microscopy. Dr. Miller will share with us her insight and experience regarding electron microscopy of minute and unusual specimens. Thank you to the Microscopy Society of America and their Local Affiliated Society speaker program for their assistance in funding Dr. Miller's visit. In addition, we also have an array of speakers across a range of disciplines who will give presentations on their utilization of microscopy as a valuable tool in each of their fields of study.

Thursday night, March 24, 2016, we will host "Kids Night with a Microscope" at the Venture One Building, 1110 S. Innovation Way in Stillwater from 5:30 to 7:30 p.m. Here kids will be able to see what instruments are used in our research, and get a taste of how much fun a career in science can be.

Please save the date for the OMS fall technical meeting which is held in conjunction with the Oklahoma Academy of Science Fall meeting. This year it will be held Friday November 4, 2016 at the Oklahoma State University Center for Health Sciences in Tulsa. Our keynote speaker will be Dr. Daniela Nicastro, UT Southwestern. Dr. Nicastro is a leading expert in cellular cryo-electron tomography, 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 their native organization. The meeting will host a number of contributed talks, competition for the 2016 Timpano Award for the best student presentation, and voting for the 2016 Ugly Bug Contest.

Thank you so much to my OSU colleagues Tammy Austin and Brent Johnson for their help in organizing this meeting. A very special thank you to Jin Nakashima, Scott Russell, and Greg Strout for all of their help and patience with my many questions.

I look forward to seeing you all soon in Stillwater!

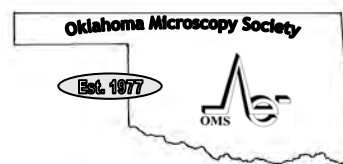
Sincerely,

A handwritten signature in black ink, appearing to read "LW".

Lisa Whitworth  
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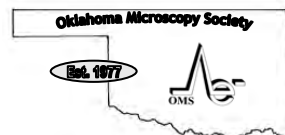
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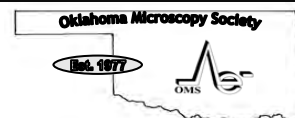
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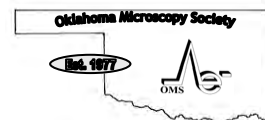
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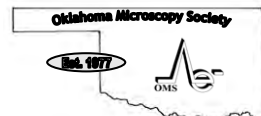
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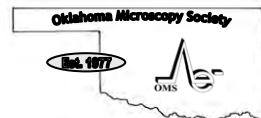
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Est. 1977



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Charlotte...

Best wishes on your retirement. We will miss you  
dearly. ...your OMS friends

Often there are individuals who make all the difference and, for sure, Charlotte Ownby is the person who made all the difference to the development of electron microscopy equipment and facilities at Oklahoma State University. Since there was only one TEM on campus when Charlotte joined the faculty of the College of Veterinary Medicine in the mid-1970s, the upgrading and expansion of EM at OSU was important for the overall research capabilities of OSU.

Soon after Charlotte joined OSU she led the quest for funding for an electron microscope as a replacement for the Phillips TEM. The upgraded JOEL 35 STEM, housed in a newly renovated EM facility in the basement of McElroy Hall, was a huge improvement in many respects – it was easy to use, could accommodate 3 grids at a time, had an airlock, took less time to change plates and the camera held 50 negatives instead the 3 negative capacity of the Phillips TEM. Subsequently, Charlotte applied for and received funds for a new SEM that was added to this facility. Finally, a confocal microscope, a Leica SP2, was acquired which greatly expanded OSU microscopy research capabilities.



Moving the EM Facility to Venture 1 was a huge undertaking, and once again the credit for leading this project was Charlotte. This first class facility provided ample room for all phases of EM and, important-

ly, was accompanied by the acquisition of state-of-the art equipment, including JOEL 200 kV high resolution STEM, and an FEI Environmental SEM. Importantly, she brought Terry Colberg to manage the new facility which contributed to the development and success of the Venture 1 EM Facility, and Terry served the EM Lab well until his retirement last Fall.

Although Charlotte has retired a few times previously (J), this retirement seems to be the one where she is leaving OSU behind. We therefore thank her for all of her contributions to OSU, most notably to the development of electron microscopy facilities and capabilities. We also thank her for leading the team that founded OKSEM, now OMS, which has made so many contributions to microscopy in Oklahoma. Who could image Oklahoma without the Ugly Bug contest? So I say “Three Cheers to Charlotte Ownby” who is the **one person** who made all the difference to the development of electron microscopy at OSU!

Very best wishes to you Charlotte for many wonderful years enjoying your family in your new home in New Mexico!

Katherine M. Kocan



~ This issue is dedicated to  
Charlotte Ownby, Microscopist and Friend ~



Terry...  
Best wishes on your retirement. You will be  
missed greatly. ...your OMS friends

Terry Colberg was a mere 7 years old when he was hired at Oklahoma State University. You might laugh, but we have the picture to prove it. Terry started working for Charlotte Ownby in 1980 as a lab manager for the Venom Research laboratory in the department of Physiological Sciences, College of Veterinary Medicine; he became Manager of the Microscopy Lab in 2005.

Over the years, Terry proved himself to be an invaluable asset to the Lab, Department and University. Terry is a man of many talents, both professionally and personally. He is a man of exceptionally good character, and we are all the better for knowing him. It's hard to know which memories stand out the most, but here are a few.

In 1988, Dr. Ownby organized the World Congress of the International Society of Toxicology in Stillwater. Terry spent countless hours building the Poster Boards for the meeting - twice. His ability to work with wood and to fix just about anything has been especially important to the Venom Lab and the Microscopy Lab. We are sure that he



will continue to enjoy working with his hands during his retirement.

Although Terry was instrumental in helping with snake venom research, he was not altogether very fond of snakes. One day, as he was assisting Dr. Ownby in extracting venom from a Prairie Rattlesnake, the snake twisted and she had to put it down immediately. Until that day, we had no idea that Terry dabbled in gymnastics and teleportation. Somehow, he made it from one side of the room to the other in a split second!

In 2008, Terry was finally recognized by the University for his enormous contribution to OSU by being awarded the

Vice President for Research Division's Employee of the Year award. No one deserved it more. Through nomination letters, many noted the quality of his work, his dedication, his reliability, his willingness and capacity to help others, AND his great sense of humor.

Over the years, Terry helped numerous researchers with their work. He taught the Graduate Course in Electron Microscopy, as well as providing individual hands-on training to many. Terry's work ethic and pleasant personality suited his position and he is remembered fondly by those who worked with him.

In addition to Terry's research experience, he also is an accomplished musician. Terry plays bass for "The Undertakers." His love for music is evident, and his face lights up when he talks about music.

Terry Colberg: a researcher, carpenter, gymnast, teacher, musician, but most importantly, friend. Well done, Terry. Thank you for your service and it is our pleasure to know you. Enjoy your retirement!



~ This issue is dedicated to  
Terry Colberg, Microscopist and Friend ~



Kathy...

