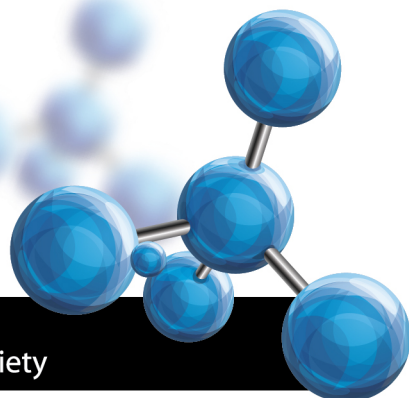




ACS

Chemistry for Life®

SCALACS



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

VOLUME LXXVIII/No. 6

OCTOBER 2023

SOUTHERN CALIFORNIA Section

**Call for Nominations
2023 Richard C. Tolman Medal**

See Page 3

**AACT/ACS/Occidental College Chemistry
Teachers Meeting**

See Page 2

**Call for Nominations for Paul Shin Memorial
High School Teacher of the Year Award**

See Page 2

**Current Status of Green Energy Production –
A Review on Green Hydrogen**

See Page 3-5

SAN GORGONIO Section

**National Chemistry Week: The Healing Power of Chemistry
October 15 - 21**

See Page 8

Project SEED Recap

See Page 8

**Seeking Experts/Professors in AI and STEM to Join Panel on
the Use of AI (Artificial Intelligence) in Chemistry**

See Page 9



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TABLE OF CONTENTS

So. Cal. Chair's Message	1
So. Cal. Information	2-5
Insights Into IP Law	6
This Month in Chemical History.....	7
S. G. Chair's Message	8-9
Bi-Section Chemists' Calendar	BC

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SOUTHERN CALIFORNIA SECTION



CHAIR'S MESSAGE



ACS Local Section
Southern California

Dear SCALACS members,

As the fall season is upon us, the awe of chemistry in the environment becomes more present for me. The changing colors of leaves, though biological in nature, are a sign that trees are adapting to the lower temperature and length of day by altering their chemical makeup. Many scientists recognize that leaf colors shifting from green to red, orange, and yellow signifies the angle shift of the sun's rays on Earth and shortening of the day, lowering the quantity of chlorophyll in leaves as anthocyanin production increases in some plants, presenting many of the brilliant colors of fall. This type of change in the world is part of what fills me with joy and makes learning and teaching chemistry so spectacular.

Watching a student's face light up when they begin to gain a deeper understanding of the world around them brings delight to my teaching day. I hope as you move through the month of October that you take the opportunity to sit back and ponder the beauty and delight that is all around us. Taking moments to find the wonderment of chemistry in different facets of life makes me smile inside.

I hope we can each find the splendor of science in our daily lives.

Sincerely,
Edye Udell
Chair, SCALACS
Science Teacher, Westridge School
(EUdell@westridge.org)

SOUTHERN CALIFORNIA SECTION

AACT/ACS/Occidental College Chemistry Teachers Meeting

The **AACT/ACS/Occidental College Chemistry Teachers Meeting** will return this year. It is tentatively scheduled for **Saturday, October 28** at **Occidental College**. This is a meeting for teachers by teachers. Any interested teachers are encouraged to sign up to be presenters.

Presentations can be as short as ten minutes or as long as an hour. Come and show us your favorite lesson, favorite demonstration, or favorite lab. Do not hesitate thinking that what you want to show will be known by everyone already. You may have a very unique and cool way of doing the procedure that we need to see!

Registration will open in the next week or two. Anyone interested in the meeting can reach out to **Michael Morgan** (mmorgan@lausd.net) for information.

Call for Nominations for Paul Shin Memorial High School Teacher of the Year 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 is teachers like the recipients of this award who make learning chemistry rewarding.

Plus, there is a financial component of **\$500**. The \$500 will be an unrestricted award directly to the teacher. **The winner of the Section Award will also be a nominee for 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 15, 2023**. Please feel free to contact **Michael Morgan** of the Educational Affairs Committee at mmorgan@lausd.net if you have questions.

