

SCALACS

A Joint Publication of the Southern California and San Gorgonio Sections of the American Chemical Society

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MARCH 2024

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2024 U.S. National Chemistry Olympiad Registration Closed

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Celebrating Women in Chemistry: By the Numbers

March is Women's History Month. See **Page 4** for more details.



UPCOMING EVENTS

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CHAIR'S MESSAGE

Hello everyone,

There has been a recent event in the Southland that has directly or indirectly affected all the members of the Executive Committee, including myself, and our local chemical community. The event is still playing out and rather than risk hurting the affected members of the community, I'd like to write a completely different kind of message than what is normally in the Chair's letter, a more personal message.



Last month, I talked about my passion for outreach and mentoring. This month I'd like to talk about my second passion: Exploration. Exploration is what I try to do as part of my day job but how that came about was due to a personal jolt as I was finishing my doctorate. While struggling to find my way, I threw caution to the wind, ignored my advisors, and took a position many miles from where I was living. Over eight thousand miles in another hemisphere: New Zealand. That decision ignited a life-long passion of exploration. This move led to many more adventures, adventures in science, and eventually to my present career in space exploration (another life-long passion that took me 40 years to achieve) – I might talk about that serendipitous route in another letter.

How does that relate to chemistry? Well, I went to New Zealand to work on single crystal diffractometry. New Zealand is the United States' jumping off point for expeditions to Antarctica and while living in New Zealand, I was able to participate in field research in Antarctica. This month's profile photo is from one of my trips. Again, what does that have to do with chemistry? On one of these trips to the ice, my colleagues and I tested a few chemical detection prototype instruments. These instruments are now in space, on the International Space Station and on Mars. Exploration on Earth led to exploration in space.

So, without sounding too much like a life coach, I hope anyone that is affected by a sudden life jolt can use that as an opportunity to change their environment, get out of any personal or occupational ruts, and get out and explore their passions. They will eventually make it back to their dream career. I made it back to mine.

All the best,

Richard Kidd Chair, SCALACS Explorer

Announcing the 2023 Richard C. Tolman Award Recipient

The 2023 Tolman Award recipient is **Professor Sarah H. Tolbert**, Department of Chemistry and Biochemistry at the University of California, Los Angeles for her research in Nanoscience and Materials Chemistry.

Congratulations, Professor Tolbert!

We will honor Professor Tolbert at the Tolman Award Dinner. Look for more information in our next issue.



ACS LEADERSHIP INSTITUTE RECAP Saturday, January 27

The Leadership Institute is an annual invitation-only conference where ACS leaders come together to learn both management and leadership skills to enable them to be successful leaders within the American Chemical Society.

ACS Leadership Institute promotes ongoing learning, development, and training for ACS volunteer leaders throughout the year. This exciting weekend featured track-based training and development as well as all-attendee sessions and networking events. The in-person weekend event was held in Atlanta, Georgia, January 26-28, 2024.

SCALACS was honored to be invited to make a presentation during the "Share Your Story" portion of the Local Section Track. SCALACS' Councilor / Chair Elect Dr. Veronica Jaramillo was our representative at this conference.



Far right is SCALACS' Councilor / Chair Elect Dr. Veronica Jaramillo.



The ACS Leadership Institute was jam-packed with professional development opportunities and networking with fellow volunteer leaders. And, who wouldn't want to pose with Meg A. Mole?

City of STEM + Los Angeles Maker Faire

APRIL 6 • LA STATE HISTORIC PARK

SCALACS will be one of the exhibitors at the City of STEM on April 6, 2024, from 9 am to 6 pm at Los Angeles State Historic Park. This is southern California's largest celebration of science. SCALACS will be there promoting Chemistry with both hands-on activity and handing out Celebrating Chemistry magazines! If you are interested in helping out at the table contact Veronica Jaramillo (vijaramillo@pasadena.edu).



GET READY FOR THE LOCAL EXAM - MARCH 13 & 14



2024 U.S. NATIONAL CHEMISTRY OLYMPIAD

Teachers, please note that the registration 2024 is now closed. We are proud to announce we have about 610 registered students from 25 schools around Southern California registered for the local exam. By now teachers and students should have notified regarding the local exam. Should you have questions, please reach out to SCALACS office at office@scalacs.org.

PREPARE FOR THE EXAMS - Students and teachers can find more information on the ACS website including exam preparation and past years exam questions and solutions.

https://www.acs.org/education/students/highschool/olympiad.html https://www.acs.org/education/students/highschool/olympiad/prepare-for-exams.html

2024 IMPORTANT DATES

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

 March 13 & 14, 2024
 Local Ex

 April 13 - 21, 2024
 National

 June 2 - 14, 2024
 Study Ca

 July 22 - 31, 2024
 Internation

Local Exam National Exam Study Camp International Chemistry Olympiad Top students will be selected to move forward to the National Exam and SCALACS will send notitications to the teachers regarding this. The time and venue for this national exam will be determined soon. Good luck to all students and thank you to all the teachers who coordinated and proctor the exams.