Best wishes on your retirement. Congratulations!  
From your OMS friends

It is a pleasure to write a brief comment about my long-time colleague, Dr. Katherine Kocan. I first met Dr. Kocan in the late 1970s, not long before she completed the PhD degree. Watching her steady progress in academia at Oklahoma State University from research associate to professor and finally as Regents Professor and occupant of the Sitlington Endowed Chair in Food Animal Research was a real privilege for me. Our relationship evolved from that of mentor and mentee to cooperating investigators and finally to my standing back to admire her international recognition as an amazingly productive scientist.

Once Dr. Kocan overcame an aggregate of problems to gain a tenure track appointment, her previously steady rise became meteoric. She amassed a remarkable record of garnering research support that extended over decades for her work, principally in tick-borne diseases. The research climate at Oklahoma State University was enhanced over the years by scientists who came to work in her laboratory. She travelled extensively, not only to give papers at scientific meetings but to work in laboratories of international repute. That activity resulted in a flow back to Oklahoma of many foreign experts.

Although it may not seem relevant at this juncture, I will close with a comment that I consider worth remembering: from the beginning of her career, Dr. Kocan made outstanding contributions in a then male-dominated setting. In spite of the disadvantages inherent in temporary/adjunct positions that she held early in her career, she not only persisted, she prospered. Her role as a microscopist that began as a technician steadily evolved into that of seasoned investigator who shared her skills with colleagues and passed them on to a new generation of scientists who studied in her laboratory.

Sidney A. Ewing, Professor Emeritus of Veterinary Parasitology





~ This issue is dedicated to  
Kathy Kocan, Microscopist and Friend ~



## **FOR TERRY, KATHY, AND CHARLOTTE... SOME WORDS FROM YOUR OMS FRIENDS ON YOUR RETIREMENT...**

The name Charlotte Ownby is synonymous with electron microscopy at Oklahoma State University. She is a founder of this society, the Oklahoma Microscopy Society, a local affiliate of the Microscopy Society of America, and her dedication to this discipline has made the Electron Microscopy Center a top notch service lab for the university. Charlotte is an excellent mentor and role model and succeeds at creating a positive work environment where everyone is valued for their contribution. As everyone knows, Charlotte always goes out of her way to make sure each person knows their work is valued and appreciated.

Now Charlotte has retired and the OSU Electron Microscopy Lab must carry on without her. Of course, Charlotte's post-OSU life proceeds at full throttle with travel, pottery and a new granddaughter to enjoy. I wish her the best of luck and much happiness in this new phase of her life.

Janice G Pennington  
Research Specialist, HHMI  
Institute for Molecular Virology  
University of Wisconsin-Madison

I've known Terry and Charlotte for approximately 12 years. My first interactions with them came when I was a graduate student attending the OMS spring and fall meetings. At that time, they were already prominent members of the community with Charlotte having played a crucial role in the founding of the OMS way back in 1977. Later, after I came into my current position as a microscopist here at OU, my interactions with them increased and we developed a collegial relationship where I would appreciate discussing microscopy techniques, receiving advice, and bonding over the quirks and nuances of our shared experiences on the job. Once, I recall running into them by chance at a national MSA meeting where we enjoyed some drinks and had a nice casual evening discussing the various microscopy talks and interactions we'd had throughout the day. I'm sorry to see them go as they were a staple of the microscopy community here in Oklahoma. Their ideas, assistance, and advice will definitely be missed but I wish them all the best. Congratulations to both for a wonderful and productive career! Hopefully, we'll still see you around occasionally at OMS meetings in the future.

- Preston Larson

## FOR TERRY, KATHY, AND CHARLOTTE... SOME WORDS FROM YOUR OMS FRIENDS ON YOUR RETIREMENT...

### Charlotte Ownby Retirement

The Electron Microscopy Lab was a strange place for a Plant Physiologist to wind up, especially since I had never used EM in my research. I remember a fellow graduate student told me about the opening for a lab technologist about the time I was getting my Masters. She said, "They're good people over there! You should apply--they'll teach you all you need to know!"

So that's how I became a lab technologist, then the lab manager in the EM Lab. I obviously did not stay in the field, but I still quote Charlotte! What I learned from Dr. Ownby was priceless, not only about science, but also about being a fair, considerate, and supportive boss. I watched as she balanced the work of a mom and the work of a scientist, the first generation to do so at that level. I saw her fight to increase salaries when most people would have quit when the administration quoted the old "them's the rules and we can't change 'em" adage. If I remember correctly, she redefined the position and got the raise for her lab personnel. You know, if the rules aren't fair, then change them!

This was also about the time Oklahoma was trying to ratify the Equal Rights Amendment for women. We were a rowdy (but professional) little group in the lab: we had pins with slogans on the bulletin board, we went house-to-house asking for people to sign petitions (on the weekend), we had many water-cooler conversations about it. There was absolutely no doubt that Charlotte supported these efforts! It was a good place to be a strong, politically active woman! And do science.

She told me once that she advised all young women in science to go on and get a PHD because that provided the most flexibility for balancing home and work. That is what I still quote you about, Charlotte!

I'm very thankful for you as the first in a line of great female bosses, Charlotte. I had a rough time finishing my Masters, but the EM lab and the support I found there, due to the atmosphere you generated, proved to me that there *were* "Good people over there!"

Enjoy your retirement! I know it will not be an idle one!

Sincerely,  
Denise Rex

Kathy,

Congratulations on your retirement! I understand you'll be keeping a lab and working on your own time, yes your own time, —no more committee assignments, no more early mornings before the sun arrives, or late nights because you need to get it done for a deadline. Now you can do it because you want to and on your own clock. You always liked what you were doing, lets face it most of us do, but to be able to do it on our own terms there's the reward!

I really don't have to say, "Enjoy your retirement!" because I know you will!

- Greg Strout



**FOR TERRY, KATHY, AND CHARLOTTE...  
SOME WORDS FROM YOUR OMS FRIENDS  
ON YOUR RETIREMENT...**

Dear Charlotte,  
Supervisor, mentor, colleague, and friend.... Each of these has a special place in my heart. I am who I am today largely because of your inspiration and I can only hope that the same will be said of me. I don't know how to say thank you because words cannot express our time together at OSU. I think this pictures says it all. Thank you Charlotte. I wish you the best! Love, Ginger



Terry Colberg, Denise Rex, Ginger (Baker) Hendricks, Katie Pennington, Janice Pennington, Andii Pennington, Phoebe Doss and Courtney Doss

Charlotte, Kathy and Terry,  
What great memories I have of our time together! From those first meetings trying to get OK-SEM started and chartered, through the name change, and beyond. Little did we realize what great friendships would develop nor what a significant organization it would become. The lecturers we've had, the development of the workshops, the Ugly Bug Contest, the school demonstrations! We achieved a lot together, over the years, and became great friends along the way! So many faces, so many stories, so many laughs! I celebrate your retirement with you and hope you get to do exactly what you want to do in the years ahead!

With great affection,  
Bill C

## FOR TERRY, KATHY, AND CHARLOTTE... SOME WORDS FROM YOUR OMS FRIENDS ON YOUR RETIREMENT...

Charlotte, Kathy, Terry

Wow, it will seem like OSU will need to shut down with all of your resignations coming it at nearly the same time! Where did all the years go?

