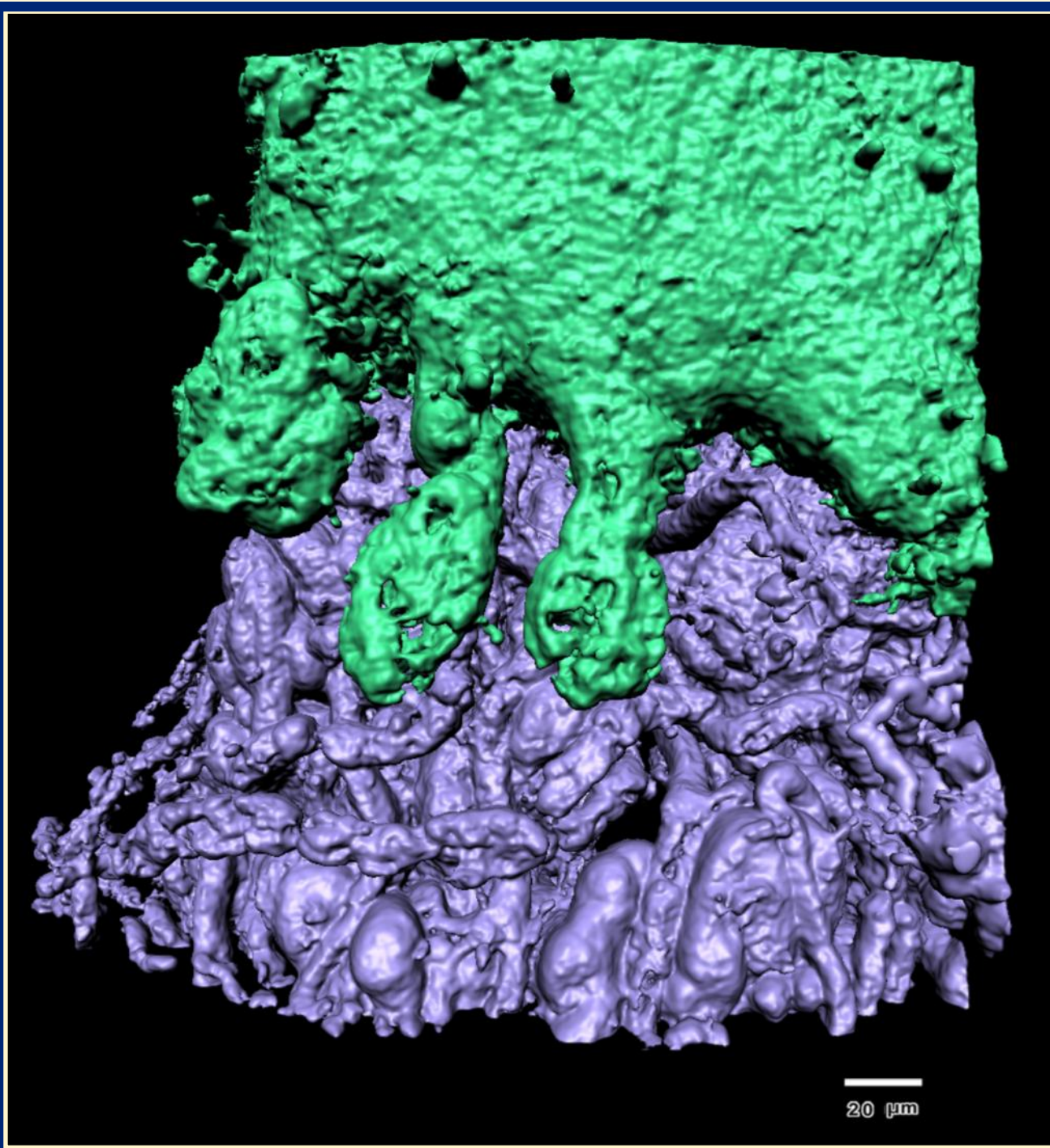


April 2014 Volume 36 No. 1 ISSN 0276-4776

SPRING NEWSLETTER

Oklahoma Microscopy Society



ABOUT THE COVER . . .

Junction between electrocytes in the knifefish *Eigenmannia*

Yue Ban, Ben Smith and Michael Markham

This image shows the junction between two electrocytes in the weakly electric knifefish, *Eigenmannia*. The posterior end of the electrocyte (lavender) is highly vascularized and deeply invaginated, while the anterior side of the electrocyte (green) is more lobular and forms a socket-like structure that encloses the posterior end. The electrocytes themselves are massive macroscopic cells that are 1mm in length, 600 μm wide and 600 μm deep. This image was taken of the autofluorescence of dermal tissue fixed in PFA. The image was taken on a Leica SP8 scanning confocal microscope using a 25x/0.95NA dipping objective.

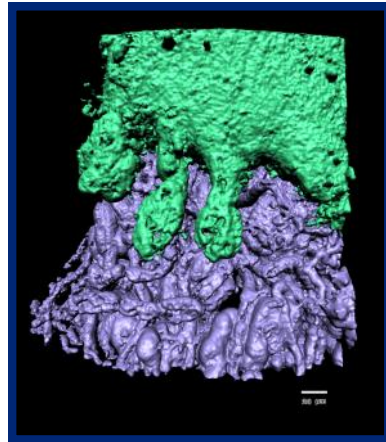


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PRESIDENT'S LETTER

The Samuel Roberts Noble Foundation, Inc.
2510 Sam Noble Parkway, Ardmore, Oklahoma 73401
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Dear OMS Members:

Our 2014 Spring Workshop is fast approaching. If you have not yet registered, I strongly encourage you to do so and join us on April 4 on the campus of the Samuel Roberts Noble Foundation in Ardmore, Oklahoma. You can register online at <https://www.regonline.com/oms2014>. As noted in my previous letter, this will be the return of the OMS meeting to the Noble Foundation. Thus, in addition to technical talks and interaction with various microscopy vendors, you will have an opportunity to take optional tours of major microscopy, scientific, and growth facilities on Ardmore campus.

Our keynote speaker is Professor Thomas E. Phillips, Director of the Molecular Cytology Core, University of Missouri. Professor Phillips is a leader in the field of advanced optical imaging, and he will share some of his unique study on mucosal epithelial cells using bright field microscopy, wide-field and confocal immunocytochemistry and electron microscopy, in combination with biochemical and molecular genetic techniques, to study mucosal cell biology in the conjunctiva and intestinal tract. As we continue to witness a revolution in light and electron microscopy, I believe the topic of this workshop "**Correlative Microscopy: Bridging Light and Electron Microscopy**" is both timely and relevant. We will also have two short presentations by representatives from Leica and Hitachi on the emerging field of super-resolution 3D imaging and correlative microscopy techniques. Although the focus of this meeting will be on applications for the biological sciences, I am convinced that you will find applications to any field of research.

For our "Kids Night with a Microscope" event which will be held on the evening of April 3, a group of 4 and 5th grade students from the Oak Hall Episcopal School will have the opportunity to operate a Tabletop Scanning Electron Microscope with OMS and Hitachi representatives.

This promises to be an exciting meeting, and I am truly looking forward to meeting you in Ardmore in early next month!

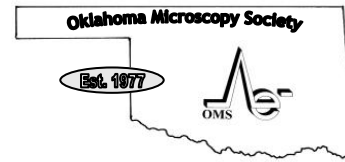
Yours sincerely,



Jin Nakashima

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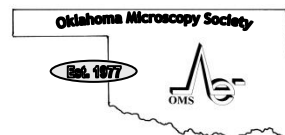
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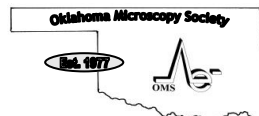
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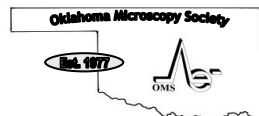
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UPCOMING MICROSCOPY MEETINGS . . .

