

A Publication of the Southern California Section of
the American Chemical Society

VOLUME LXXIX/No. 7

NOVEMBER/DECEMBER 2024

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SCIENCE AT SCHRÖDINGER

Friday, November 15 • 3:00 - 4:00 PM

A virtual seminar presented by

Dr. Katherine Bay, Senior Scientist at Schrödinger

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WE WISH YOU ALL THE BEST
FOR THE

HOLIDAY SEASON

AND A HAPPY NEW YEAR!



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SCALACS

A Publication of the Southern California Section of the
American Chemical Society

Volume LXXIX

NOVEMBER/DECEMBER 2024

Number 7

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NOTICE:

DISCONTINUING PRINT VERSION OF THE SCALACS MAGAZINE

Beginning **January 2025**, the *SCALACS Magazine* will be going 100% digital as the default delivery mode. *SCALACS Magazine* has been available in digital form since 2010, but we continued to send print issues to a subset of members. If you are currently receiving a printed version of the *SCALACS Magazine* and wish to continue receiving the *SCALACS Magazine* in this form, please e-mail office@scalacs.org by **November 15, 2024**.

The upcoming January/February 2025 and subsequent issues of *SCALACS Magazine* will be published digitally and posted on our website at scalacs.org. This will be a PDF file where you can view online or download to your device.

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CHAIR'S MESSAGE



Hello everyone,

This past year has gone by quickly and not without a lot of stress. I want to start by thanking everyone who has helped make my year as Chair run smoothly and made our section a place to learn and participate in all things chemistry. I am indebted to our Board of Directors, Councilors, members of the Executive Committee, and members of different subcommittees for devoting their time to SCALACS. Also, thanks are due to all members of the section for their kind and generous support. It is our honor to have recognized Professor Sarah H. Tolbert of the University of California at Los Angeles, who won the 2023 Tolman Award, and Krishna Kallury, who won the 2023 Agnes Ann Green Service Award for his dedication to the local section. I especially want to thank Chair-Elect Veronica Jamarillo for stepping up and organizing the ACS Special Awards at the Regeneron International Science and Engineering Fair (ISEF) this year as well as presenting the Tolman Award to Prof. Tolbert at the Tolman Award dinner.

Speaking of the Tolman Award, the Southern California Section and the Tolman Award Committee are now seeking nominations for the 2024 award. There is no official nominating form for this award, and nominations are accepted from any member of this section or of neighboring sections. The nomination package should include:

- an up-to-date curriculum vitae or resume of the candidate
- no more than 5 letters of support from colleagues in the profession describing the candidate's major achievements
- if the candidate is being considered for outstanding teaching, no more than 5 letters of support from former students should be included.

Please submit nomination packages electronically to the Co-Chairs of the Tolman Committee at office@scalacs.org. Rather than submitting copies of publications, a list of representative publications would suffice. Inquiries should be directed to the Chairpersons via email at office@scalacs.org.

Our special salute of honor goes to our 2024 Senior Scientists who completed 50, 60, and 70 years of membership in the American Chemical Society for their outstanding service and selfless activities spanning such a long period. See the April issue of the *SCALACS Magazine*.

I would like to recognize the hard work of Ms. Barbara Belmont, our Secretary/Treasurer, for supporting me and the Section throughout my Chairpersonship - she was a consistent source of information and support, and our high school teachers' team led by Dr. Gerald Delker for conducting the Southern California Section Chemistry Olympiad Examinations and the respective programs efficiently. I am honored and privileged to work with these wonderful people, who are always diligent to offer their support when asked.

(Continued on page 2)

Call for Nominations for the 2024 Richard C. Tolman Medal

The Tolman Medal is awarded each year by the Southern California Section of the American Chemical Society in recognition of outstanding contributions to chemistry. These contributions may include achievements in fundamental studies, achievements in chemical technology, significant contributions to chemical education, or outstanding leadership in science on a national level. The nominee need not be a Southern California resident; however, most of the award-related accomplishments must have been made in this area.

The Southern California Section and the Tolman Award Committee are now seeking nominations for the 2024 award. There is no official nominating form for this award and nominations are accepted from any member of this section or of neighboring sections. The nomination package should include:

- an up-to-date curriculum vitae or resume of the candidate
- no more than 5 letters of support from colleagues in the profession describing the candidate's major achievements
- if the candidate is being considered for outstanding teaching, no more than 5 letters of support from former students should be included.

Please submit nomination packages electronically to the Chair of the Tolman Committee at **office@scalacs.org**. Rather than submitting copies of publications, a list of representative publications would suffice.

The deadline for receipt of nominations is **November 15, 2024**. Inquiries should be directed to the Chairperson via email at **office@scalacs.org**.

A list of winners listed here demonstrates the caliber of awardee sought by the committee: https://scalacs.org/?page_id=20



(Continued from page 1)

My very sincere thanks are due to our office team led by Ms. Jenneva Guzman, Ms. Peggie Chan, and Ms. Danielle Fazzi (Huntington Association Management) for their prompt and efficient administrative services, SCALACS Magazine preparation, arrangements for Zoom lectures, symposia, and various programs. Dani has kept me on track all year long!

All the best,
Richard Kidd
Chair, SCALACS

2024 NCW ILLUSTRATED POEM CONTEST PICTURE PERFECT CHEMISTRY

Thank you to all who have submitted your entries. SCALACS received 30 entries from students in kindergarten through 12th grade. Winners will be notified by email and will advance to the National Illustrated Poem Contest for a chance to be featured on the ACS website and to win prizes!





2025 HIGH SCHOOL CHEMISTRY OLYMPIAD

Teachers, if your students are interested in participating in the 2025 USNCO exams, they must register with ACS by completing the **online registration form** on ACS website by January 17, 2025. Completion of this form does not guarantee participation in the program. Registration opens November 15, 2024.