Charlotte's leadership in microscopy in the State was always exceptional over the years. We always counted on Charlotte and Kathy's ideas for where the Society would go, great workshops and Charlotte .... three terms as President!!!! Wow!! Counting Kathy and Charlotte's service as Presidents-Elect, Presidents, Past Presidents, Charlotte as Newsletter Editor, and Terry as representative on the board ... they were in charge for about half of the Society's existence ... and with Charlotte and Kathy retiring, we are losing our last two founding members!

I will really miss the great talks at OAS too. Kathy and Charlotte's groups always gave talks that could make your skin crawl. In the early days, I remember a lot of rattlesnake toxin-related work from Charlotte's lab, not to mention a lot of tick-borne disease related work from Kathy's lab. Their preparation of students, both undergraduate and graduate alike, set a high standard in the State. They helped to drive the State to higher levels of accomplishment with every meeting and workshop. It is hard to believe how much we did get done together. Have great retirements and all best wishes in the future.

- Scott Russell





**FOR TERRY, KATHY, AND CHARLOTTE...  
SOME WORDS FROM YOUR OMS FRIENDS  
ON YOUR RETIREMENT...**

Terry,  
CONGRATULATIONS on your retirement! I was very happy for you when I heard the good news. I've always enjoyed working with you as a fellow microscopist and OMS society member. I wish I had known of your music interests with the bass sooner. I have always admired people who can play and would like to attempt to learn myself one day. It should be a challenge for whomever takes me on as I don't believe I have a musical bone in my body. I can dream... perhaps after I retire?

- Greg Strout

Charlotte, Kathy and Terry -- Thank you for your service to the Oklahoma Society for Electron Microscopy and the Oklahoma Microscopy Society!  
Charlotte – Thanks for being a great mentor in the area of histology and electron microscopy.

– Bill Meek

Charlotte,  
It will be hard to imagine microscopy in Oklahoma without you. Your leadership has not only benefitted the laboratories at Oklahoma State University, but microscopy across the entire State of Oklahoma as well. The founding and shepherding of the Oklahoma Microscopy Society brought microscopists in the state together to provide for education, collaboration, and exchange of ideas when the art of electron microscopy was emerging. You were the first to put a confocal station in a centralized laboratory in Oklahoma. An idea that people have now recognized as a means of concentrating expertise to enable users to get the most out of their microscope sessions. For me personally, you taught me a valuable lesson when I was organizing my first spring workshop in 2005. Your assistance and advice was invaluable and your willingness to share your experience taught me that this was how I wanted to interact with people too. Not just an organization lesson, but a life lesson. One I am truly grateful for...

- Greg Strout

## SUCCESSFUL FALL MEETING 2015

104th Annual  
Fall Technical Meeting of the Oklahoma Academy of Science  
November 13, 2016  
Oklahoma City University, Oklahoma City, Oklahoma



"The Future of TEM and why  
we must Remember the Past"

**Dr. C. Barry Carter**

Professor,  
Dept. Chemical & Biomolecular Eng.,  
Department of Materials Sci. & Eng.  
Institute of Materials Science,  
University of Connecticut, Storrs, CT

## UPCOMING MICROSCOPY MEETINGS . . .

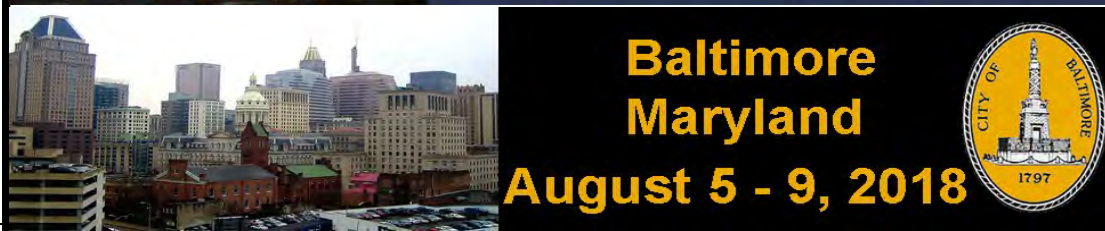
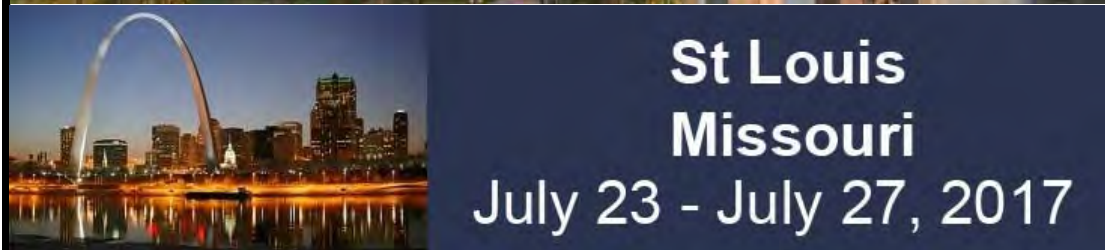
# Oklahoma Microscopy Society

## Spring 2016 OMS Workshop

Keynote speaker will be Dr. Sara Miller, Professor of Pathology at Duke University Medical Center and Director of the Duke Electron Microscopy Service. This should prove to be an exciting workshop, as in addition to the keynote speaker, we also have an array of speakers across a range of disciplines.

Students may submit a print of their favorite micrograph to enter the OMS Best Micrograph Contest. The winner receives a cash prize and the image will be featured on the cover of the OMS Fall 2016 Newsletter. Please prepare a label that describes the subject of the image in the micrograph, how the sample was prepared and the conditions under which the image was taken, i.e. magnification, kV, etc.

## Microscopy and Microanalysis



## OMS MEMBER NEWS



### **TIMPANO AWARD WINNER, FALL 2016**

Joseph N. Tessmer, student at the University of Oklahoma won the Timpano Award for his talk entitled:

**“Crystalline Defect Characterization Using Field Emission Scanning Electron Microscopy.”**

Joseph is an undergraduate student working in Dr. Matt Johnsons lab at the University of Oklahoma. He will graduate in May 2016 and has numerous offers for graduate study.

**Congratulations Joseph!**



## OMS MEMBER NEWS



### **TIMPANO AWARD WINNER, FALL 2016**

S.M. Shazzad S. Rassel, student at the University of Oklahoma won the Timpano Award for his talk entitled:

**“Characterization and Failure Analysis of Interband Cascade (IC) Structures and Devices Using a Zeiss Neon 40 Cross-Beam Microscope.”**

Rassel is a graduate student in Dr. Matt Johnsons lab at the University of Oklahoma studying laser structure and failure.