Oklahoma Microscopy Society

Spring Workshop 2014
**Correlative Microscopy: Bridging Light
and Electron Microscopy**
Samuel Roberts Noble Foundation
April 4, 2014

Our keynote speaker, Professor Thomas E. Phillips, Director of the Molecular Cytology Core, University of Missouri, will be discussing his use of multiple microscopy techniques in combination with biochemical and molecular genetic techniques, to study mucosal cell biology. Talks will also include presentations by representatives from Leica and Hitachi on the emerging field of super-resolution 3D imaging and correlative microscopy techniques. Tours will be available of the facilities on the Samuel Roberts Noble Ardmore campus.

Microscopy and Microanalysis



THANKS...

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

Conoco Phillips

For providing grants to fund

the contest and printing of posters delivered to classrooms

 **ConocoPhillips**



Justin Meek

For not only designing the 2014 Ugly Bug Poster, but The OMS Ugly Bug Contest logo as well

Leica

 **Leica**
MICROSYSTEMS

For providing a generous subsidy toward the purchase of stereomicroscopes given away as a part of the contest

and

the Microscopists

who make the images that are the heart of the contest

Tulsa University—Paige Johnson

Oklahoma State University—Lisa Whitworth

University of Oklahoma—Preston Larson

OMS UGLY BUG SCOPE DELIVERIES

Inola Elementary 4th Grade Johnna Robinson Class

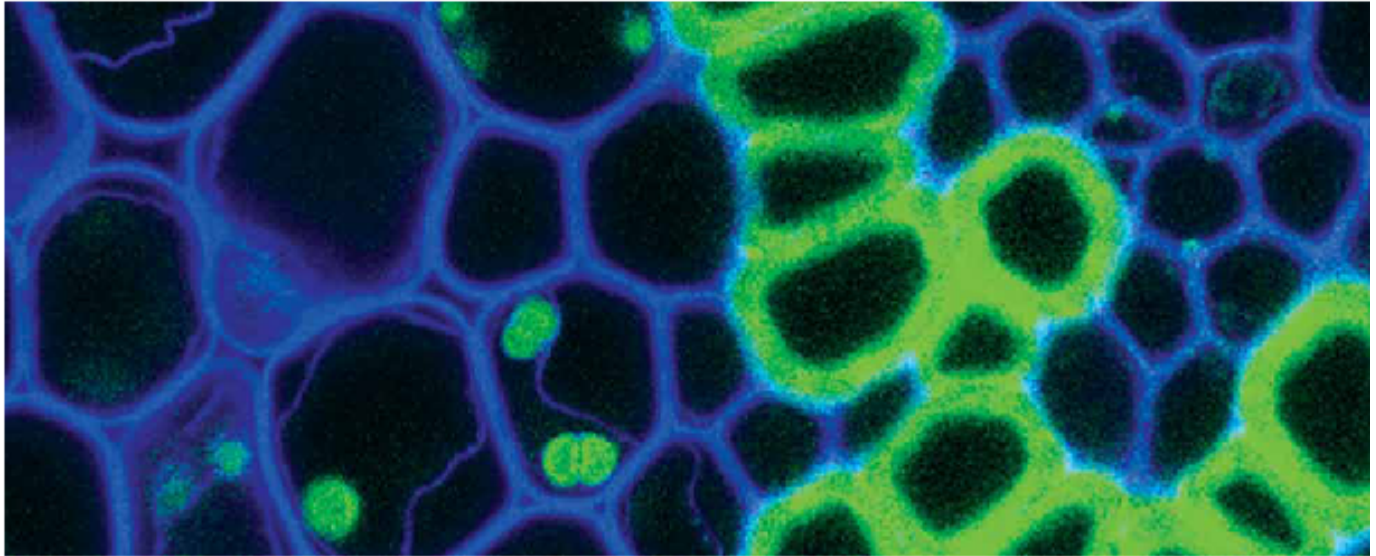


Teacher Johnna Robinson with Christian Miller and the 4th grade class that voted & reported on their Ugly Bug.



Christian Miller collected the moth for his class. Microscopes, Cowboys, the other Cowboys, Posters, and Longhorns (school mascot) – What more could one want? It was a great day at Inola Elementary.

OMS ANNUAL SPRING MEETING



OKLAHOMA MICROSCOPY SOCIETY (OMS) 2014 SPRING WORKSHOP

Correlative Microscopy - Bridging Light and Electron Microscopy

9 a.m.-4:00 p.m. (includes lunch)

Friday, April 4

Noble Foundation Kruse Auditorium

Registration: 8:00 a.m.

Professor Thomas E. Phillips, Director of the Molecular Cytology Core,
University of Missouri, will be the keynote speaker

Other Activities

- Optional tours of the Noble Foundation campus
- Kids night with a microscope – April 3 (5:30 p.m. - 7:30 p.m.)

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2510 Sam Noble Parkway
Ardmore, Okla.

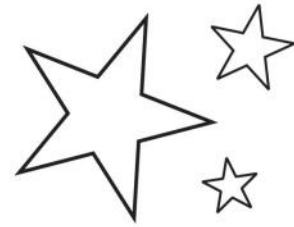


THE SAMUEL ROBERTS
NOBLE
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Oklahoma Microscopy Society
and Noble Academy present:

Kids Night with a microscope



Dear Oak Hall Students,

You are invited to attend the Noble Foundation's Kids Night With a Microscope. During your visit you will explore the microscopic organisms found in pond water and soil, and you will have the opportunity to use a scanning electron microscope with a Noble Foundation scientist. Bring your own specimen (bug, snake skin, apple peel, blade of grass, cookie crumb, etc.) to examine with the same microscope that Noble Foundation scientists use when conducting world-class plant science research. Prizes will be awarded for the best specimen. Your parents are welcome and encouraged to attend with you. Pizza dinner will be provided for the entire family.

5:30 p.m.-7:30 p.m.
Thursday, April 3
Noble Foundation
Kruse Auditorium



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"Noble Academy" is an education and
outreach program of:

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OMS SPRING MEETING PROGRAM

Correlative Microscopy – Bridging the Light and Electron Microscopy

Oklahoma Microscopy Society (OMS)
2014 Spring Workshop



THE SAMUEL ROBERTS
NOBLE
FOUNDATION

Schedule

Thursday, April 3

5:30 pm	<i>Kids Night with a Microscope</i> Kruse Auditorium	Frank Hardin & OMS Members
7:30 pm	OMS Executive Meeting Conference Center	

Friday, April 4

8:00 am	Registration Kruse Auditorium	Scotty Phelps & Tracy Cumbie
9:00 am	Opening Remarks	Jin Nakashima – Noble Foundation
9:15 am	Topic #1	Dr. Chris Vega – Leica Microsystems
10:00 am	Break	
10:15 am	<i>Antigen-sampling M Cells in the Conjunctiva: Using Microscopy to Find an Old Friend in an Unexpected Place</i>	Thomas E. Phillips – University of Missouri Keynote Speaker
11:15 am	<i>A Streamlined Technique to Examine Cell Monolayers by means of Correlative Light and Transmission Electron Microscopy</i>	Barbara L. Armbruster, – Hitachi High Technologies America, Inc.
11:45 am	Lunch & Tradeshow (continued until 4:00 pm) Forage Building Atrium	
1:15 pm	Optional Afternoon Activities • Core Facilities Tour • Greenhouse Tour • Cellular Imaging Facility Tour • Live Imaging Cell Demonstration	Yuhong Tang, David Huhman David McSweeney Jin Nakashima Elison Blancaflor
2:15 pm	Optional Afternoon Activities • Core Facilities Tour • Greenhouse Tour • Cellular Imaging Facility Tour • Live Imaging Cell Demonstration	Yuhong Tang, David Huhman David McSweeney Jin Nakashima Elison Blancaflor
3:15 pm	Reception & Tradeshow (Beer, Wine, Snacks) Forage Building Atrium	
4:00 pm	End OMS Workshop	