Registration and more information can be found at the USNCO website below:
<https://www.acs.org/education/olympiad.html>

Once registration closes, a \$10 registration fee per student is required. The SCALACS office will send you a payment link via email. If you are a teacher registering your class, you can submit payment for the total number of participating students.

2025 IMPORTANT DATES

Schedule is subject to change. All changes will be posted on the USNCO website.

January 17, 2025

March 1-23, 2025

April 5-13, 2025

June 1-14, 2025

July 5-14, 2025

Student registration closes

Local Exam

National Exam

Study Camp

International Chemistry Olympiad

2025 ELECTION Vote for SCALACS Section Officers

The 2025 SCALACS election ballot was sent out through the Election Buddy system on October 16 to all SCALACS members. If you did not receive the email invitation to vote, please check your spam folder or contact Danielle Fazzi (office@scalacs.org) to receive a copy of your voting link.

Please cast your vote and support the section through the ballot. The deadline is November 24, 2024. We appreciate your participation in the SCALACS 2025 election process.

Those who are interested to volunteer in our section's activities, please email Danielle Fazzi at office@scalacs.org.

Our sincere appreciation to all the volunteers in advance, who are willing to volunteer their time and serve the section.

SUMMARY OF THE CLIMATE CHANGE SYMPOSIUM

September 27, 2024, 2:00-4:00 PM

Presented by:

Prof. Doris Lewis, Suffolk University, Boston, MA and Prof. Shelley Minter, Missouri University of Science & Technology



The event was organized by SCALACS under the LSAC-IP Grant funding and showcased two speakers – Prof. Doris Lewis of Suffolk University, Boston, MA; and Prof. Shelley Minter of Missouri University of Science & Technology. Each of them addressed the topic of Climate Change from divergent angles which complemented each other – educating the public and researching alternate technologies for reducing/eliminating carbon emissions.

Presentation by Prof. Doris Lewis



Doris started off with a fundamental approach that could be understood by elementary/middle school kids as well as general public who are not exposed to science. When coal is burnt to heat a home or in an industrial set up, it consumes oxygen from the air to liberate the greenhouse gas carbon dioxide together with energy. She also briefly touched upon the stretching, bending and wagging motions of this gas and its absorption bands in the infrared. She then explained how a single molecule of octane (gasoline) generates eight molecules of carbon dioxide. This gas absorbs heat and radiates onto the atmosphere causing the climate change and long-term weather problems. She then went on to describe the rainbow colors as applied to light of different wavelengths from the ultraviolet to infrared regions and the energies associated with them. That is how scientists analyze and characterize carbon dioxide and other molecules

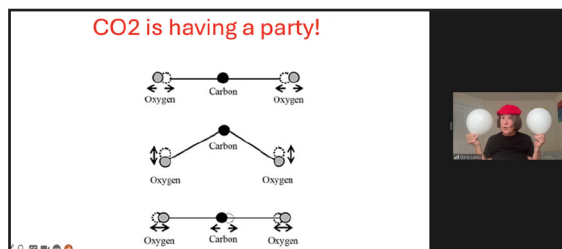
responsible for climate change and also explain global warming.

Doris gave an example of the coal mines in West Virginia where coal is transported by rail and then through the Mississippi river to the whole country. She indirectly touched upon the health effects coal particles caused to these miners. In the same vein, she mentioned photosynthesis in which plants take in CO_2 and convert it into glucose, which could be a remedial measure.

Doris cited some individuals contributing to environmental protection in various administrative capacities. They are Corey Mocka of EPA, North Carolina; Felicia Lucci, Technology Manager, Department of Energy (DOE), Washington, DC; and Doris's daughter Joanne Lewis, Provost's Distinguished Associate Professor of Energy and Environment and Director of the Science, Technology and International Affairs Program (STIA) at Georgetown University's Edmund A. Walsh School of Foreign Service.

Doris spent the last 15 minutes of her seminar describing the contributions of ACS in addressing climate change and remediation. These included National Meetings, programs catering to students and educators, support to Chem Clubs, various committees including one that interacts with Congress, Student Chapters and International Affiliates. Some events such as Earth Day and National Chemistry Week also make significant contributions. Some educational aids such as Chemistry in a Box and Act 4 toolkit were also mentioned.





electrodes and facilitate DET at these electrode surfaces for ATP-independent nitrogenase electrochemistry. This approach is effective for directly measuring the redox potentials of complex nitrogenase cofactors under biologically pertinent conditions. However, the amount of electrochemically active wired oxidoreductase is restricted to less than a monolayer of enzymes in the correct orientation to ensure the active site is within electron tunneling distance with the electrode surface. The comparatively low amount of electrochemically available nitrogenase on the electrode surface lowers the overall performance of the DET systems for bio-electrosynthesis applications. Introducing freely diffusable redox mediators for mediated electron transfer (MET) could enhance the overall electrochemical performance because the ET becomes independent of the electrode surface distance and the orientation of nitrogenase, allowing a larger amount of immobilized nitrogenase to be active. Cobaltacene-functionalized polyallylamine was used as the redox mediator. In all these studies, cyclic voltammetry and squarewave voltammetry were used to study the electrochemical redox processes. The issue is the inadequate supply of nitrogenase using a genetically engineered process with a cyanobacterium.

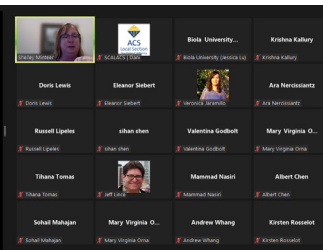
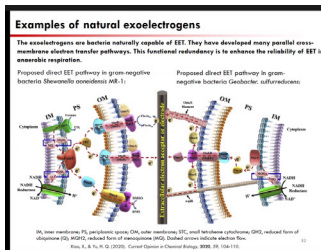
She inspired students to become a “Super Power” with STEM education and research and become ambassadors in fighting climate change and contribute to the country and the world in creating a sustainable earth.