March is Women's History Month in the United States-a month designated to acknowledge the contributions of women to history and contemporary life. In the sciences, there are many examples of women whose contributions to science and chemistry are significant. Some of these women have been honored with international. national, and local awards and many others have been recognized within their own work organizations. In this article, we consider the track record of recognizing significant contributions of women-especially women Southern California-to in chemistry through just three awards: the Nobel Prize, the American Chemical Society's Priestley Medal, and the Southern California Section's Tolman Award.

Historically, women and their contributions to chemistry have received scant notice, with men garnering well over 90% of these awards through the years. When the Nobel Prizes were inaugurated in 1901, **Marie Curie** was among the first to receive recognition—for physics in 1905 and chemistry in 1911. But over the history of the award, fewer than 7% of the nearly 1000 Nobel laureates, are women. And, if we separate out the physical sciences, women account for only 4% of Nobel laureates recognized for work in chemistry and less than 2% of those recognized for work in physics.¹

Here we give a shoutout to two Southern California women who recently received a Nobel Prize. In 2018, **Frances Arnold** (Caltech) became the eighth woman to win a Nobel Prize in chemistry. In 2020, **Andrea Ghez** (UCLA) became the fifth woman to win a Nobel Prize in physics. Please go online to check out the remarkable contributions these women have made!

by Eleanor D. Siebert, Ph.D.

Unfortunately, the scarcity of women among Nobel laureates is not an anomaly. The Priestly Medal is one of the most prestigious honors awarded by the American Chemical Society. The Priestly Medal recognizes persons "for distinguished services to chemistry"; it was first given in 1923 to Ira Remsen.² Over 70 years later in 1997, **Mary L. Good** became the first woman to win the Priestley Medal. Since 1923, a total of six women (7% of all recipients) have received the Priestly Medal, with four receiving the honor since 2013. **Jacqueline Barton** (Caltech) received the Medal in 2015.

And each year, the Southern California Section of the ACS (SCALACS) solicits nominations for its Tolman Medal, recognizing those who have made significant contributions to chemistry while working in Southern California. The Tolman Medal was first presented in 1960 to William G. Young (UCLA) and over 30 years later in 1994, **Jacqueline Barton** became the first woman to receive the award. A total of five women (8% of all recipients) are Tolman medalists:³

1994: Jacqueline Barton, Caltech

2007: Barbara Finlayson-Pitts, UC Irvine

2008: Joan Selverstone Valentine, UCLA

2020: Pingyun Feng, UC Riverside

2022: Alison Butler, UC Santa Barbara

In recent years, there has been a "surge" in women scientists who are being recognized for their work. From 2013-2023, women Nobel laureates in chemistry have increased in number from 3 to 8. While 4% of all chemistry Nobel laureates are women, 13% of chemistry Nobel recipients since 2013 have been women. And while just

(Continued on page 5)

Summary of the Seminar by Prof. Kwabena Bediako, UC Berkeley on the occasion of Celebrating Black History Month

SCALACS in collaboration with the New York ACS Local Section and the Nigerian Affiliate of ACS secured an LSAC grant for promoting DEIR through events celebrating Black History Month and Hispanic Heritage Month. This seminar focuses on this objective.

Engineering two-dimensional(2D) materials by controlling the stacking orientation of atomic layers has emerged as a powerful technique to manipulate their mechanical and optoelectronic properties. Bilayer graphene (BLG) is one of the simplest van der Waals (vdW) structures that display diverse physical properties such as contrasting electronic properties that depend on the stacking arrangement.

Part 1: Studies on Graphene Bi- and Trilayers

seminar described how azimuthal The misalignment of atomically thin layers produces moiré superlattices that manifest a strong twist angle dependence of heterogeneous electrochemical kinetics in the case of twisted bilayer and twisted Tri layer graphene electrodes with the greatest enhancement observed near the magic angles. These effects are driven by the angle-dependent engineering of moiré superlattice flat bands that dictate the electron transfer processes with the solution-phase redox couple. The design and manipulation of superlattice structures is therefore shown to serve as a versatile platform for systematically interrogating and exploiting the

dependence of physical and chemical phenomena on electronic structure.

Part 2: Magnetic Materials from Dichalcogenides

Transition metal dichalcogenides (TMDs) spin-bearing intercalated with transition metal centers are a diverse class of magnetic materials where the spin density and ordering behavior can be varied by the choice of host lattice, intercalant identity, level of intercalation, and intercalant disorder. Each of these degrees of freedom alters the interplay between several key magnetic interactions to produce disparate collective electronic and magnetic phases. The array of magnetic and electronic behavior typified by these systems renders them distinctive platforms for realizing tunable materials magnetism in solid-state and promising candidates for spin-based electronic devices.