**Congratulations Rassel!**

# UGLY BUG MICROSCOPE DELIVERIES



Riverfield Country Day School excited about receiving microscope and posters for a winning OMS Ugly Bug



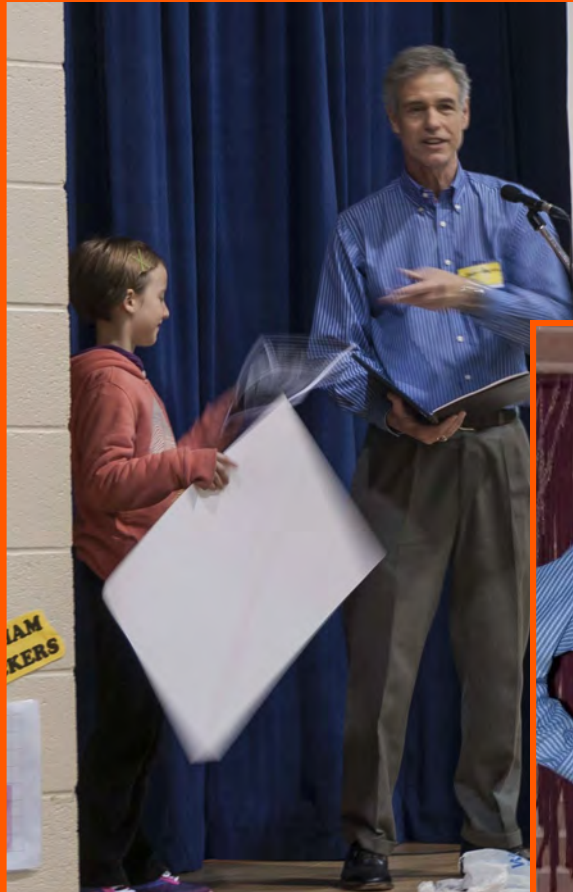
Preston and Ben with the Ugly Bug Contest winners from Battiest Elementary school





# UGLY BUG MICROSCOPE DELIVERIES

The student who collected the bug at Washington Elementary, Norman OK found out she had won during morning assembly courtesy of Dr. Scott Russell



Avas' family was very proud of her work, even her little brother!



## OMS SPRING MEETING REGISTRATION

# REGISTRATION AND FEES

**Please register online at:**

[http://www.ou.edu/research/electron/oms/paypal\\_springworkshop.html](http://www.ou.edu/research/electron/oms/paypal_springworkshop.html)

### **Workshop prices are as follows (includes lunch\*)**

Student Fee: \$5.00\*

Professional OMS Members Fee: \$15.00\*

Professional Nonmembers Fee: \$30.00\*

Corporate OMS Members Fee: \$50.00

Corporate Nonmembers Fee: \$100.00

Exhibitors: \$300.00

For late registration, add \$5.

If you would like to pay at the meeting, please send an email indicating so to: [lisa.whitworth@okstate.edu](mailto:lisa.whitworth@okstate.edu) or 405-744-6765. Please email by March 21, 2016 5 p.m. to avoid late fee.

Alternatively, you may mail registration payment to:

OMS Registration

Venture 1 Building

1110 S. Innovation Way Drive

Stillwater, OK 74074

# OMS ANNUAL SPRING MEETING



The Oklahoma Microscopy Society Presents:

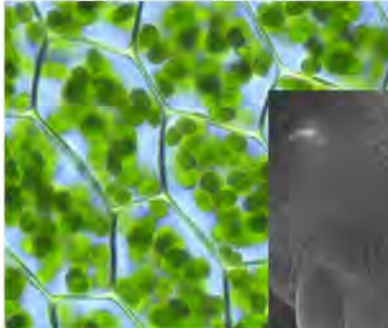
## KIDS NIGHT WITH A MICROSCOPE

You are invited to attend Kids Night With a Microscope.  
**Ages 6 and older.**

Bring your own specimen (bug, snake skin, apple peel, blade of grass, cookie crumb, etc.) to examine with the same microscopes that OSU, OU, and Noble Foundation scientists use when conducting world-class scientific research.

Your parents are welcome and encouraged to attend with you. Pizza will be provided with RSVP.

Please RSVP by March 23, 2016 5 p.m.  
405-744-6765 or [microscopy@okstate.edu](mailto:microscopy@okstate.edu)



5:30 p.m.-7:30 p.m.  
Thursday, March 24  
Venture One Building  
1110 S. Innovation Way  
Stillwater, OK

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# OMS SPRING MEETING ABSTRACTS

## It's a Small, Small World: Electron Microscopy of Minute and Unusual Specimens

Sara E. Miller, Ph.D.  
Department of Pathology  
Duke university  
Durham, NC 27710

### Abstract

As electron microscopists, we are accustomed to working with tiny specimens; in fact, it's required. Sometimes, however, the material supplied to us to process is minuscule, even by our standards, and somehow, we're supposed to keep up with it during multiple steps and find it in the electron microscope. Examples include cytology specimens, 6- $\mu$ m thick sections on a slide, invisible pellets of tissue culture cells, white blood cells from heel stick of a premature infant, virus or subcellular organelles purified and banded on a gradient, tears, blister fluid, or other practically invisible samples.

Tiny-tipped tubes are available for concentrating small amounts of cells such as cytology specimens into a pellet, which can be encased in agar for holding them together and enlarging the mass so that it does not get lost during processing. [Tip: cells must be glutaraldehyde-fixed before agar; if glutaraldehyde is used afterward, it will cross-link the agar so that penetration of additional fluids is difficult.] Also, pointed-tipped BEEM capsules are available where small numbers of cells can be entirely processed without removing them from the final container. [Tip: care must be taken to ensure that fixatives and resin fully penetrate the pellet, which is not disturbed during processing.] A similar method has been described for processing cells in 200  $\mu$ l Airfuge tubes (Metcalf, 2013) but the pellet may be invisible and whether the sample is really there may not be known until the pellet is thin sectioned and examined. Very small amounts of non-adherent cells, such as 200  $\mu$ l of blood from a premature infant, can be processed in a capillary tube to produce a buffy coat for sectioning and examination of white blood cells or platelets. Another technique for keeping up with small numbers of cells such as those sorted from a FACS (fluorescence activated cell sorter) is to amplify the "invisible pellet" with 0.5  $\mu$ l of red blood cells. This increases the pellet bulk and permits keeping up with the specimen; while remaining in the sample, these red cells can be simply overlooked during the ultrastructural examination.

Other minuscule specimens include particulate cell organelles and viruses from gradient purifications or in small amounts of fluids such as tears and blister fluids. Methods for preparation of fluids for detection of viruses have been published (see list below). With the use of a Beckman Airfuge and EM-90 rotor (particles can be pelleted directly onto filmed grids and negatively stained). Other methods of concentration

## OMS SPRING MEETING ABSTRACTS

### It's a Small, Small World: Electron Microscopy of Minute and Unusual Specimens

include the use of antibodies. Immune serum can be added to a virus suspension and the aggregates centrifuged out and placed onto a grid. This procedure both concentrates them and “identifies” them if they react with the antibody. Alternatively, the antibody may be added to the grid first, after which excess is washed off, and the grid is then placed onto a droplet of virus. The antibody “glues” the virus to the grid in a technique called SPIEM (solid phase immuno electron microscopy); also, the antibody can be held, reactive sites outward by using protein A to attach it to the grid (Doane, 1987). Antibody techniques require that the virus identity be known for selection of the proper reagent. Agar diffusion, whereby the virus suspension is placed onto a 1% agar surface and a grid is placed onto the virus drop, concentrates the preparation as the fluid diffuses into the agar, leaving the viruses in the remaining fluid. Just before the liquid disappears, the grid is removed and negatively stained; or the grid can be placed into a multi-welled dish with agar plus antibody, and the virus suspension added to the dish. In a variant of this procedure, called pseudoreplica technique, Formvar is spread over the agar with the presumed viruses on the surface, and after drying, the film is floated off on the surface of water in a bowl like the making of Formvar-coated grids. Grids are placed on the film and picked up for negative staining. Finally, filter units can be purchased that permit fluid to pass during a low-speed centrifugation, but not small particles such as viruses, as another way to circumvent the necessity for an ultracentrifuge. [Tip: A caveat to this method is that all debris larger than the particles of interest must be clarified out at low speed first (~2000 x g, or they will clog the filter.)]