Presentation by Prof. Shelley Minteer

Shelley’s seminar focused on one industrial product, ammonia, which is used in the manufacturing industries producing fertilizers, plastics, explosives, fabrics, dyes, and other chemicals, in pharmaceuticals, and in deodorizing. Cleaning and purifying water supplies are currently made by reacting hydrogen (from natural gas) with nitrogen from air using iron catalyst at 400-450°C and 200 atmospheric pressure. Coal is used as the heating agent. This generates CO₂ which is estimated to contribute to about 3% of the total pollution.

Shelley then focused on the electrification of ammonia synthesis to make the process greener and more sustainable. She took a cue from biology, which shows that nitrogen conversion into ammonia is catalyzed by a specialized enzyme called ‘nitrogenase’ produced by certain bacteria. This enzyme is a complex metalloprotein consisting of two components, an iron protein and a molybdenum-iron protein, which work together to utilize ATP energy to reduce nitrogen to ammonia. The attractive feature is that this biocatalytic reduction occurs at room temperature and normal atmospheric pressure. However, no company offers this enzyme on the market and Shelley had to rely on a research laboratory to procure the enzyme. In addition, it takes 16 moles of ATP per mole of nitrogen for nitrogenase catalyzed reduction. Her group then studied methyl viologen as a mediator which works but was not cost-effective.

Shelley then investigated the strategy of transferring the electrons to the MoFe protein by direct electron transfer (DET). Pyrene-functionalized linear polyethylenimine was used to immobilize the MoFe protein onto graphite



Lastly, Shelley touched on the generation of chiral amines and amino acids using her biocatalytic electrochemical approach with omega-transaminase as the enzyme. She pointed out that traditional organic chemists use oxidizing and reducing agents for chiral synthesis, but her approach is greener and sustainable.

For a detailed account on the work of Shelley’s group, on electrochemical synthesis and greener ammonia production using biocatalysts, please see the following references:

Shelley Minteer et al, *J. Am. Chem. Soc.* 2020, 142, 4028; 2019, 141, 17150; *ACS Catalysis* 2020, 10, 6854; *Angewandte Chemie International Edition*, 2020, 39, 17, 16511.

SUMMARY OF THE HISPANIC HERITAGE MONTH SEMINAR AN UNLIKELY CAREER IN SCIENCE & ACADEMIA

October 3, 2024 • 3:00 to 4:00 pm

Presented By

Professor Benjamin Garcia
Washington University, St. Louis, Missouri

An unlikely career in science and academia

GARCIA LAB

Benjamin A. Garcia, PhD., FRSC
Raymond H. Wittcoff Distinguished Professor and Head
Department of Biochemistry and Molecular Biophysics
Washington University School of Medicine, St. Louis, MO

Benjamin Garcia
Krishna Kallury
Jeferson Valencia
Clarita Joung
Luis fernando M...
Manju Venugopal

ACS
Local Section
Southern California

The seminar was organized by SCALACS under an LSAC/DEIR grant awarded in early 2024. The grant proposal, submitted by the Southern California and New York ACS Sections and the Nigerian International Chemical Sciences Chapter, consisted of celebrating the history and contributions of African American, Hispanic, and Nigerian communities/scientists. The seminar coincided with the National Hispanic Heritage Month celebration from September 15 to October 15, 2024. Prof. Garcia, a successful Hispanic scientist, was showcased as a role model for underrepresented community students to take up STEM education and research.

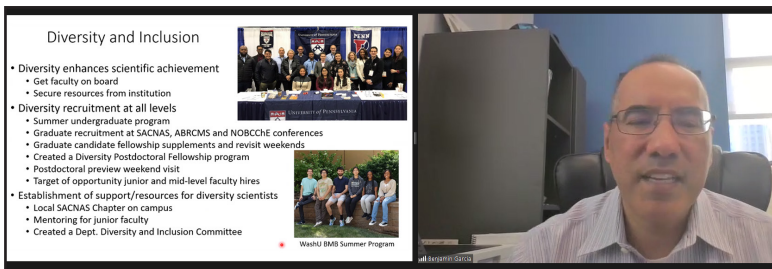
In the early part of the presentation, Benjamin recounted his educational journey starting from his schooling in La Mirada, CA, in which he ended up with a “D” in Chemistry. He enrolled the Cyprus Community College and continued to fare below average in Chemistry and other STEM subjects. He attributed it to being the first-generation kid belonging to an underrepresented family. He then switched to UC Davis and completed his undergraduate degree in five years. The tide turned when he joined the group of Prof. Carlito Labrella with whom he worked on the mass spectrometry of carbohydrates and published his first research paper. He completed his Ph.D. in 2005

under Prof. Donald Hunt on the Proteomic applications of Mass Spectrometry. He worked as a faculty member at Princeton University, then at the University of Pennsylvania; since 2021 he has been at Washington University, St. Louis where he is current the Head of the Department of Biochemistry. He has a spectacular research group with students from all over the world, including Latinx students. His group is one of the leaders in mass spectrometric characterization of nucleic acids and proteins in the world.

He then presented his recent work on histones. Histones are proteins that perform several functions in the body, viz. (a) Chromosome structure: Histones bind to DNA and help give chromosomes their shape; (b) DNA compaction: Histones help organize DNA strands into tightly-packed chromosomes and (c) Gene regulation: Histones help control gene activity through modifications like methylation and acylation. In biology, histones are highly basic proteins abundant in lysine and arginine residues that are found in eukaryotic cell nuclei and in most Archaeal phyla. They act as spools around which DNA winds to create structural units called nucleosomes.

Benjamin went on to describe in detail about his group’s work on mass spectrometric identification and quantification of post

translational modifications of histone. The area of regulation of gene expression and epigenetics in human disease is of great interest to academic researchers as well as pharma companies like Pfizer. Analytical techniques his group employed include HILIC, Reversed-phase and Ion chromatography and advanced mass spectrometric ionization methods such as MALDI and Electrospray and instrumentation like ToF-MS. Traditional approaches consisted of antibody-protein interactions, monoclonal modification and methylation. His group probed histone modifications, histone codes, post-translational modifications (PTM) dynamics and nucleosomal tail protected by the dimer H4.