OMS SPRING MEETING REGISTRATION

Register online at <https://www.regonline.com/oms2014>

Correlative Microscopy – Bridging the Light and Electron Microscopy

Oklahoma Microscopy Society (OMS)
2014 Spring Workshop



THE SAMUEL ROBERTS
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OMS 2014 Spring Workshop

Friday, April 04, 2014 9:00 AM - 4:00 PM

Noble Foundation Kruse Auditorium

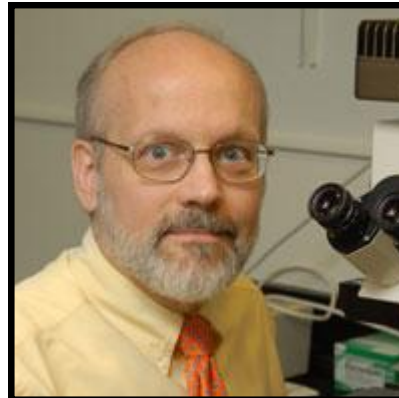
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Ardmore, Oklahoma 73401

United States

Key Note Speaker

*Antigen-sampling M Cells in the Conjunctiva:
Using Microscopy to Find an Old Friend in an Unexpected Place*



Contact Information at Noble Foundation

Phone: 580-224-6292 Email:

tlcumbie@noble.org

Professor Thomas E. Phillips
Director of the Molecular Cytology Core
University of Missouri

Payment Instructions

Lunch is included in your registration fee.

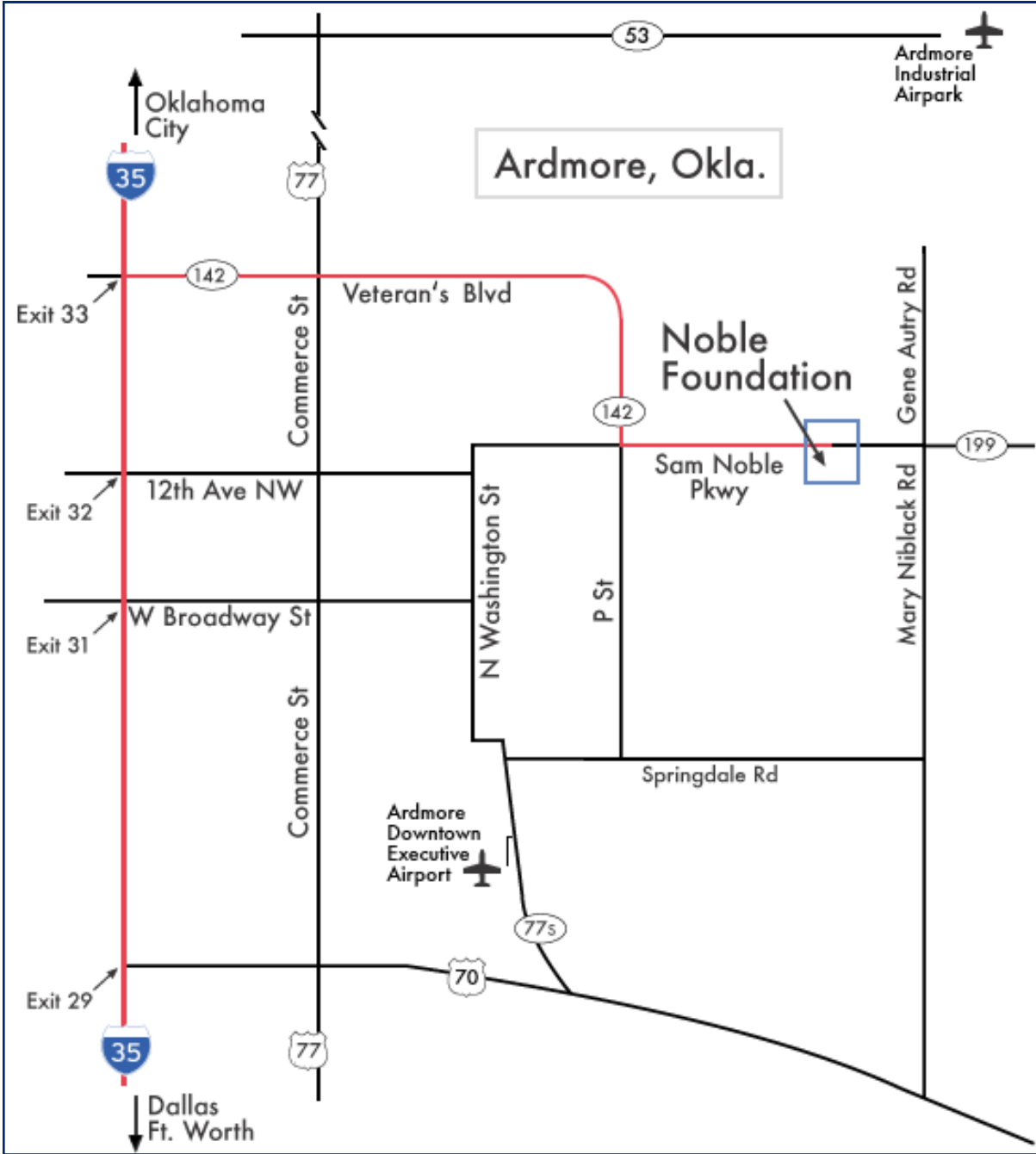
Make checks payable to: Oklahoma Microscopy Society
(rates available at online registration site)

Mail a copy of your receipt with the check by Friday, March 21 to: Tracy Cumbie The Noble
Foundation Admin Building 2510 Sam Noble Parkway Ardmore, OK 73401

If you are unable to mail your check by this date; please bring it with you to registration on
Friday, April 4.