SOUTHERN CALIFORNIA SECTION

Current Status of Green Energy Production – A Review on Green Hydrogen

By Krishna Kallury, Alternate Councilor, SCALACS

SCALACS is dedicated to advance the ACS Policy and Vision as stated below.

ACS Public Policy Statement for 2023-2026 (Focus: Chemistry for Life)

Climate change presents serious risk for civil society, business, and ecosystems. The Earth's climate is changing in response to increasing concentrations of greenhouse gases (GHGs) and particulate matter in the atmosphere, and human activity is the primary cause. Atmospheric carbon dioxide (CO₂) concentrations are increasing at a rate never observed before, primarily due to emissions from fossil fuel combustion. Extreme weather and related events, such as floods, droughts, hurricanes, heatwaves, and wildfires,

are already increasing in frequency and intensity, threatening ecosystems and humanity's physical, social, and economic well-being. Continued uncontrolled GHG emissions will compound the effects and risks of our altered climate state well into the future. The world will experience more extreme weather events which, coupled with sea level rise, will continue to cause coastal property damage and population displacement. Extreme weather and flooding events will further impact infrastructure (such as energy supply and transportation systems) leading to disruption of supply chains, business and industry productivity, and military operations. Ecosystems and natural resources will continue to be stressed, affecting food and water availability, burdening economies,

(Continued on page 4)

Call for Nominations 2023 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 2023 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
- letters of support from colleagues in the profession describing the candidate's major achievements
- if the candidate is being considered for outstanding teaching, 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, 2023**. Inquiries should be directed to the Chairperson via email at **office@scalacs.org**. A list of winners appended here demonstrates the caliber of awardee sought by the committee.

SOUTHERN CALIFORNIA SECTION

and societies. Climate change threatens human health, leading to increased illness and mortality, increased incidence and distribution of vector-borne diseases, and decreased work force efficiency.

The American Chemical Society (ACS) acknowledges the chemistry enterprise has a critical role to play in helping to mitigate climate change by developing green technologies to meet GHG reduction targets.

The Potential of Hydrogen

Hydrogen has the advantages of being clean, non-polluting, renewable, storable and versatile. Its reserves are quite abundant in nature and its unit calorific value is relatively high. It can easily be seen as a potential energy storage media that could be the “ultimate energy” of the 21st century, and is important to support the energy transition from fossil fuels. Hydrogen is used in many fields, including construction, industry, electricity, transportation, etc.

Methods of Green Hydrogen Production

Electrolysis of Water: The technology of hydrogen production by electrolysis of water is currently mature in industrial applications. The electricity in this process has great potential to be driven by renewable energy and obtained through low-carbon or carbon-free methods. Therefore, this technology is considered to be the most promising green hydrogen production technology. The process of producing hydrogen from water electrolysis is mainly composed of two half reactions: one is hydrogen evolution reaction (HER) in the cathode, and the other is oxygen evolution reaction (OER) in the anode. At present, the application and research of this technology mainly includes 4 types: alkaline water electrolysis (AWE), proton-exchange membranes (PEM), solid oxide electrolytic cells (SOE) and solid polymer anion exchange membrane (AEM).

Photocatalysis: Photocatalysis is a process in which a catalyst absorbs photons to generate high-energy electrons and holes and then initiates a redox reaction. In 1972, Fujishima and Honda discovered that photocatalytic water splitting can produce hydrogen on the TiO_2 electrode. This discovery provides a foundation for realizing solar water splitting to produce hydrogen.

Photocatalytic splitting of water for hydrogen production is through the use of semiconductor photocatalyst to generate electron hole pairs under the light irradiation, and the H_2 as the target product could be obtained in the reduction reaction.

From Biomass: Using biomass as raw material, through gasification, conversion, decarbonization and separation, the pure hydrogen is obtained finally. Biomass can also be covered in the bio-chemical processes such as pretreatment, enzymatic hydrolysis, and fermentation to obtain hydrogen-containing compounds such as methane, methanol, ethanol, etc., and then reformed by catalytic reaction to obtain high-purity hydrogen. Hydrogen production by biomass is expected to be able to overcome the two major problems of green hydrogen sources and hydrogen storage and transportation costs. It might be an effective way to solve the current hydrogen energy development problems and shows great commercial prospects.