Key points about Benjamin's histone mass spectrometry research:

- Comprehensive analysis of histone modifications:
His work often focuses on identifying and quantifying multiple histone modifications occurring simultaneously on a single histone protein, revealing the "combinatorial histone code."
- Methodological advancements:
Benjamin has contributed significantly to developing new mass spectrometry techniques for histone analysis, including the use of mild performic acid oxidation to improve peptide separation and identification.
- Application to biological questions:
His research has been used to investigate the roles of histone modifications in various cellular processes like gene regulation, development, and disease states.



I am grateful for the opportunity for my students to interact with Dr. Garcia during the National Hispanic Heritage Month Virtual Symposium hosted by the California Section of the American Chemical Society (SCALACS).

Dr. Garcia's journey to becoming the Head of the Department of Biochemistry and Molecular Biophysics at Washington University School of Medicine in St. Louis was inspiring.

Students were impressed by his research on recent advancements in high-throughput quantitative mass spectrometry for analyzing histone post-translational modifications (PTMs) and chromatin structure. It was motivating to see high school students interacting with a scientist.

*~Clarita (Sunhwa) Joung,
Science Teacher at Pacifica Christian School*

Outside the Lab Contributions Towards Promotion of DEIR

Benjamin recruits graduate students and postdoctoral workers from the underrepresented communities. He made presentations at several ACS National Meetings on the topic of "A Diversity Path to Success in Analytical Chemistry". He has also made presentations on "Diversity and Inclusion in Science" by highlighting the contributions of successful scientists from the underrepresented communities and made a collection of such scientists for publication in the Analytical Chemistry journal.

(Continued on page 8)

SUMMARY OF THE SEMINAR IN CELEBRATION OF THE NATIONAL CHEMISTRY WEEK

MORE THAN PRETTY PICTURES
October 23, 2024 • 3:00 - 4:00 PM

Presented by
Felice Frankel



In her own words, Felice is not an artist. She holds a bachelor's in Biology from Brooklyn College. While working as a technician at Columbia University Cancer Research Laboratory, her passion for understanding science led her to create architectural photographs for a number of years. In 1991, she was awarded a Loeb Fellowship at Harvard's Graduate School of Design. She visited the lab of world-renowned chemist George Whitesides and made an image of his work which appeared on the cover of the Science magazine. George encouraged her to pursue "the great work nobody is doing". That eventually landed her at MIT and her career as a science photographer took off. She is more comfortable using the word "design" instead of "art" and her main goal is to communicate science and engineering through pictures.

Some of the observations she made while illustrating her work are:

- Images communicate science in a way words cannot convey.
- Pictures draw the attention of everybody and their curiosity to understand them lead to questions and understanding what they are trying to communicate.
- People are less afraid to ask questions when they see images. Most have taken pictures and can even speak a photographic "language." You can take notice of color, for example, and wonder if it suggests meaning, as for example, why is that black hole picture orange?
- Tools we use affect what we see – a point she illustrated by elaborating on flatbed scanner, editing a picture, smartphone cameras, use of light and shadows, use of hand-sketching and use of AI.
- Even slight changes can sometimes misrepresent the science behind the image, researchers say, or eliminate information inherent in the origin.
- Textual explanations are key to achieving the ultimate goal of photographs: communicating the science. In publications and exhibitions, detailed captions that explain what is pictured and how images were made must be included.

(Continued from page 7)

Benjamin is a member of the American Society for Mass Spectrometry (ASMS) Inclusion Committee and highlighted the faces of Hispanic and Latinx students in the Mass Spectrometry group.

For further information on this topic, refer to:

(1) From the journal "Analytical Science:" Recalibrating Representation in MS

The creators of Hispanics and Latinx in Mass Spectrometry discuss the challenges and bias their community faces – and why representation is key.

(Panel Discussion summary on the proceedings at ASMS, by Benjamin Garcia, Livia Schiavinato Eberlin, Facundo Fernandez and Francisco Fernández-Lima.)

(2) ASMS Feature: "Faces of Mass Spectrometry," January 2024

For a detailed account of Prof. Garcia's work on Histones, please see the following reference:

1. American Society of Mass Spectrometry 2023, 34, 2508-2517
2. Genomic Research 2019, 29, 978-987
3. J. Chemical Communications 2023, 59, 12499-12502

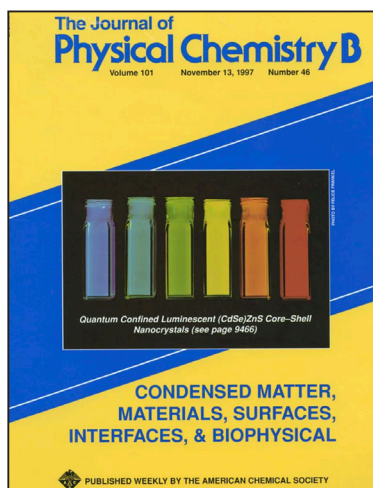
Basically, researchers think that we see what they see. They make a picture, and because they've been working on the material for so long, it becomes part of their being. They assume that we are looking at what they want us to look at — and that's generally not the case. It's very hard to take a step back and be a first-time viewer, and it's a real issue.