DIRECTION TO SPRING MEETING

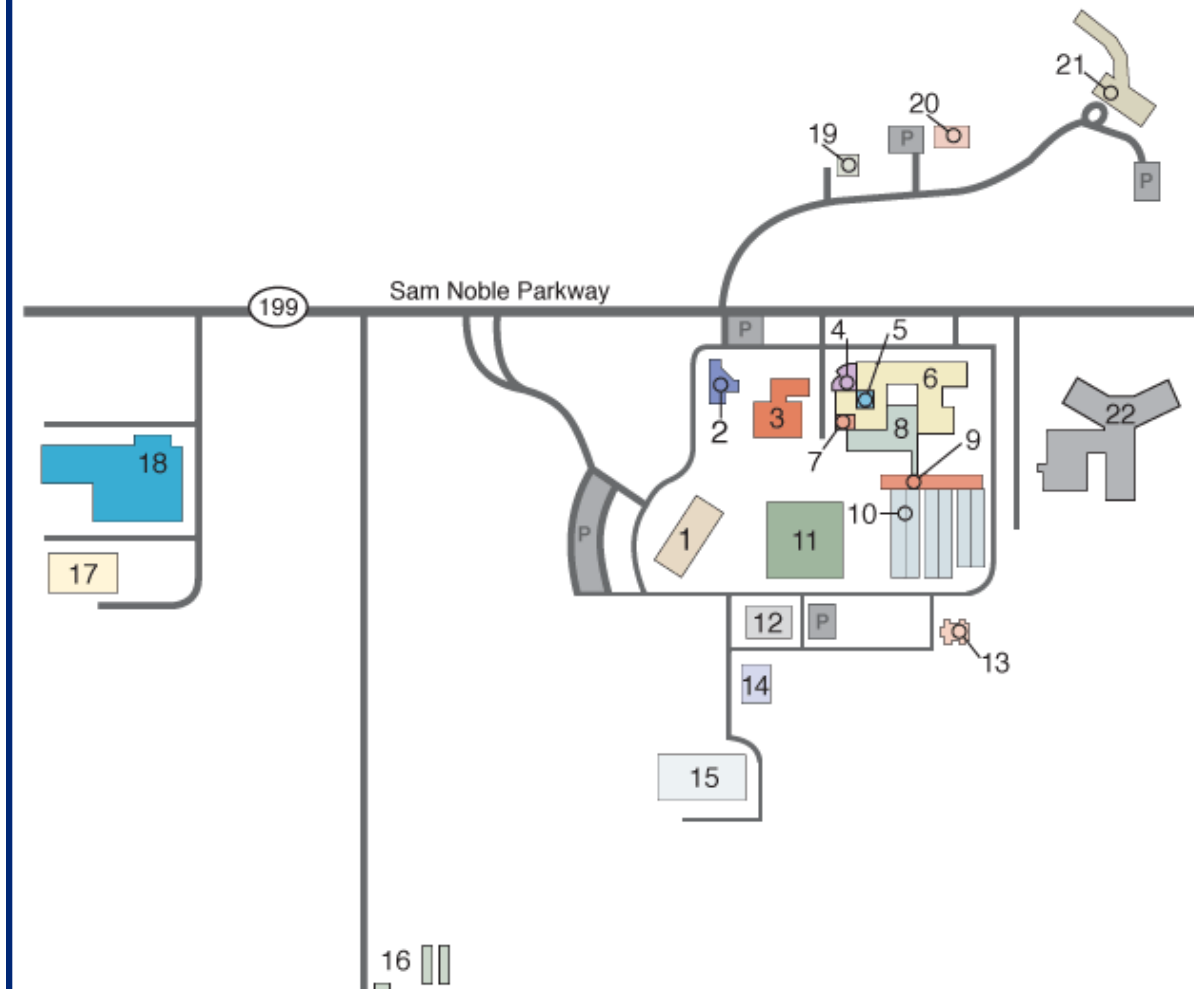
Ardmore Area Map



DIRECTION TO SPRING MEETING

Noble Foundation Campus Map

- | | |
|---------------------------------|--|
| 1. Administration | 12. Wellness Center |
| 2. Agricultural Research | 13. Quadraplex |
| 3. Agricultural Division | 14. Plant Operations |
| 4. Kruse Auditorium | 15. Utility Services Center |
| 5. Library | 16. Horticultural Center/Hoophouses |
| 6. Plant Biology Division | 17. Shipping and Receiving |
| 7. Cafeteria | 18. Soil Testing/Agricultural Publications |
| 8. Lablink | 19. Farmhouse |
| 9. Headhouse (Greenhouse) | 20. Pavilion |
| 10. Greenhouses | 21. Conference Center |
| 11. Forage Improvement Division | 22. So. Okla. Technology Center |



OMS SPRING MEETING ABSTRACTS

OMS 2014 Spring Meeting Key Note Speaker

Antigen-sampling M cells in the conjunctiva: Using microscopy to find an old friend in an unexpected place

Professor Thomas E. Phillips, Director of the Molecular Cytology Core, University of Missouri



Abstract

Antigen sampling M cells (membranous epithelial cells) are present in the follicle associated epithelium (FAE) of many mucosae but their presence in the conjunctiva was controversial. M cells play a key role in the initiation of the mucosal immune response by sampling antigens and translocating them to underlying lymphocytes and antigen-presenting cells. In addition, M cells represent a site of entry for opportunistic pathogens such as Shigella, Salmonella, and HIV. Our laboratory has used a combination of stereo, wide-field, and confocal fluorescent microscopy and transmission and scanning electron microscopy to demonstrate that the FAE of the Guinea pig and rabbit conjunctiva contain M cells with morphological and functional characteristics similar to those in other mucosae.

Bio

Dr. Tomas Phillips received his B.Sc. in Chemistry from Indiana University-Bloomington, a Ph.D. in Pharmacology from Northwestern University, and did his postdoctoral training in Anatomy & Cell Biology at Harvard Medical School. He is a Professor of Biological Sciences at the University of Missouri. He is also Director of the campus-wide light microscopy imaging facility. In addition to his work on the ocular mucosa, Tom has worked on quick-freezing of synapses, differentiation of intestinal cell lines, intracellular trafficking in transgenic plants and liver cells, and bacterial interactions with mucosal tissues.

A Streamlined Technique to Examine Cell monolayers by means of Correlative Light and Transmission Electron

Microscopy

Dr. Barbara Armbruster
Hitachi High Technologies America Inc.

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Abstract

A CLEM protocol is described for embedding cell monolayers on gridded glass bottom live imaging dishes after imaging transfected GFP-tagged proteins by means of laser scanning confocal microscopy (LSCM). This streamlined, low cost method allows rapid EM processing without equipment beyond what is standard for LSCM and TEM labs. LSCM imaging and specimen preparation for TEM are completed in the same culture dish without transfer of samples. The method is extremely useful for GFP-labeled organelles in culture and could conceivably be applied to structure/function studies of organelle trafficking or biogenesis.

Bio

Barbara Armbruster is the Senior Product Marketing Manager at Hitachi High Technologies America, Inc. Dr. Armbruster received her Ph.D. from Duke University and completed postdoctoral fellowships at the Biozentrum, University of Basel and Washington University Medical School. Dr. Armbruster managed the TEM lab at the Central Analytical Facility of Monsanto Company before accepting product manager positions with Gatan and JEOL, Inc.. An imaging specialist with a varied background in biological and materials science transmission electron, scanning probe and light microscopy, Dr. Armbruster is an expert in low temperature microscopy and digital imaging by means of transmission electron microscopy.

2014 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

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) _____

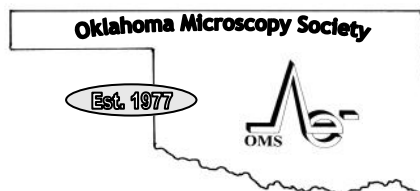
Professional (\$15.00) _____

Student (\$5.00) _____

Amount Enclosed: _____

Please enclose a check for one year's dues (July 1, 2014 - June 30, 2015) made out to:
"OMS" or "Oklahoma Microscopy Society" and mail to:

**Scott Russell, Secretary/Treasurer, OMS
Dept. of Microbiology and Plant Biology
University of Oklahoma
770 Van Vleet Oval
Norman, OK 73019
Email: srussell@ou.edu**