Some comments:

Ping Furlan, New York ACS Section: His presentation was exciting and enlightening. Sushila Kanodia, California Local Section: I enjoyed the seminar. Amazing work!

(Continued from page 4)

under 7% of all ACS Priestley medalists are women, 25% of medalists from 2013-2023 are women. Four out of five women SCALACS Tolman awardees have received recognition since 2007, with two women (20%) having received the Tolman Award since 2013.

Why so few women? There are many factors that impact the selection of award winners, and the data presented here do not point to specific causes of why so few women have been recognized over the years. One important factor, however, is that historically women have been vastly underrepresented in science fields. Today, more women are choosing careers in science, technology, engineering and mathematics (STEM). In the next issue of SCALACS, we examine the current status as well as trends in employment and earnings of Los Angeles County women in STEM.

¹ Women who changed the world: Nobel Prize awarded women (2023). www.nobelprize.org/prizes/lists/nobel-prize-awarded-women/

² American Chemical Society website, Awards. www.acs.org/awards

³ Southern California American Chemical Society. www.SCALACS.org

INSIGHTS INTO IP LAW

ΒY

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The 1976 "Agreement on Guidelines For Classroom Copying In Not-For-Profit Educational Institutions," ("the Guidelines") purport to set forth minimum standards of permissible copying in the educational setting. But they "do not purport to be a complete and definitive statement of fair use law for educational copying" and "do not have the force of law," as one court observed several decades ago. More recently, another court addressed the Guidelines when it was "called upon to determine whether the unpaid copying of scholarly works by a university for use by students-facilitated by the development of systems for digital delivery over the Internetshould be excused [from copyright infringement] under the doctrine of fair use."

The plaintiff copyright holders in the case were three publishing houses that specialized in academic works. At trial, they established that the Board of Regents and other officials of a state university had infringed a small subset of their asserted copyrights by maintaining a policy that allowed professors to make digital copies of excerpts of the plaintiffs' books available to students without paying for them. In assessing whether making such digital copies constituted fair use, the trial court concluded that its analysis of the third fair-use factor, "the amount and substantiality of the portion used in relation to the copyrighted work as a whole," would not be bound by the standards provided in the Guidelines. The court enjoined the defendants to maintain copyright policies not inconsistent with a detailed order analyzing the ninety-nine copyright claims brought by the plaintiffs.

The plaintiffs appealed, arguing, among other things, that the trial court's application of the fair use factors in connection with the majority of its asserted copyrights was legally flawed and that the copying permitted by the trial court exceeded the amounts outlined in the Guidelines. The court of appeal reversed the district court, but not based on the Guidelines. Instead, the court of appeal noted that the Guidelines do not carry the force of law, do not create a hard evidentiary presumption, "suggest a minimum, not a maximum, amount of allowable educational copying that might be fair use, and were not intended to limit fair use in any way."

With regard to the third fair-use factor, the court of appeal ruled that the trial court "erred in setting a 10 percent-or-one-chapter benchmark" and "should have performed its analysis on a work-by-work basis, taking into account whether the amount taken—qualitatively and quantitatively—was reasonable in light of the pedagogical purpose of the use and the threat of market substitution." However, the court of appeal ruled that the district court appropriately declined to give much weight to the Guidelines.

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.

THIS MONTH IN CHEMICAL HISTORY

ΒY

HAROLD GOLDWHITE California State University, Los Angeles hgoldwh@calstatela.edu

For my next few columns I plan to revert to my custom at the beginning of a new year and look back at the new chemistry of 90 years ago as reflected in the pages of The Chemical Society's Annual report for 1934 (Volume XXXI) published in London in 1935. Glancing at this volume I was struck by the advertisements that preceded the actual contents. Old advertisements have a strangely nostalgic impact, I find. Lang of London offers All-British high-speed mixers and emulsifiers and high-speed centrifuges. Their offices and works are located, as a mini-map indicates, at the junction of Euston Road and Hampstead Road in N.W.1. B.Black and Son offer mercury in glass thermometers that are British made throughout and can come with National Physical Laboratory certificates of precision. The Derbyshire Silica Firebrick Company offers highest grade refractories and insulating bricks.

Bookshops and publishers are also included. H.K.Lewis offers English and Foreign scientific books and - a novelty - a scientific lending library. Heinemann has just published A.J.Mee's "Physical Chemistry" and O.Hassel's "Crystal Chemistry". The former cost 15 shillings or about \$4.00; the latter 6 shillings or about \$1.50. W.R.Chambers has published Part III of Perkin and Kipping's "Organic Chemistry" containing recent advances in the subject. This is really nostalgic; seventeen years later F. Barry Kipping, one of the authors, was my lab. Instructor in organic chemistry. Finally, Kennicott Co. specializes in water purification for all purposes - a bold claim.