When the points of interest in tissue (pathology, infection) are small and focal, embedding multiple blocks of tissue is one way of hoping to locate them; however, this can be time-consuming and frustrating. Methods have been described for using a confocal microscope to select areas of pathology (Miller et al., 1987). Since a confocal microscope does not require the beam to pass through the specimen, wet sections, made with a vibrating microtome, can be examined to select areas of pathology that can be cut out and embedded. A new device is recently available for illuminating objects with fluorescent light and selection of areas under a dissecting microscope for EM exam. Additionally, a laser capture device can be used to select individual cells of interest such as infected cells in tissue cultures. If the only available specimen has already been processed into paraffin blocks for light microscopy and cut onto slides, a 6- $\mu$ m section can be embedded *in situ*, and the section cut out and glued onto a blank block for cutting; the stained paraffin section serves as the “thick” section for selection of pathological change for examination by EM (Estrada et al., 2005). Likewise, monolayer tissue cultures can be grown on slides, embedded *in situ*, peeled up and glued onto blank blocks, and then thin sectioned.

In these ways, specimens too small for handling by routine methods can be kept up with and processed for EM examination.

## OMS SPRING MEETING ABSTRACTS

### **It's a Small, Small World: Electron Microscopy of Minute and Unusual Specimens**

#### **References for Handling Small Specimens, Non-Adherent Cells, Focal Pathology, Sections on Slides, Tissue Monolayers**

**Electron microscopy of tissue culture.** Miller SE. in Jones BR. **Electron Microscopy: 41 Exercises by 17 Scientists.** Library Research Assoc. Monroe, NY. 1985. pp.2 93-315.

**Identification of focal viral infections by confocal microscopy for subsequent ultrastructural analysis.** Miller SE, Levenson RM, Aldridge C, Hester S, Kenan DJ, Howell DN. *Ultrastruc Pathol.* 1987. Mar-Apr: 21(2)183-193.

**Laser capture microdissection as an aid to ultrastructural analysis.** Grant K, Jerome WG. *Microsc Microanal.* 2002 Jun;8(3):170-5.

**TEM of paraffin-embedded H&E-stained sections for viral diagnosis (an unusual papovavirus case.** Estrada JC, Selim MA, Miller SE. *Microsc Microanal* 2005;11 (Supl 2)964-965.

**Same-day diagnostic electron microscopy of virus-infected cell cultures by a modified protocol for conventional and microwave processing.** Metcalf M, Humphrey C, Rollin D. *Microsc Microanal.*

#### **References for Virus Concentration and Identification**

**Negative Staining Electron Microscopic Protocol for Rash Illness.**

<http://www.bt.cdc.gov/labissues/>

Then click on title above.

**Electron Microscopy for Rapid Diagnosis of Emerging Infectious Agents.**

[http://wwwnc.cdc.gov/eid/article/9/3/02-0327\\_article.htm](http://wwwnc.cdc.gov/eid/article/9/3/02-0327_article.htm)

**Detection and identification of viruses by electron microscopy.** Miller SE. *J Electron Microsc Tech* 4:265-301;1986.

**Electron Microscopy in Viral Diagnosis.** Palmer EL, Martin ML. 1988. CRC Press, Boca Raton, FL.194 pp.



# OMS SPRING MEETING ABSTRACTS

## It's a Small, Small World: Electron Microscopy of Minute and Unusual Specimens

### References for Virus Concentration and Identification

**Electron Microscopy in Diagnostic Virology, A practical Guide and Atlas.** Doane FW, Anderson N. 1987. Cambridge University Press, New York. 178 pp.

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# OMS SPRING MEETING ABSTRACTS

## It's a Small, Small World: Electron Microscopy of Minute and Unusual Specimens

Sara E. Miller, Ph.D.  
Department of Pathology  
Duke university  
Durham, NC 27710

### Bio

#### Education

Attended - Wake Forest U  
PhD - U GA  
Postdoctorate - UNC

#### Served as

MSA President  
MSA Biological Director  
SEMS Sec/Treas  
SEMS President  
Sigma Xi Secretary

#### Currently

Society for Ultrastructural Pathology - President

#### Editorial Board

Journal of Microscopy Results and Techniques (formerly Journal of MicroscopyTechniques)  
Ultrastructural Pathology

#### Special Interests

Diagnostic Virology  
Infectious Diseases  
Immunoelectron microscopy  
Correlative microscopy

#### Teaching

Postdoctoral, medical, and graduate students

Taught international workshops on Diagnostic Virology by Electron Microscopy:

Beijing, China (World Health Organization)  
Bangkok, Thailand (World Health Organization)  
Bangkok, Thailand (Betty Dumaine Foundation)  
Chiang Mai, Thailand (Betty Dumaine Foundation)  
Adelaide, Australia (Australian Microscopy Society)  
Geelong, Australia (Australian Microscopy Society)





## 2016 Oklahoma Microscopy Society Spring Workshop



**Thursday, March 24, 2016**

Venture One Building, 1110 S. Innovation Way, Stillwater, OK

March 24, 2016 Time	Event
5:30 – 7:30 pm	<b>Kids Night with a Microscope</b>
7:30	<b>OMS Executive Meeting</b>

**Friday, March 25, 2016**

Wes Watkins Center, Oklahoma State University, 207 Watkins Farm Road, Stillwater, OK  
Located at the Corner of Hall of Fame Ave and Washington St.

March 25, 2016 Time	Event
8:00 am - 8:30	<b>Registration and Welcome</b> Outside of Room 109 Executive Seminar Room; Refreshments Room 101 Legacy Room
8:30 - 9:30 Room 109 WWC	Keynote Lecture: <b>It's a Small, Small World: Electron Microscopy of Minute and Unusual Specimens</b> Sara E. Miller, Department of Pathology, Duke University, Durham, NC
9:30 – 10:00 Room 109 WWC	<b>Five Dimensional Nanoscale Microanalysis: 3D Structure, Chemistry and Reaction Over Time</b> Qinang Hu, Department of Civil Engineering, Oklahoma State University
10:00- 10:30 Room 101 WWC	<b>Break</b> Refreshments Room 101 Legacy Room. Please take this opportunity to visit with our many vendors, who make our OMS workshops possible
10:30-11:30 Room 109 WWC	<b>Correlative Fluorescence and Electron Microscopy to Study Lymphatic Vascular Development</b> Xin Geng, Cardiovascular Biology Research Program, Oklahoma Medical Research Foundation
11:30- 12:00 pm Room 109 WWC	<b>How Microscopy Provides Insight into Potential for Fluid Flow and Extraction in "Unconventional" Carbonate Reservoirs: Examples from the Oklahoma "Mississippian Limestone"</b> Beth Vanden Berg, Department of Geology, Oklahoma State University
12:00-12:30 Room 109 WWC	<b>Should I Stay or Should I Go?! The Dilemma of Anaerobic Fungi Classification between Morphology and Phylogenetic Analysis</b> Noha Youssef, Department of Microbiology and Molecular Genetics, Oklahoma State University
12:30- 1:30 Room 101 WWC	<b>Lunch</b> Room 101 Legacy Room. Please take this opportunity to visit with our many vendors, who make our OMS workshops possible
2:00 – 3:00	<b>Optional:</b> <b>Tour of OSU Microscopy Lab, 1110 S. Innovation Way</b>

# DIRECTIONS TO SPRING MEETING

## Wes Watkins Center, Oklahoma State University 207 Watkins Farm Road, Stillwater, OK Located at the Corner of Hall of Fame Ave and Washington St.