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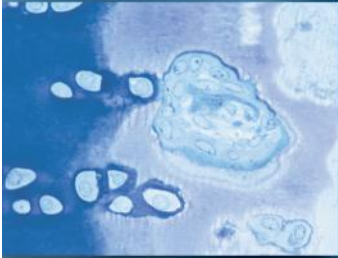
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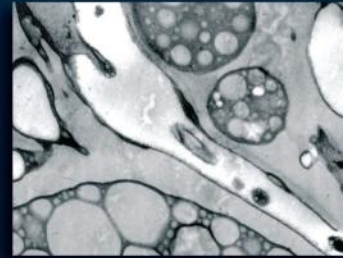
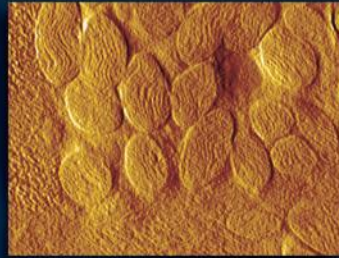
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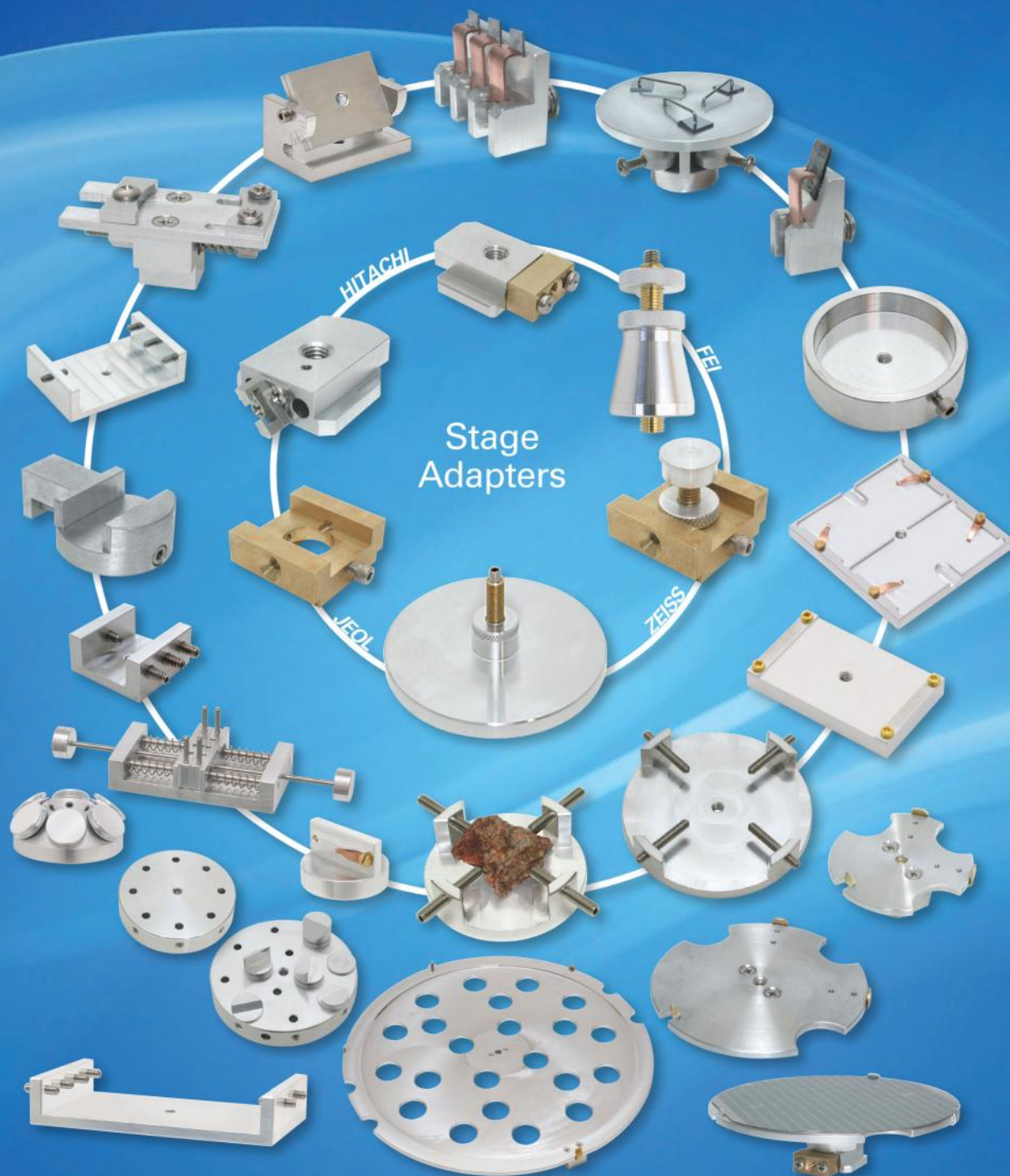
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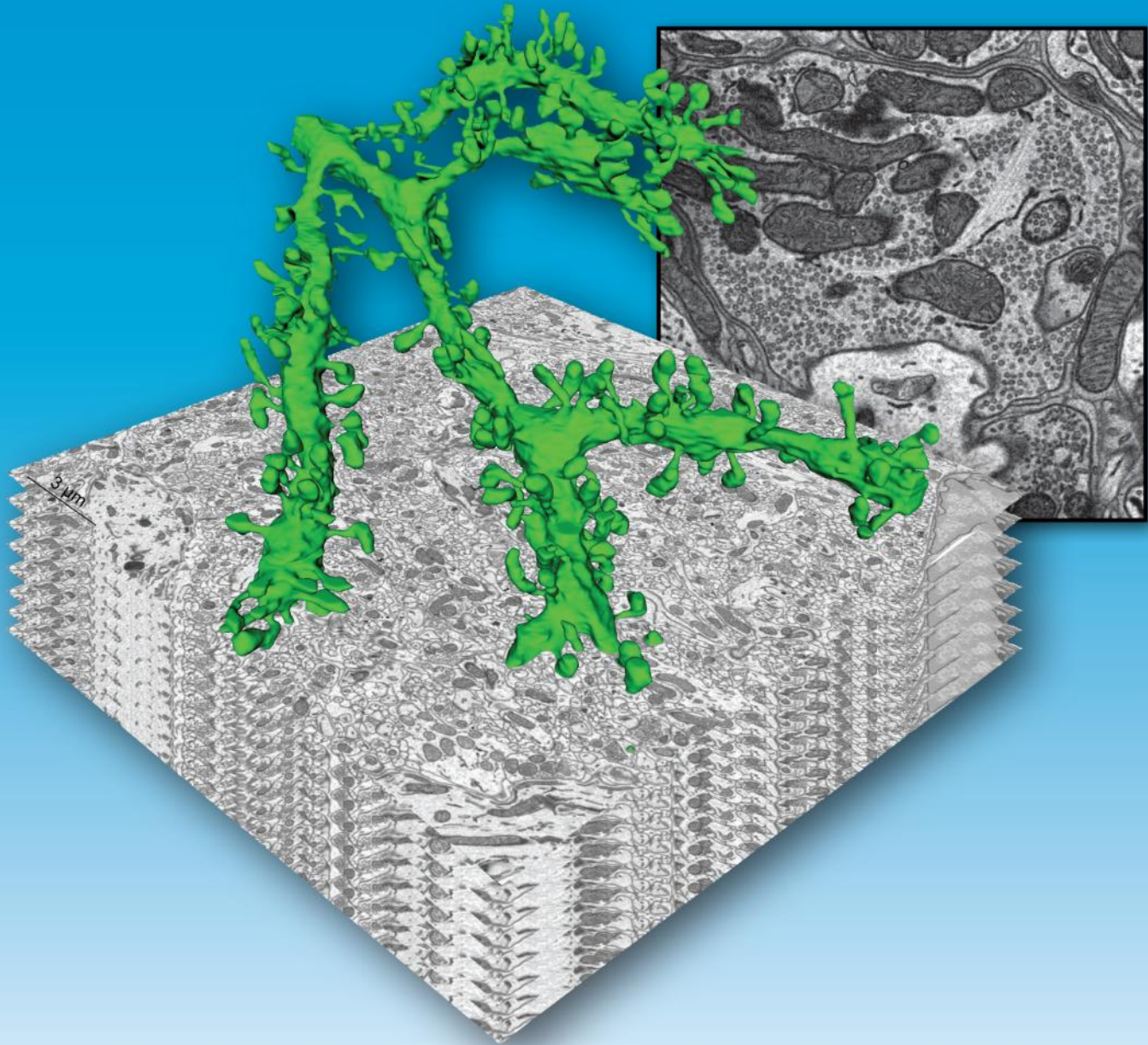
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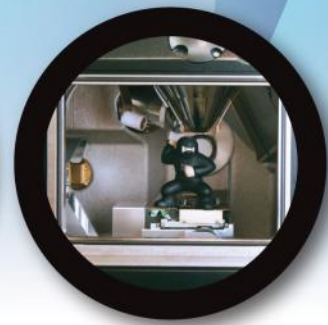
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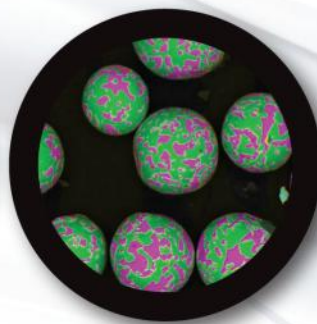
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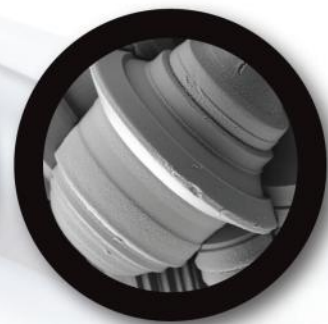
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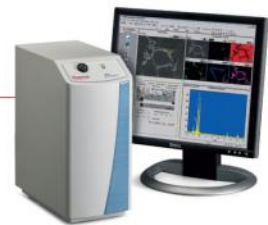
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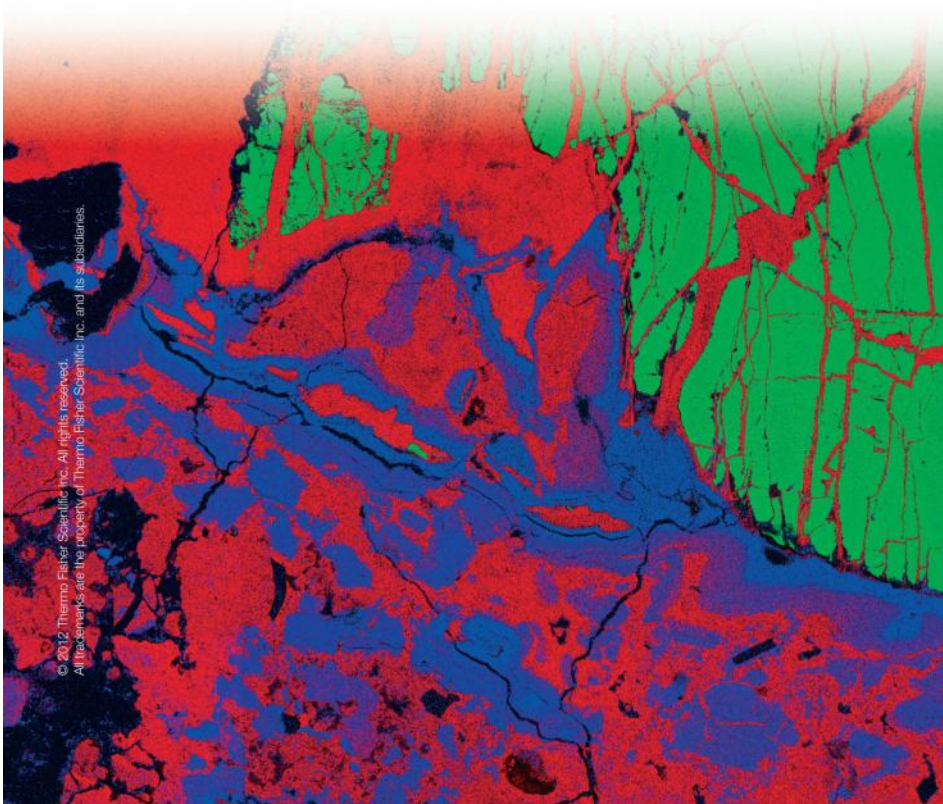
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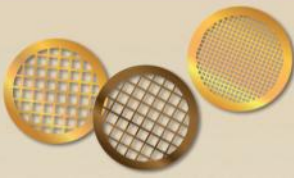