Energy Sources for Green Hydrogen Production

Wind Energy: Wind energy is converted into electrical energy through wind generators, and then the hydrogen is produced by electrolysis of water and passed through the hydrogen transmission system to achieve terminal elimination thereby completing the wind energy conversion to hydrogen energy.

Solar Energy: At present, the solar hydrogen production system by photovoltaic-water electrolysis can be divided into direct coupling and indirect connection according to the connection mode between the solar photovoltaic panel and the water electrolysis cell. The direct coupling system is through the optimal structure matching between the photovoltaic array and the water electrolyzer, without the maximum power point tracking (MPPT) controller, direct current-direct current (DC-DC) controller and storage battery etc., making the system more economical and efficient.

For more details, see Ying Zhou et al Chinese J. Chem. Eng. 2022, 43, 2-13.

(Continued on page 5)

SOUTHERN CALIFORNIA SECTION

THE HEALING POWER OF CHEMISTRY



October 15–21 | 2023
#NationalChemistryWeek

Look out for events that we'll be hosting as we celebrate National Chemistry Week together.

Recent Contributions from Universities and Industries in Southern California area

As the most abundant element on earth, hydrogen has the potential to transform many of the sectors that power our world, from transportation and utilities to biofuels, fertilizers and environmentally benign chemicals. However, the high cost and logistical complexity of physically transporting hydrogen present cost barriers that we all have to pay for in the cost of our electricity, fuels and foods.

Travis Williams, a chemist at the USC Loker Hydrocarbon Research Institute, is tackling this challenge head-on by developing a “hydrogen on-demand” reactor that promises to simplify and cost-effectively revolutionize the transportation of hydrogen. In 2022, the U.S. Department of Energy recognized Williams’ groundbreaking technology as one of five pivotal achievements in recent hydrogen research history.

While electric cars powered by lithium-ion batteries dominate the landscape of zero-emission vehicles, hydrogen FCEVs (Fuel Cell Electric Vehicles) are on the road, too—especially in California. In recent years, the Golden State has doubled down on its investment in hydrogen infrastructure. California currently hosts 57 of the 58 hydrogen fueling stations nationwide, with the only exception in Hawaii.

“For a long time, there has been a debate about the ideal role of electric vehicles, particularly in urban areas like L.A. The aim has always been to reduce gas vehicle usage due to emissions, and hydrogen vehicles were seen as a solution if we could establish the necessary refueling infrastructure,” Williams said. “If you combine lithium-ion batteries with a liquid or gaseous

hydrogen carrier, you can significantly enhance fuel range. Our reactor can help make that happen,” Williams said, adding that the chemistry of these carriers can store much more energy compared to solid-state batteries.

While FCEVs are important, most hydrogen is used for liquid fuels and fine chemicals. California is also taking on sustainable aviation and, last year, marked a major milestone with the announcement of a \$2 billion expansion project at the World Energy sustainable aviation fuel facility in Paramount, California. This adds to the facility’s current capacity to refine renewable diesel fuel. The facility is the largest of its kind in North America and is poised to become a global hub for hydrogen-powered diesel and jet fuel production as well, so long as it can get enough hydrogen. Renewable fuels manufacturing is emerging as one of the largest uses for on-demand hydrogen generation. This is an opportunity where Williams sees important impact potential for emerging USC technology.

NewHydrogen (a CA-based company) and UC Santa Barbara Project

- NewHydrogen, Inc. partners with UC Santa Barbara for green hydrogen research.
- Thermochemical approach used, employing heat instead of electricity.
- The method could lower costs compared to traditional electrolysis methods.
- The technology involves using molten liquids in a single redox chemical loop.
- The system named NewHydrogen ThermoLoop™ aims for high efficiency and low temperature.

For catalyzed thermal splitting of water, see Tran et al, Joule, 2023, Vol.7.1759-1768.