B. O. Dabbousi, J. Rodriguez-Viejo, F. V. Mikulec, J. R. Heine, H. Mattoussi, R. Ober, K. F. Jensen and M. G. Bawendi, “(CdSe) ZnS Core-Shell Quantum Dots: Synthesis and Characterization of a Size Series of Highly Luminescent Nanocrystallites,” Journal of Physical Chemistry B, Vol. 101, No. 46, 1997, pp. 9463-9475 - Cover Image

Examples from Felice's presentation:

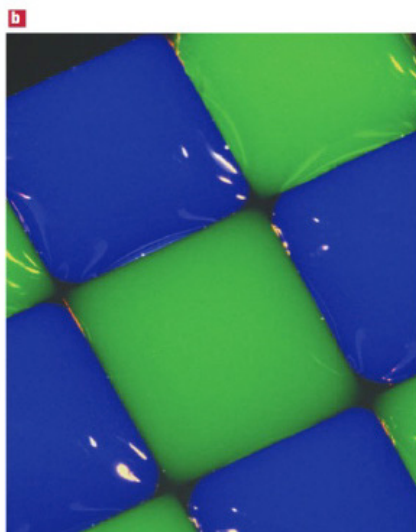
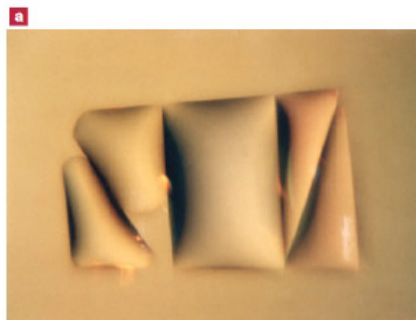
Proceedings of the National Academy of Sciences (PNAS2016, vol.113, 1528-1533 by Dou et. al.) - Cover Image

Explanation: Pictured are crumpled paper balls on a surface. Xuan Dou et al. developed aggregation-resistant particles of crumpled graphene resembling miniature paper balls that could self-disperse in lubricant oil and were better than other carbon-based lubricant additives at reducing friction and wear. Base oil containing less than 0.1% crumpled graphene by weight outperformed a fully formulated commercial lubricant, suggesting that crumpled graphene could be used to develop superior lubricants. See the article by Dou et al. on pages 1528–1533. Image courtesy of Felice Frankel (Massachusetts Institute of Technology, Cambridge, MA).



Explanation: We report a synthesis of highly luminescent (CdSe) ZnS composite quantum dots with CdSe cores ranging in diameter from 23 to 55 Å. The narrow photoluminescence (fwhm ≤ 40 nm) from these composite dots spans most of the visible spectrum from blue through red with quantum yields of 30–50% at room temperature. We characterize these materials using a range of optical and structural techniques. Optical absorption and photoluminescence spectroscopies probe the effect of ZnS passivation on the electronic structure of the dots. We use a combination of wavelength dispersive X-ray spectroscopy, X-ray photoelectron spectroscopy, small and wide angle X-ray scattering, and transmission electron microscopy to analyze the composite dots and determine their chemical composition, average size, size distribution, shape, and internal structure. Using a simple effective mass theory, we model the energy shift for the first excited state for (CdSe) ZnS and (CdSe) CdS dots with varying shell thickness. Finally, we characterize the growth of ZnS on (CdSe) cores as locally epitaxial and determine how the structure of the ZnS shell influences the photoluminescence properties.





Improving an image by redesigning:

a. Patterned hydrophobic lines, 3-4 mm long, on a self-assembled monolayer (SAM) stop water from further wetting the surface. This image was made by the researchers for their notebook and used in the published article. (Image reprinted with permission from ref. 6. Copyright (1992) AAAS).

(Image reprinted with permission from ref. 6. Copyright (1992) AAAS).

b. At my suggestion, the sample was redesigned to further communicate the significance of the lines.

In addition by colouring the water before dropping it on the SAM, the purpose of the investigation is reinforced that the lines are preventing the water from blending together. Note, as well, the not-so-trivial issue, that the image in **b** is in focus while the other is not. Image **b** was used on the cover of the journal. (Image by F. Frankel.)

Gang Fan, Pris Wasuwanich, Mariela Rodrigues-Ortero and Ariel Furst, "Protection of Anaerobic Microbes from Processing Stressors Using Metal-Phenolic Networks," *Journal of the American Chemical Society*, Vol.144, 2022, pp. 2438-2443.



Cover Image: Self-assembled metal-phenolic networks (MPNs) can be formed on the surface of microbes. These coatings were found to protect next-generation microbial biotherapeutics from harsh processing conditions and oxygen exposure. (Cover image and design: Felice Frankel)

Explanation: The gut microbiome is essential to maintain overall health and prevent disease, which can occur when these microbes are not in homeostasis. Microbial biotherapeutics are important to combat these issues, but they must be alive at the time of delivery for efficacy. Many potentially therapeutic species are anaerobes and thus are difficult to manufacture because of the limited efficacy of existing protective methods, making their production nearly impossible. We have developed a self-assembling cellular coating to improve the viability and stability of the next-generation biotherapeutic, *Bacteroides thetaiotaomicron*. We show protection from both harsh processing conditions and oxygen exposure, even in the absence of canonical cryoprotectants. This advance will increase the range of microbes that can be stably manufactured and facilitate the development of emerging strains of interest by ensuring their postproduction viability.

THANK YOU TO ALL 2024 VOLUNTEERS

The many programs and services that this Section provides are accomplished by the volunteers of the various committees. We would like to acknowledge and thank all of you who volunteered your time and talents during this year.

Chair:

Richard Kidd

Chair-Elect:

Veronica Jaramillo

Secretary/Treasurer:

Barbara Belmont

Elected Members of Executive Committee:

Jessica Lu
Lucky Morales
Eric Kuenstner
David Hanna
Benjamin Ku
Sahar Roshandel
Aaron Moment
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Barbara Belmont
Michael Morgan
Alexandros Oxyzolou
High School Olympiad:
Gerald Delker, Chair
Barbara Belmont
Caroline Morgan
Michael Morgan

Educational Affairs Committee:

Michael Morgan, Chair
Richard Erdman
Caroline Morgan
Larry Walker

Nominations & Elections:

Brian Brady, Chair

Senior Chemists:

Krishna Kallury
Eleanor Siebert
Barbara Sitzman

Tolman Award:

Trevor Hayton, Chair
Richard Kidd

Speakers/Volunteers/Olympiad Teachers/Contributing Authors:

Stephanie Cheung
Angelina Lin
Naomi Xia
Isaiah Gutierrez
Lucky Morales
Jessica Lu
Sunhwa (Clarita) Joung
Susanne Ahola
(Fern School, Torrance)
Claire House (Fern School)
Alamelu Arunachalam
Veronica Jaramillo
Glendy Ramirez
Michael Morgan
Tyler Molton
Harishree Khunt
Kwabene Bediako
Sarah Tolbert
Doris Lewis
Shelley Minter
Felice Frankel
Katherine Bay
Emma Kuczkowski
Grace Sun
Peter Shin
Barry Vella
Antonio Kim
Dusty Rael
Edye Udell
Mark Guevin
Benjamin Ku
Karl Geckle
Sam Finder
Maryceline Espanol
Altair Maine

David Cho
Ryan Casey
Grace Cho Kim
Wonjong Kim
Jeffrey Friesen
Anna Mkrtychyan-Antonyan
Michael Morgan
Christopher Navarette
Tracey Kim
Kristin Fontilea
Brenda Pan
Owen Su
Cynthia Chubbuck
Nathan Cardin
Harold Goldwhite
Keith Orso
Krishna Kallury
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It takes a lot of people's time and efforts to make our programs work. We as a Section and the community at large sincerely appreciate the dedication of these people and invite you to participate if you haven't already! This Section would be nothing without your volunteer efforts.

If you're interested in Section governance or helping with any of our events, please contact our Section Office at office@scalacs.org. We'd love to have you on a committee!

We tried to get everyone on the list. If we missed you, please accept our thanks for a job well done!

HIGH SCHOOL STUDENTS RESEARCH SYMPOSIUM

November 2, 2024 • 9:00 AM - 4:00 PM

Aren't High School Students Too Young To Do Research?

History is rife with prodigious teens doing research that would eventually land them in the annals of history. Sir C.V. Raman, India's first Nobel Laureate in the sciences, was only 16 when he began his experimental research on sound and light. Mathematician Srinivasa Ramanujan was 17 when he independently developed and investigated the Bernoulli numbers and the Euler–Mascheroni constant. Ada Lovelace, often called the world's first programmer, was merely 17 when she began working with Charles Babbage, the father of modern computing.

Why should high school students do research? Because it is exciting, it teaches valuable skills, it makes you understand in depth the topic you are working on, trains you on modern techniques, helps to develop concepts of collaboration and originality, self-motivation and persistence. These are skills that can help you lifelong. Since so few high school students get involved in research, it can set you apart when applying to universities or internships. Beyond uniqueness, it also signals valuable qualities like critical thinking, initiative and self-discipline.

This virtual symposium is a continuation of the SCALACS International High School Symposium sponsored by Lumiere Education which was held in December 2023. This year we are proud to present 23 presentations from very talented high school researchers. The event will be held via Zoom on November 2 from 9 AM to 4 PM. This virtual symposium is made possible with the ACS LSAC-Innovative Projects Grant (IPG). For more information, please visit scalacs.org.

Below is a list of presenters, their high schools, and the title of their presentations.

Student Name	High School Name	Title of Presentation
Grace Sun	Paul Laurence Dunbar High School	My journey through K-12 in pursuit of STEM Education and Research
Katherine Lam	University High School	Novel TMOS-dependent Synthesis of CsPbBr ₃ -SiO ₂ Core-Shell Nanoparticles for Biosensing Applications
Thien-Nhi Nguyen	West Shore Jr/Sr High School	The Effect of Liposomes on Drug Delivery of Ascorbic Acid
Athena Xing	Oxford Academy	A Bibliometric Analysis of Research on the Detection of Epilepsy from Electroencephalogram (EEG) Signals
Angelina Lin	Brentwood School	Algae NanoTextiles: A Sustainable and Versatile Alginate-based Textile Infused With Nanotechnologies
Chloe Lee	IB World School at Plano East Senior High School	Chemical Modification of Acetaminophen to Decrease Liver Toxicity and Enhance Drug Efficacy
Hriday Meka	North Hollywood High School	Targeting NF- κ B in Acute Myeloid Leukemia via Oligonucleotide Therapeutics
Alia Wahban	Hillfield Strathallan College, Hamilton, Ontario	Redefining the Landscape of Hydrogen Safety using Innovative Gasochromic Technology

Student Name	High School Name	Title of Presentation
Anthony Efthimiadis	Oakville Trafalgar High School	Rapid Screening for Major Skin Cancers with Interpretable CNN-Transformer Hybrid Networks, Lesion Evolution Tracking, Trait Identification, and Color Constancy for Improved Generalization in Diverse Populations
Finley Vincent	The Archer School for Girls	The Effects of Epigallocatechin Gallate (EGCG) and Nano-EGCG on Cadmium Chloride and Tetradecanoylphorbol Acetate Induced Cancerous Tumors within a Planaria Model
Lucia Ortega	Francisco Bravo Medical Magnet High School	Prediction of Hippocampal Morphology During Ageing
Yash Devang Bhuvra	Fremont High School	AptaDock: A Molecular Docking Pipeline for Protein and Aptamers
Ramin Sarkar	Gwinnett Sch. of Mathematics, Science and Technology	Treatment Analysis for Alzheimer's Using <i>Caenorhabditis elegans</i> as a Model
Diego Alvarez Gonzalez	Fusion Academy Miami	The effect of dynamic pricing on airline customers
Olivia Saun So	Harvard-Westlake School	Concentration-dependent effects of dietary niacin and NAD ⁺ in longevity, memory, and motor function of flies
Ishaan Mandala	Silver Creek High School	Computational Simulations of Aptamer-Based Modulation of CAR T-Cells Targeting CD25 ⁺ T Cell Malignancies
Paula Jovel & Ayesha Hossain	Francisco Bravo Medical Magnet High School	How Toy Interaction Informs Cognitive and Motor Development in Infants at Risk of Developing Cerebral Palsy.
Abdalmrhan Sheer	Francisco Bravo Medical Magnet High School	Laser-Induced Graphene-Based Sensor for Detection of Subclinical Mastitis
Tanishka Aglave	Strawberry Crest High School IB	Advancing Sustainable Citrus Greening Disease Management: A Comprehensive Eco-friendly Approach for the Management of <i>Candidatus Liberibacter asiaticus</i> using trunk injection of <i>Murraya koenigii</i> derived biological extract and its validation through precision agriculture tools
Vaishnavi Kolluru	Dougherty Valley High School	Human Milk Immune Complexes Isolated Following Pregnancies Complicated by COVID-19 Infection Contain SARS-CoV-2 Nsp13 Helicase and Biologically Active Factors
Srijay Chenna	Charter School of Wilmington	Optimizing the Synthesis of mRNA Therapeutics
Andrew Lee	Yongsan International School of Seoul	Prevention of Phone Scams Through Identification of Distinct Voice Prints
Samuel Azmaien	Gwinnett Sch. of Mathematics, Science and Technology	Neural Network Analysis of MRI Scans for Functional Neurological Disorder Diagnosis