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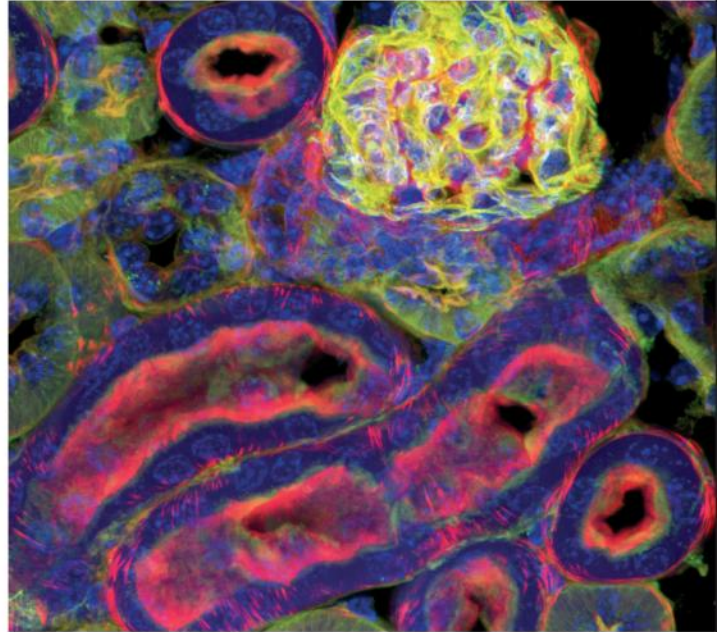
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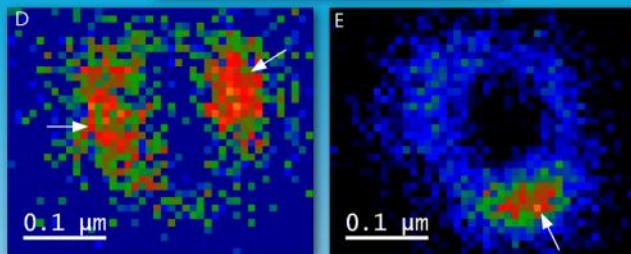
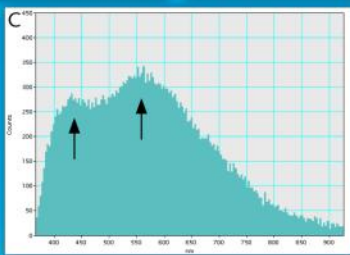
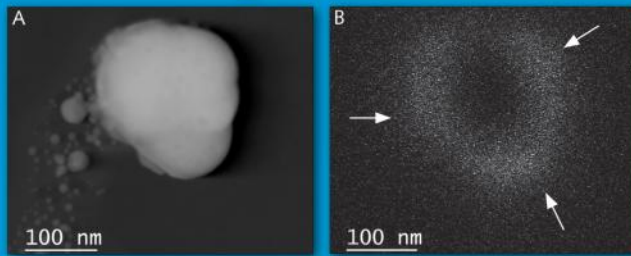
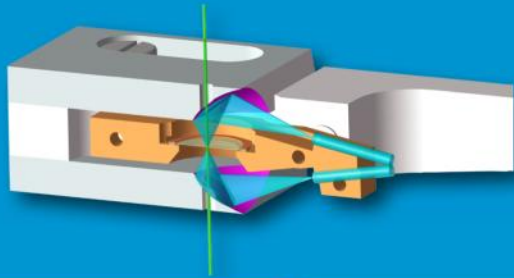
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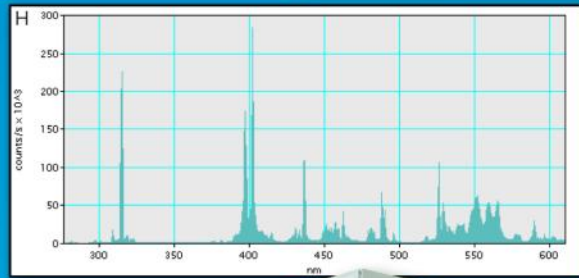
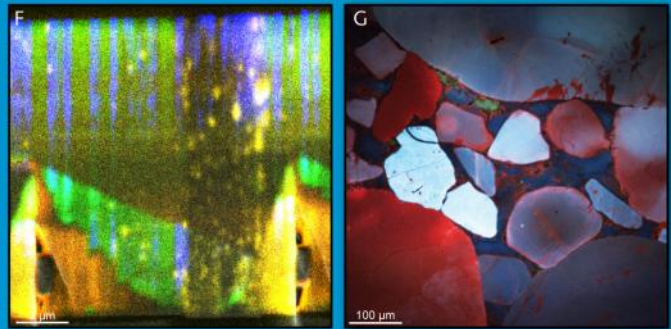
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Cathodoluminescence for SEM, and now for TEM