### Directions from Tulsa via Cimarron Turnpike:

- Take Hwy 64 to the Cimarron Turnpike - toll gate (manned - \$1.00)
- Take the OSU "Y" turnoff (approximately 20 miles) - toll gate (unmanned - \$.50)
- Continue on the turnpike. It will curve left into Stillwater and become Washington Street.
- Drive thru four traffic lights (Richmond Rd, The Links Apartments, & Airport and Lakeview Rds)
- Just before the next traffic light, go right at the "Y" (do not go through the light). This will keep you on Washington.
- Pass through two more traffic lights (Will Rogers Elementary School and McElroy Street).
- The Watkins Center is located on the left approximately three blocks after the 2nd light (McElroy).
- Turn left into the parking lot just before the Watkins Center (before the light at Hall of Fame and Washington).

### Directions from Tulsa via State Highway 51:

- Travel through Stillwater to Duck Street.
- Turn right (north) onto Duck Street
- Go north to McElroy (4th traffic light).
- Turn left (west) onto McElroy.
- At the next light (Washington), turn left (south).
- The Watkins Center is located on the left, approximately three blocks south of McElroy.
- Turn left into the parking lot just before the Wes Watkins Center

### Directions from Oklahoma City via I-35 North:

- Take the Stillwater Exit and turn right on State Highway 51 (you are approximately 17 miles west of Stillwater).
- As you enter the edge of Stillwater, turn left (north) at 4th traffic light, which is Western.
- As you round the curve, it becomes Hall of Fame.
- Turn left at 4th traffic light (Washington). The Wes Watkins Center is on the corner.
- Turn left onto Washington & right into the parking lot behind the building.



Google Map - <https://goo.gl/maps/odHS1Bx4v3t>



## 2016 OMS SPRING WORKSHOP

# For Students . . . Best Micrograph Contest



**SUBMIT YOUR BEST "PRIZE-WINNING" MICROGRAPH TO THE OMS STUDENT MICROGRAPH CONTEST. STUDENT DOES NOT NEED TO BE PRESENT TO WIN.**

**PLEASE PREPARE A LABEL THAT DESCRIBES THE SUBJECT IN THE MICROGRAPH, HOW THE SAMPLE WAS PREPARED AND THE CONDITIONS UNDER WHICH THE IMAGE WAS TAKEN, I.E., KV, MAG.**

1st Prize = \$100 and cover of Fall Newsletter  
2nd Prize = \$50

# 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.

# CONSTITUTION & BYLAWS OF THE OMS

## 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.

# CONSTITUTION & BYLAWS OF THE OMS

## 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.



# CONSTITUTION & BYLAWS OF THE OMS

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

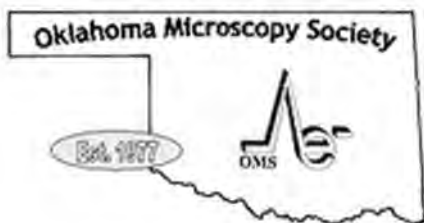
By petition of ten percent of the members.

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 2015-2016



**NOTE:** For snailmail, 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 (\$50.00) \_\_\_\_\_  
Professional (\$15.00) \_\_\_\_\_  
Student (\$5.00) \_\_\_\_\_

Amount Enclosed: \_\_\_\_\_

Please enclose a check for one year's dues (**July 1, 2015 - June 30, 2016**) 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](mailto:srussell@ou.edu) (use also for any address or membership information updates)

**NOTE:** You can pay by Paypal at: <http://www.ou.edu/research/electron/oms/paypaldues.html>

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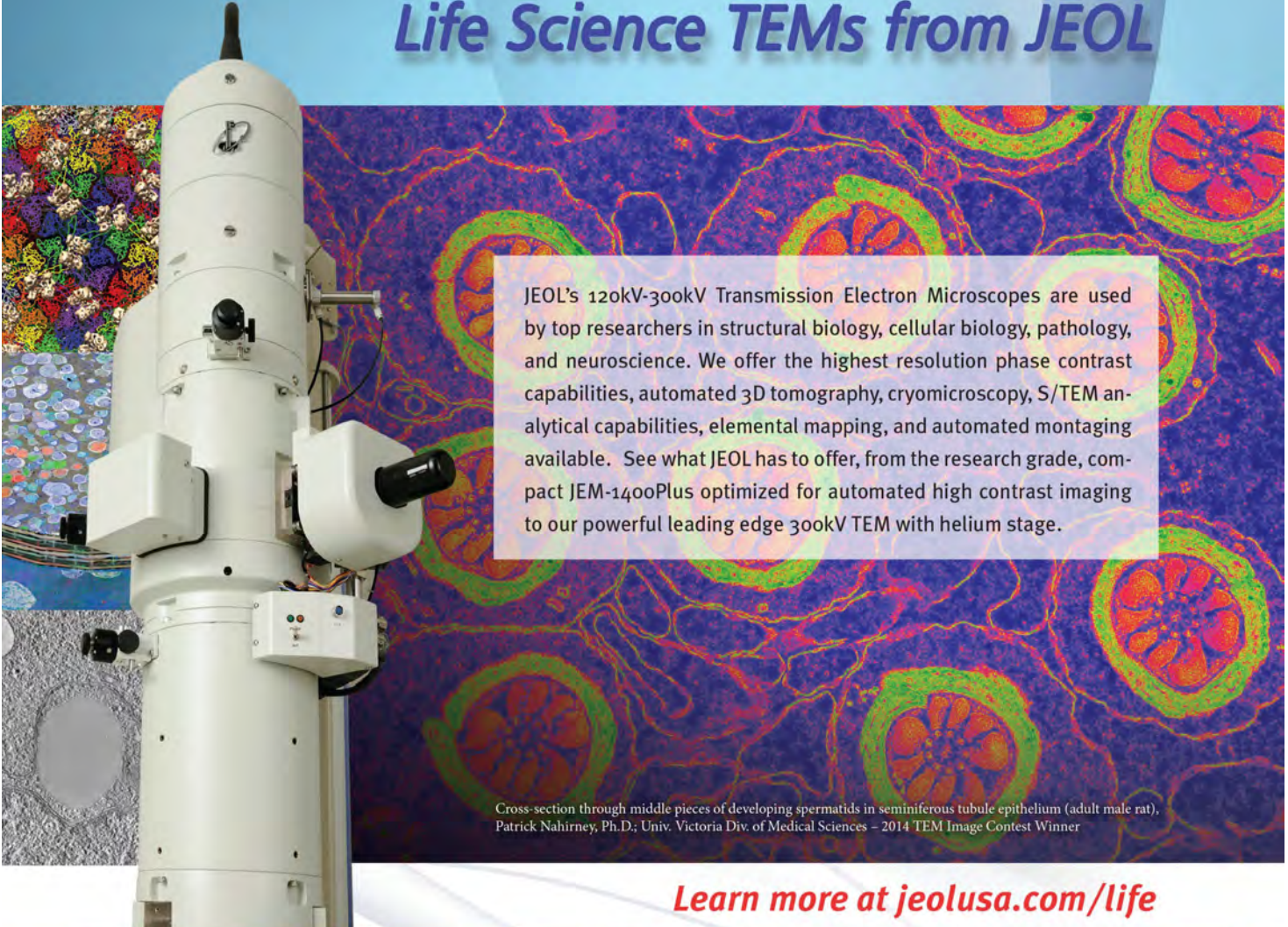
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Bacteriophage Epsilon 15, Wah Chiu, Ph.D.,  
Baylor College of Medicine (top image)