And now for 1934's chemistry. The relatively recent discovery of deuterium (this is now the accepted name for the hydrogen isotope) has led to a surge in new findings. Heavy water either as pure D₂O or in various mixtures with H₂O is now available commercially in both America and Europe. The electrolytic method is used exclusively to prepare it. The ratio D:H in many samples has been determined (e.g. in benzene, kerosene, and honey) to an accuracy claimed as 2 ppm. Generally, the ratio is slightly higher than in normal tap water and this is attributed to slightly different evaporation rates. The vibration-rotation spectra of HD and D₂ have been observed and agree completely with theoretical predictions - the assumption being that the potential energy curve is essentially the same as for H_a. The nuclear spin of the deuteron is 1, twice that of the proton. The ionic product of D₂O is about 3 x 10⁻¹⁵ at 298K, that is about onethird of the value for H₂O.

The kinetics of a few reactions involving deuterium have been determined and compared with those of compounds containing normal hydrogen. D_2 reacts with chlorine at about one third of the rate of H_2 in the photochemical reaction to produce DCI or HCI. This is attributed to the rate of the initial step in which chlorine atoms extract D(H) from $D_2(H_2)$. Reaction of D_2 with oxygen, catalyzed by palladium, is 1.6 times slower that the comparable reaction of H_2 .

Reaction rates of several reactions in H_2O and D_2O have been compared. The acid catalyzed mutarotation of glucose is 1.3 times as fast in the former solvent. The activation energy differs by

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Engaging Girls In STEM

This is an in-person event organized by the Los Angeles County Office of Education. SCALACS is proud to be an exhibitor at this event. Teachers, mark your calendar and bring your students to visit SCALACS Booth.

EVENT: 2024 Engaging Girls in STEM DATE: March 30, 2024 TIME: 10 AM - 2 PM VENUE: Los Angeles Zoo, 5333 Zoo Dr, Los Angeles

For more information, visit: https://www.engaginggirlsinstem.com/



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1.25 kCal. In the absence of added acid the rate in H_2O is 3.8 times that in D_2O . Surprisingly the rate of acid catalyzed inversion of sucrose is nearly twice as great in D_2O as in H_2O . However, the rate of enzymatic inversion is slightly slower in the deuteriated solvent.

Let's change the topic to the relatively recent discovery of the Raman effect. In 1934 the technical challenges were substantial, but there were still around 1000 articles to review since the initial papers in 1929. Despite the faint appearance of Raman scattered lines on photographic plates the effect has been used quantitatively with fair accuracy in a number of cases. Benzene-toluene mixtures have been analyzed with an accuracy of about 5%. As little as 0.4% of styrene can be detected in ethylbenzene. In a mixture of xylenes, the meta isomer can be detected down to 1%.

This is just the opening salvo in a barrage of fascinating information about the advances in chemistry 90 years ago. I promise you more in succeeding columns. In the meantime, here's wishing you a happy and prosperous 2024.



LOS ANGELES COUNTY SCIENCE & ENGINEERING FAIR

Join us for the 74th Annual LA County Science & Engineering Fair in person, March 10-11, 2024, at the Shrine Expo Hall, Los Angeles!

Virtual Awards Ceremony on YouTube Channel Sunday, March 24, 2024





CSEF 2024 judging will take place on Tuesday, April 16, 2024, and will be entirely online. More info will be announced at https://csef.usc.edu/



Regeneron ISEF 2024 will take place in Los Angeles from May 11-17, 2024 at the Los Angeles Convention Center. Regeneron ISEF 2024 is an in-person event with all finalists competing in-person. For more information on volunteering and sponsorship, visit https:// www.societyforscience.org/isef/



SOUTHERN CALIFORNIA SECTION AMERICAN CHEMICAL SOCIETY 2700 East Foothill Blvd #209 Pasadena, CA 91107

IMPORTANT Do Not Delay!

Contains Dated Meeting Announcement

PERIODICALS

IMPORTANT DATES

MARCH

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- **13 & 14** High School Chemistry Olympiad Local Exam — page 3
- **17-21** ACS Spring 2024 page 8
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APRIL

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MAY

11-17 Regeneron International Science and Engineering Fair 2024 in Los Angeles — page 9

JUNE

- **3-5** ACS Green Chemistry Institute's 28th Annual Green Chemistry & Engineering Conference in Atlanta, GA page 8
- **24-26** 2024 International Coalition of Girls' Schools Conference in Baltimore, MD — page 9

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