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Top Image: Schematic cross section through the Vulcan™ holder showing the specimen region and top and bottom collection mirrors (mirrored surface shown in purple). An electron beam (green) stimulates the specimen to emit photons (blue) which are focused by the collection mirrors into optical fibres situated away from the specimen region. Bottom Images A-E: CL study of colloidal silver nanoparticle; A) HAADF image; B) panchromatic CL image (acquired simultaneously to the HAADF image) displaying three "bright" resonance nodes (indicated by arrow markers); C) cathodoluminescence spectrum with two peaks corresponding to spectrally discrete resonance modes at 430 and 510 nm; D) and E) cathodoluminescence band pass images at 430 and 550 nm ±40 nm extracted from parent spectrum-image showing resonance modes are separated spatially and spectrally.



Images F-H: F) GaN film in cross section imaged with Gatan MonoCL4™ CL imaging and spectroscopy system. Composite image of stacking fault, threading dislocation, point defect and band gap luminescence. Temperature = 6 K; G) quartz arenite polished section cathodoluminescence image prepared using the Gatan Iion™ and imaged with Gatan ChromaCL2™ imaging system. Image courtesy of Dr. J. Schieber, Indiana University; H) Cathodoluminescence spectrum from lanthanide doped yttrium aluminium garnet single crystal acquired at room temperature. Multiple spectral features corresponding to various Eu³⁺ d to f orbital electron transitions observed. Bottom image: MonoCL4™ Elite CL imaging and spectroscopy system.

Vulcan
Cathodoluminescence Detection and Analysis for Scanning TEMs

MonoCL4
Cathodoluminescence Imaging and Spectroscopy System for the SEM

ChromaCL2
Live Color Cathodoluminescence Imaging in the SEM



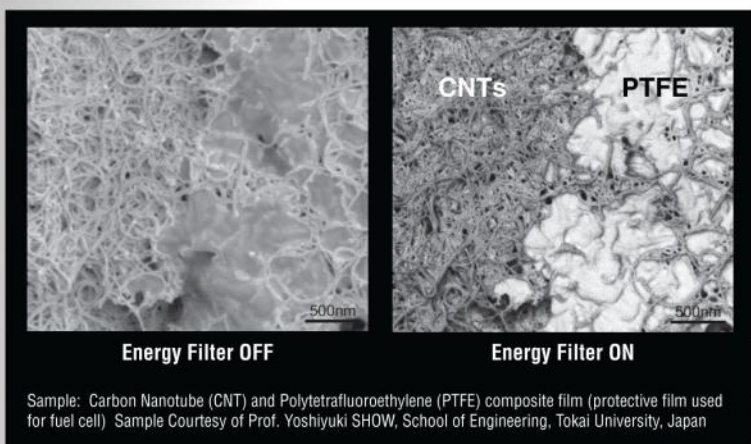
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Sample: Carbon Nanotube (CNT) and Polytetrafluoroethylene (PTFE) composite film (protective film used for fuel cell) Sample Courtesy of Prof. Yoshiyuki SHOW, School of Engineering, Tokai University, Japan

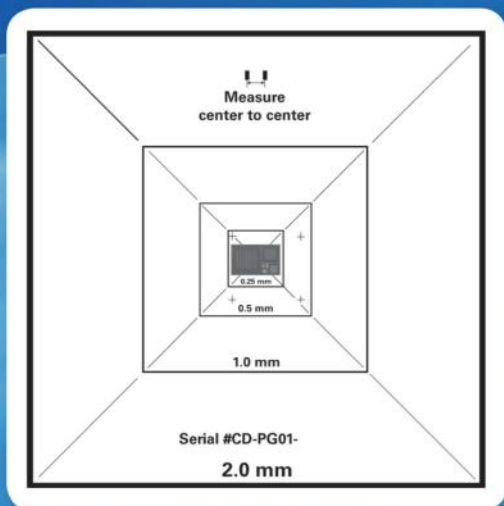
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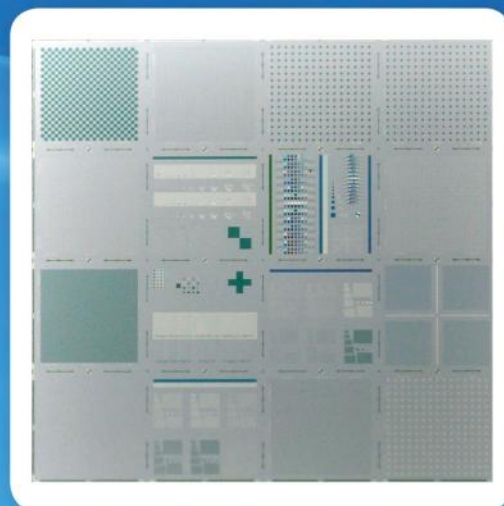
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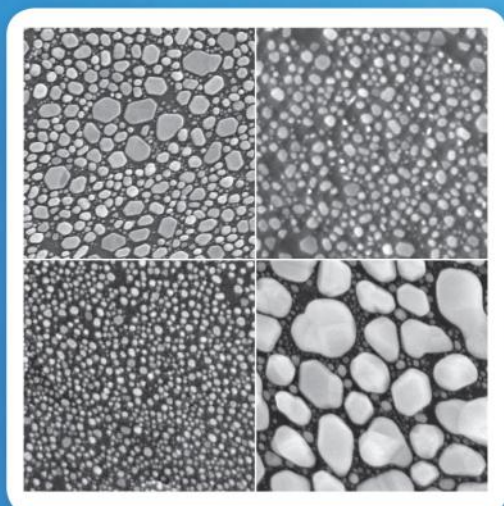
SEM CALIBRATION STANDARDS



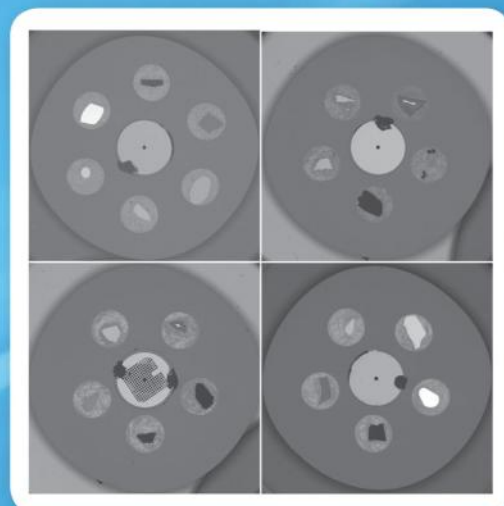
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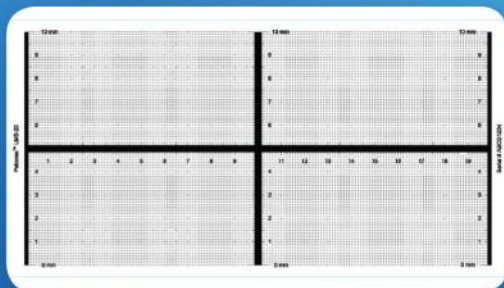
Metrochip Microscope Calibration Target