Rabbit Retinal Connectome volume; Robert Marc, Ph.D.,  
Marc Lab, Moran Eye Center, Univ. of Utah (middle image)

Neuron, 200nm, tomography; Greg Ning, Ph.D.,  
Penn State University College of Agricultural Sciences  
(bottom image)



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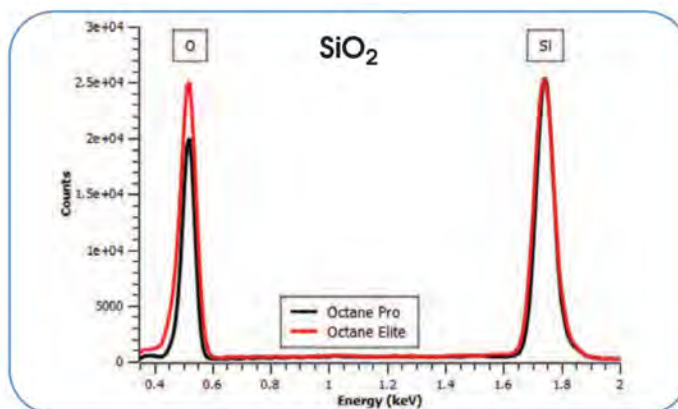
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The results above show spectra acquired from a silicon dioxide sample at 10 kV. The two spectra have been scaled to the same peak amplitude at the Si K peak to facilitate comparison and a clear improvement for the  $\text{Si}_3\text{N}_4$  window is seen in the increased oxygen peak intensity.

### Low kV performance

The mechanical properties of  $\text{Si}_3\text{N}_4$  allow the windows to be very thinly fabricated, offering a great benefit in terms of sensitivity, enabling optimal low voltage analysis.

### Reliability

The material properties and durability of  $\text{Si}_3\text{N}_4$  ensure the most robust and reliable detectors available for all EDS applications.

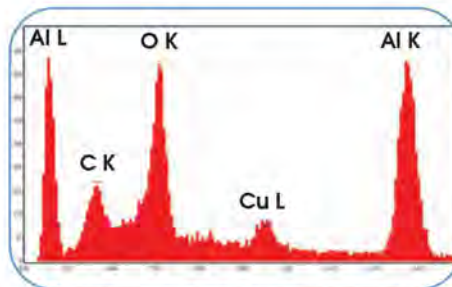
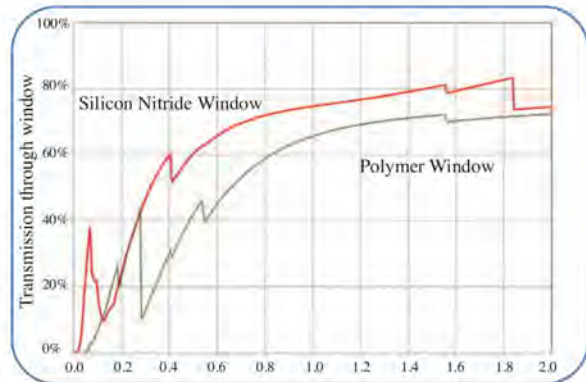
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- Carbon detection above 500 K CPS for ultra fast mapping and particle acquisition
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- Standard with TEAM™ EDS Software Suite
  - Fast Phase Mapping routine (patent pending) and materials libraries
  - Smart Diagnostics
  - Smart Acquisition
  - EXpert ID
  - Smart Mapping
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## Features and Benefits

### Si<sub>3</sub>N<sub>4</sub> window

- Thermal resistance enables in-situ testing and analysis
- Corrosion and shock resistance
- Higher sensitivity for superior low kV performance
- Unique grid arrangement blocks fewer X-rays
- Vacuum encapsulation maximizes low energy collection
- Can be plasma cleaned to reduce contamination build-up



Al L to Al K peak height ratio of 1:1 at 2.5 kV

### Use of CUBE Technology

- Electronics are available on a smaller module
- Achieves lower temperatures using less power for better resolution
- Offers the fastest pulse processing available
- Maps can be collected in much shorter times, boosting user productivity

### Stable energy resolution at high collection speeds

- Data quality guaranteed at all count rates
- Extraction of high-resolution quantitative analysis at mapping speeds up to 200,000 cps

### TEAM™ Software Suite allows users to optimize their analysis time and get the best possible data from their sample

- Smart Diagnostics and Smart Acquisition facilitate optimized collection and analysis conditions
- Smart Pulse Pile-Up Correction minimizes concerns typical of high count rate collections and allows maximum use of SDD technology

## Conclusion

The design enhancements and analytical benefits of the Octane Elite Series advance SDD technology to the highest level of performance ever achieved in a commercially available EDS detector. They enable users to meet more of their materials characterization challenges with the best results.



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**Hitachi is proud to support the Oklahoma Microscopy Society.**

I look forward to working with you all this year.