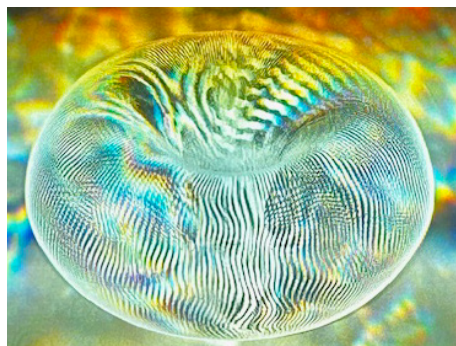
SCALACS Members Enjoyed Immersive Photography Tour

SCALACS members recently had the opportunity of a guided tour of the Getty PST Photography exhibit. The tour highlighted two captivating exhibitions: "Abstracted Light: Experimental Photography" and "Sculpting with Light: Contemporary Artists and Holography." These exhibits showcased the innovative and artistic ways in which light has been manipulated in both photography and holographic art.



SCALACS members at The Getty Center.

A total of eight attendees, including six SCALACS members and two guests, were inspired by the tour. The event also provided a valuable networking opportunity for all participants. Thank you to SCALACS Chair-Elect Dean Veronica Jaramillo for organizing this wonderful tour.



Call for Nominations for the Paul Shin Memorial Outstanding High School Chemistry Teaching Award

If you know of a local high school chemistry teacher who is making a difference, please make the effort to show how important his/her work is to you and the students. Self-nominations from those who feel they fit the requirements are accepted as well. It's teachers like the recipients of this award who make learning chemistry rewarding.

The winner of the Section Award will also be nominated for the Western Regional High School Teacher of the Year Award and the National ACS James Conant Bryant Award. Having won a previous award does not necessarily exclude a nominee; however, the nomination would need to be based on different criteria than the first award.

Nomination Package should include: Biographical sketch of nominee with date of birth, list of any publications, statement (no more than 1,000 words) of nominee's achievements as a high school chemistry teacher including quality of teaching, effective methods, nominee's ability to challenge and inspire students, extracurricular work (science fairs, clubs, etc.). Seconding letters are not essential, but up to five may be included. Nominating documents should be submitted via email to **office@scalacs.org**. Note that signed documents that have been scanned are acceptable.

The deadline for nominations is **November 15th, 2024**. Please feel free to contact **Michael Morgan** of the Educational Affairs Committee at **mmorgan@lausd.net** if you have any questions.

UPCOMING EVENTS



ACS Local Section
Southern California

THIS SCALACS VIRTUAL PRESENTATION IS MADE POSSIBLE BY
THE ACS SENIOR CHEMISTS COMMITTEE (SCC/DEIR) GRANT

SCIENCE AT SCHRÖDINGER

Friday, November 15
3:00 to 4:00 pm PT

PRESENTED BY

Dr. Katherine Bay,
Senior Scientist at
Schrödinger



scalacs.org

SCIENCE AT SCHRÖDINGER

Friday, November 15 • 3:00 to 4:00 pm PT

Presented by

Dr. Katherine Bay, Senior Scientist at Schrödinger

Molecular modeling provides a powerful set of tools that are used in the life sciences industry to simulate molecular behavior in chemical or biological systems, making it a key component in many areas of research, including drug discovery. For more than 30 years, Schrödinger has worked tirelessly to improve human health and quality of life by transforming the way therapeutics and materials are discovered. Schrödinger believe that true breakthroughs in therapeutics and materials design come from better molecules.

Schrödinger's global team has pioneered the leading computational platform for molecular discovery, leveraging physics and machine learning to accurately simulate and predict key properties of billions of novel molecules across vast chemical space.

This talk will demonstrate how the Schrödinger Education team scales computational chemistry education in an evolving educational and professional landscape.

Dr. Katherine Bay is a Senior Scientist responsible for leading the Teaching with Schrödinger program. She develops academic curricula that integrates Schrödinger's molecular modeling tools in the classroom. Prior to joining Schrödinger, she was an Assistant Professor of Organic Chemistry and earned her Ph.D. in Organic Chemistry from UCLA.

This SCALACS virtual presentation is made possible by the ACS Senior Chemists Committee (SCC/DEIR) Grant. It's a free event to all. Just sign up at scalacs.org.

BY

KEITH ORSO
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Recent editions of this column have explored two ways people attempt to patent the same invention more than once: statutory double patenting and obviousness-type double patenting. This installment begins to address ways to mitigate double patenting.

Because statutory double patenting involves claiming the exact same thing twice, such that a claim of the first patent will always be infringed when a claim of the second patent or patent application is infringed, and vice versa, there is no way to cure a statutory double-patenting problem (short of a claim amendment). The corresponding claims in the second patent application or patent are simply duplicative and are unpatentable or invalid.