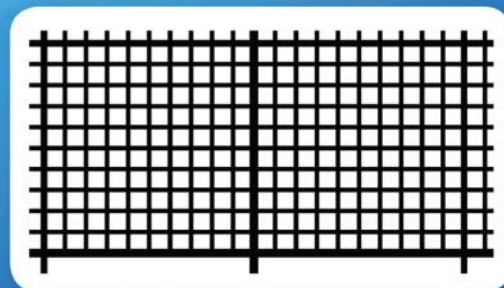
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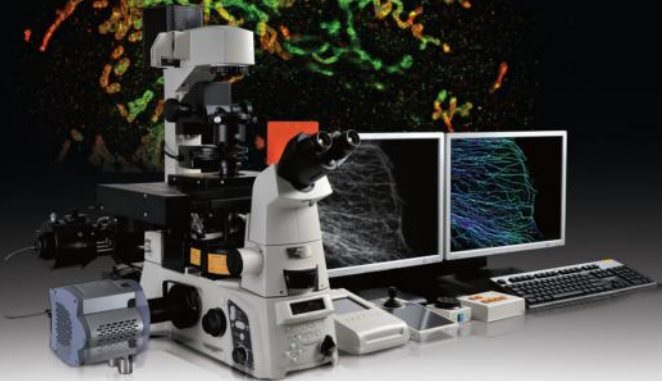
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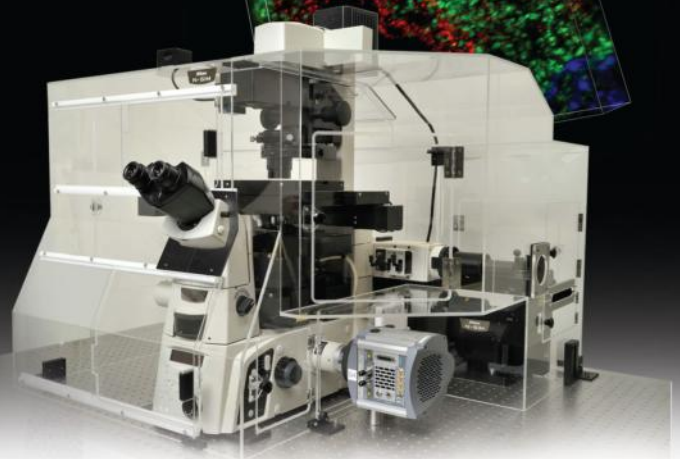
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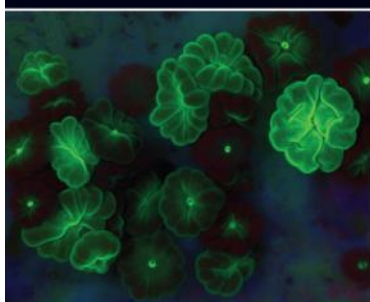
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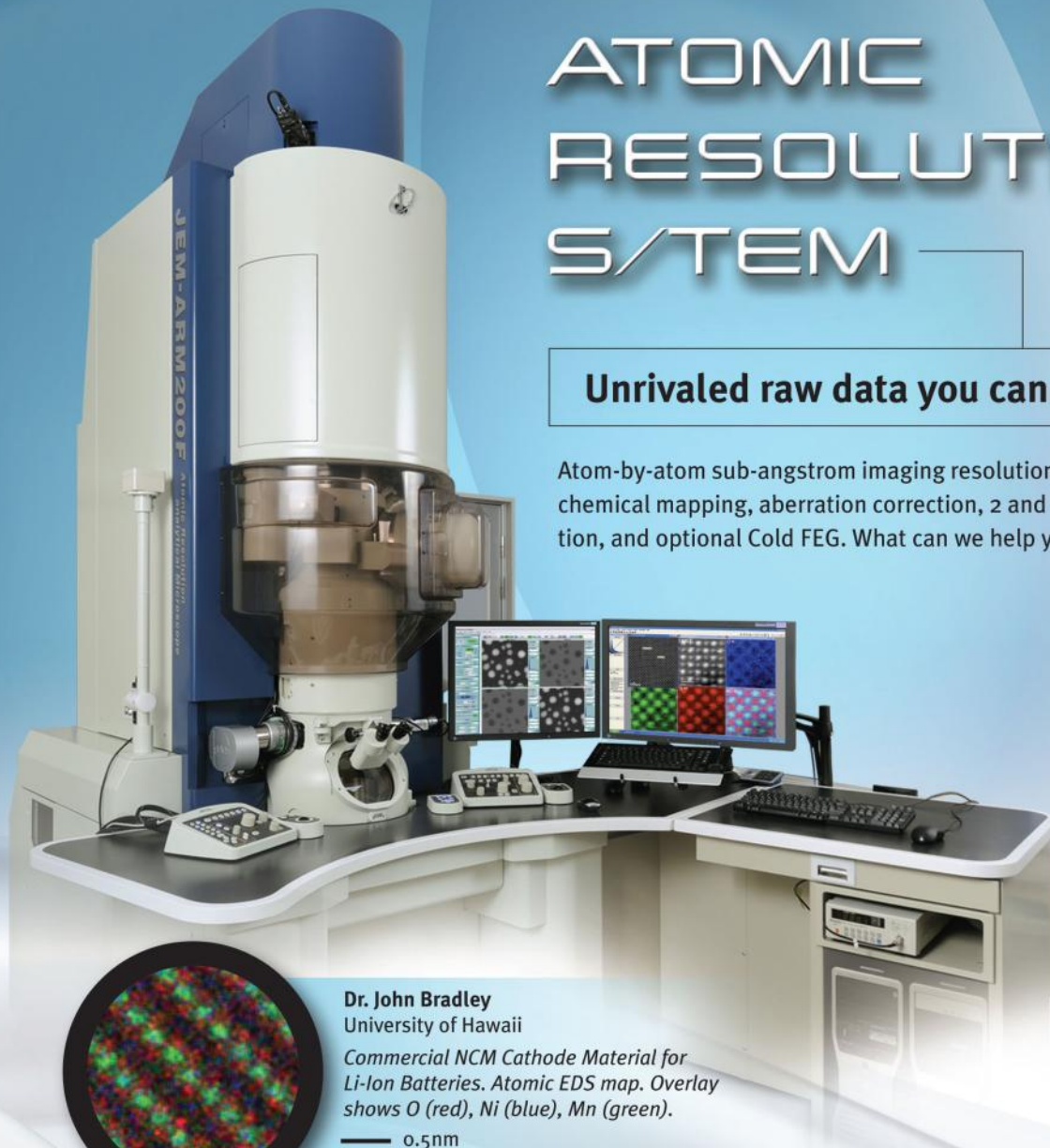
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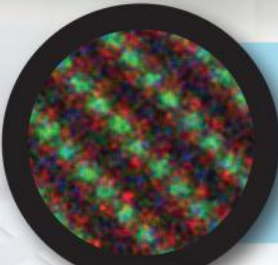
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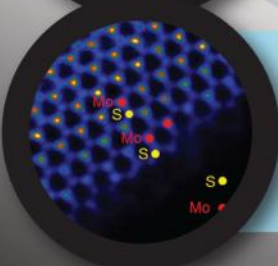
— 0.5nm



Dr. Miguel Jose Yacaman
University of Texas, San Antonio

Sample provided by Tour Lab, Rice University
Chiral Nanotube with parameters $n=10$ and $m=4$ (simulated and experimental)

— 0.5nm



Dr. Moon Kim
University of Texas, Dallas

STEM HAADF image of transferred MoS₂, showing Mo and S atom positions and their 2H stacking sequence.

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