Rod Baird  
South Central Sales Manager, Electron Microscope Sales  
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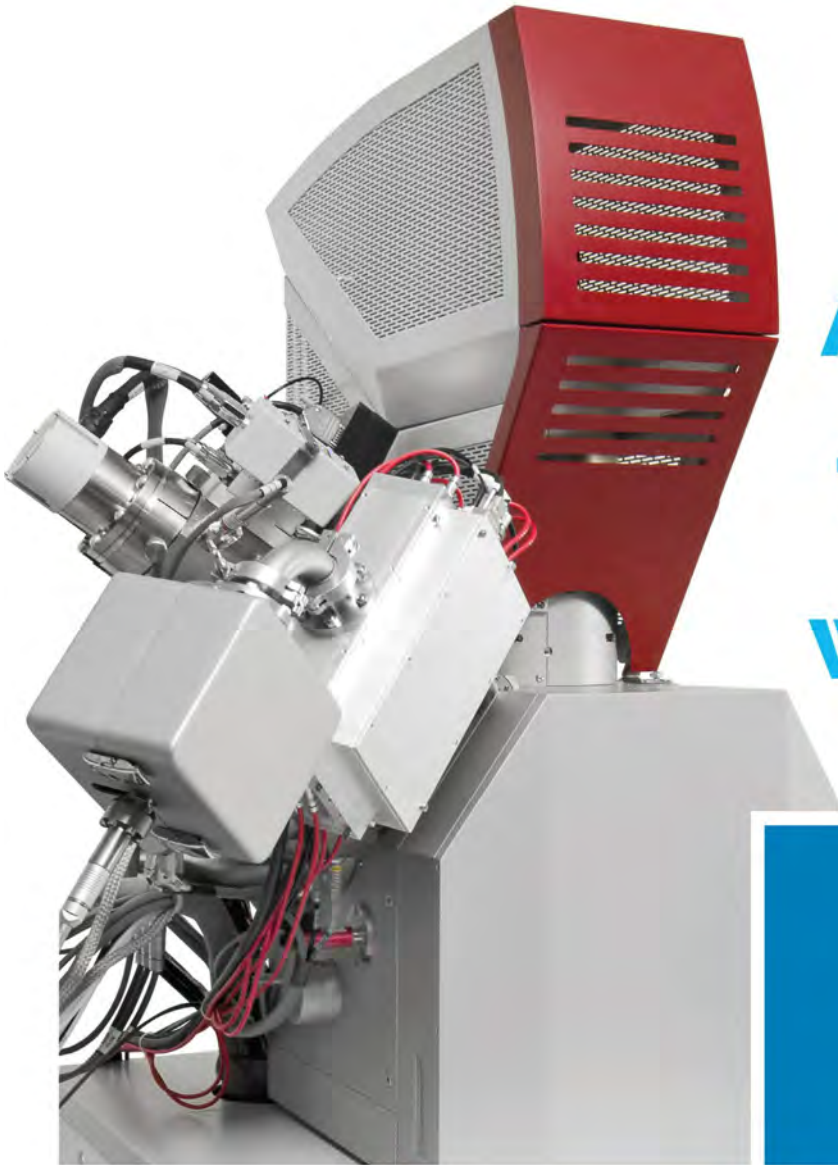
Rod Baird  
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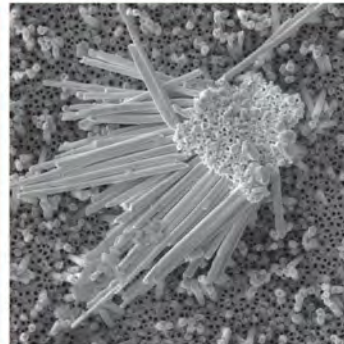
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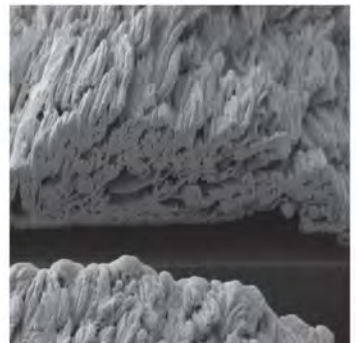
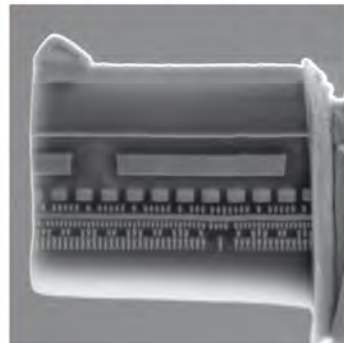
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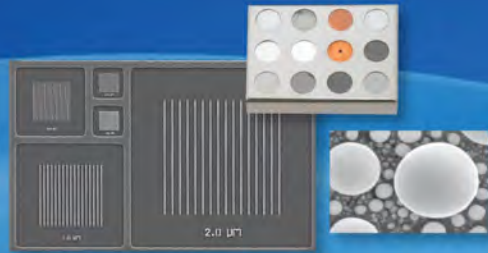


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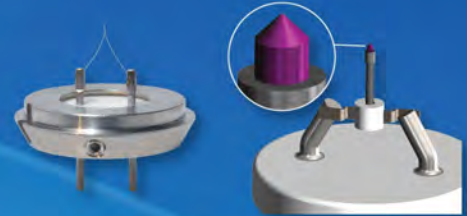




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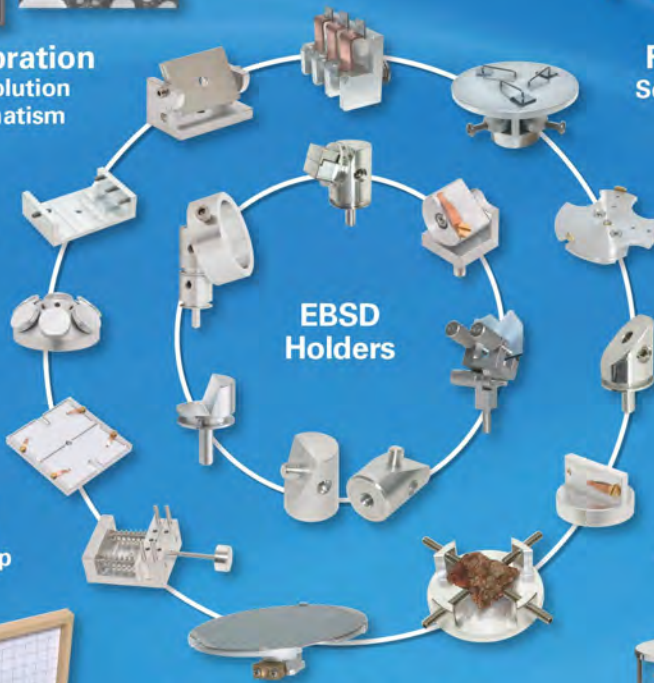
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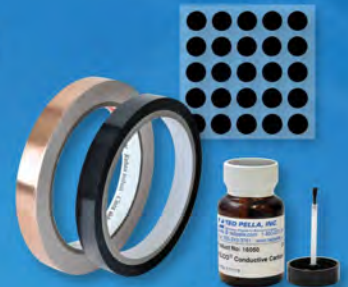
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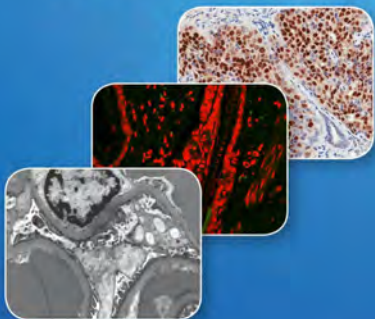


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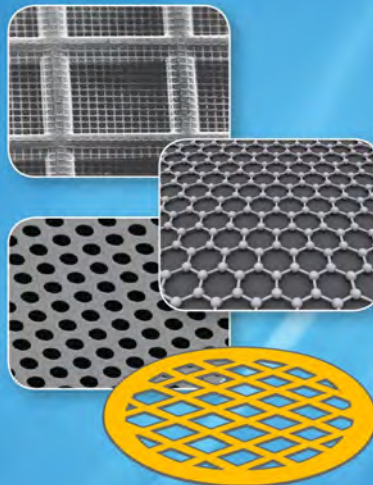


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