There is, however, a way to mitigate obviousness-type double patenting, because with obviousness-type double patenting, the claims do not have the exact same scope but rather are obvious variations of the same invention (see the cough syrup example described in the October issue). The way to mitigate obviousness-type double patenting relates to concerns raised by the existence of different patents claiming obvious variations of each other.

Historically, there were at least two concerns about obviousness-type double patenting. First, back when the term of a patent was 17 years from issuance, patentees could potentially extend their patent monopolies by filing serial patent applications claiming obvious variations of their inventions. For example, if the invention was a cough syrup formulation, a patentee could potentially first obtain a patent for the basic formulation and then later seek patents on versions of the same formulation that add flavors and colors. Because the latter patents would issue later, they would also expire later, and the patentee would enjoy at least some level of protection for its cough syrup formulation for longer than a single 17-year period.

A second concern with obviousness-type double patenting has been that two patents essentially claiming the same thing can be used to harass alleged infringers if each patent is owned by a different entity. Returning to the cough syrup example, suppose a third-party company starts selling a cough syrup having the basic formulation plus purple coloring and grape flavor. The cough syrup infringes the first patent to the basic formulation and also the second patent to the formulation plus an added flavor or color. If a first entity owns the first patent and the second entity owns the second patent, then two different entities can file serial or parallel lawsuits against the defendant company and maybe even each collect infringement damages. Next month's column will explore how this can be stopped.

The author earned engineering and chemical engineering undergraduate and graduate degrees, and is a patent attorney and partner at the law firm of Irell & Manella LLP. This column does not constitute legal advice and does not necessarily reflect the views of the firm or its clients.

BY

HAROLD GOLDWHITE
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In my last column I gave a sketch of the career of Nevil Sidgwick, in preparation for a review of his two-volume work "Chemical Elements and their Compounds" (Oxford University Press, 1950), a book that I regard as one of the great chemistry books of the 20th Century. It is a massive tome: 2 volumes, each over 850 pages. But what would you expect from a work that takes all the elements (well, all that were known in the 1940s) as its subject matter?

I begin with an extended quotation from the preface that gives an insight into Sidgwick's view of the scope of this book:

"This book is an attempt to discuss in detail the properties of the elements and their compounds in the light of modern ideas of atomic and molecular structure. The development of these ideas in the last thirty years has made it possible to transform 'Inorganic' Chemistry from a mass of disconnected facts into an ordered system of relations. Inorganic textbooks are, however, usually so over-burdened with the details of mineralogy, metallurgy, technical chemistry, and analysis that hardly any space is left for the consideration of the theoretical relations; while the customary exclusion of all but the simplest carbon compounds deprives us of the help of the best-known and most important of the elements."

The work is arranged following the Periodic Table with Volume 1 covering an introduction; Group 0; Groups IA and IB following an old form of the Table; and so on up to Group V. Volume II covers the rest of the elements. This certainly seems ambitious; but remarkably it succeeds in giving an overall view of all 92 of the chemical elements and many of their compounds. The present review of Sidgwick's book must be highly selective. The following excerpts are simply illustrative of topics that have captured my interest. In the section on Group 0, the noble gases, I note the melting point of solid helium under various pressures

from 1K at 25 atm. to 42K at 5450 atm. Sidgwick mentions "the obscure question of the formation of chemical compounds" of the heavier elements of Group 0. Various metals have been stated to form compounds with helium under the influence of electric sparks including mercury, tungsten, and platinum. None of these have been shown to be stoichiometric compounds. They may all be merely helium adsorbed on to a dispersed metal. In the solid state there are well defined hydrates of argon, krypton, and xenon.

Hydrogen, the first element of Group I, and its isotopes deuterium and tritium, have a remarkably rich chemistry that takes up nearly 50 pages. There is an extended discussion of the ortho and para forms of molecular H_2 . Methods of production of hydrogen atoms at moderate temperatures are also reviewed in detail. The binary hydrides form 4 classes: salt-like e.g. CaH_2 ; volatile e.g. CH_4 ; metal-like e.g. non-stoichiometric Pd hydride; and spectroscopic hydrides seen only in discharges. There is an extensive section on the hydrogen bond – not surprising since Sidgwick was one of the earliest chemists to point out the existence and importance of this form of bonding.

In the section on deuterium I came across the following perceptive quotation from Rutherford in 1920, a full decade before the definitive evidence for the existence of this isotope was presented: "It seems very likely that one electron can bind two hydrogen nuclei, and possibly also one hydrogen nucleus. In the one case this entails the possible existence of an atom of mass nearly two, carrying one charge, which is to be regarded as an isotope of hydrogen."

Sidgwick discusses the possibility of optical activity in a compound of general formula $CaHD$ and concludes that any activity will be extremely small. "Failures to detect any resolution are numerous."

In this column I have only "scratched the surface" of this great book. More will be forthcoming.

**SOUTHERN CALIFORNIA SECTION
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Contains Dated Meeting Announcement

PERIODICALS

ATTENTION SCALACS MEMBERS!

Beginning **January 2025**, the *SCALACS Magazine* will be going 100% digital as the default delivery mode. You will be able to view or download it from our website, **www.scalacs.org**. If you are currently receiving a printed version of the *SCALACS Magazine* and wish to continue receiving the *SCALACS Magazine* in the printed form, please e-mail **office@scalacs.org** by **November 15, 2024**.

LOOK OUT FOR THESE UPCOMING SCALACS EVENTS

NOVEMBER

- Science at Schrödinger by Dr. Katherine Bay, Senior Scientist at Schrödinger, **Nov. 15**
- Tolman Award nomination deadline, **Nov. 15**
- Paul Shin Award nomination deadline, **Nov. 15**
- National Chemistry Olympiad registration opens, **Nov. 15**
- 2025 SCALACS Election Ballot deadline, **Nov. 24**

**More events will be announced in our next issue in January 2025!
Be sure to view or download it on our website: www.scalacs.org**

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For more information or to find events, please see our website: www.scalacs.org