BY

KEITH ORSO
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In 1976, representatives from an Ad Hoc Committee of Educational Institutions and Organizations on Copyright Law Revision, the Authors League of America, and the Association of American Publishers delivered to Congress an “Agreement on Guidelines For Classroom Copying In Not-For-Profit Educational Institutions.” The guidelines stated that they were not intended to limit the types of copying permitted under the standards of fair use but rather were designed to articulate minimum standards of permissible copying in the educational setting. A thumbnail of the guidelines might be of particular interest to our colleagues in academia.

The guidelines were divided into two parts: (I) single copying for teachers; and (II) multiple copies for classroom use. Part I provided that “[a] single copy may be made of any of the following by or for a teacher at his or her individual request for his or her scholarly research or use in teaching or preparation to teach a class:

- A. A chapter from a book
- B. An article from a periodical or newspaper
- C. A short story, short essay or short poem, whether or not from a collective work
- D. A chart, graph, diagram, drawing, cartoon or picture from a book, periodical or newspaper.”

Part II provided that “[m]ultiple copies (not to exceed in any event more than one copy per pupil in a course) may be made by or for the teacher giving the course for classroom use or discussion; provided that:

- A. The copying meets the tests of brevity and spontaneity as defined below and,
- B. Meets the cumulative effect test as defined below and
- C. Each copy includes a notice of copyright.”

The guidelines defined “brevity” in the context of prose that are not “special” works as a complete article, story or essay of less than 2,500 words, or an excerpt from any prose work of not more than 1,000 words or 10% of the work, whichever is less, but in any event a minimum of 500 words (subject to expansion to include an unfinished paragraph).

The guidelines defined “spontaneity” to require the copying to be at the instance and inspiration of the teacher and the inspiration and decision to use to be so close in time to the moment of use for maximum teaching effectiveness that it would be unreasonable to expect a timely response to a request for permission. The next edition of this column will complete the thumbnail sketch.

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

BY

HAROLD GOLDWHITE
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Yes, there is a little chemistry in this story. I once “did lunch” with Oliver Stone and Michael Caine at the Beverly Wilshire and appeared in a movie they were making – as an extra.

In 1976 I lost my left hand, disarticulated at the wrist, as a result of a laboratory explosion. I was cleaning my lab after a year’s absence on sabbatical. I wore full protective clothing – or so I thought. I lifted a 5 ml. pear shaped flask, closed with a Teflon stopper, and holding about 0.5 mL of a colorless liquid, with my left hand and pulled out the stopper. Immediate detonation. A quick-thinking colleague applied a tourniquet to my left arm. I was hospitalized for two weeks, had plastic surgery, and lost my left hand. I worked with physical therapists and a prosthetist over the next year. Some time later, in 1980 as I recall, I got a call from my prosthetist with a somewhat unusual request. He had been contacted by a film director who wanted to talk to someone who had lost a hand in a traumatic accident. The prosthetist asked me if I was interested, and I agreed to meet the director.

I drove to his office in what used to be the Selznick studios and met Oliver Stone who was directing his first movie for a major studio. Stone had recently received an Oscar in 1979 for his screenplay for “Midnight Express.” We had a long and engaging conversation about my experience, and about the planned movie entitled “The Hand,” based on a novel “The Lizard’s Tail.” In this story an artist loses his hand, and the hand takes on a life of its own with horrific consequences. Mr. Stone asked me to meet with the star of the movie to talk about my accident.

And, so I lunched with Oliver Stone and Michael Caine at the Beverly Wilshire. Mr. Stone and I arrived first to be soon joined by Mr. Caine who was briefly escorted by his wife -and chauffeur- but after introductions she left the three of us to lunch and discuss business. Lunching with a recognizable celebrity was quite entertaining. I could see many of the patrons at nearby tables eyeing us and no doubt wondering who were these two guys in close

conversation with Michael Caine. (Oliver Stone was still little-known at this time). Mr. Caine and I found things in common: both grew up in the East End of London; he was a year younger than I; both evacuees during World War II. He was very interested in my emotional state immediately after my accident. It was, surprisingly enough, shame.

A few days later Oliver Stone and I visited a special effects studio in the Valley run by the Rambaldi family. Carlo Rambaldi had been an Oscar winner in 1979 for his work on “Alien.” He was particularly interested in my bioelectronic left hand prosthesis and took some photos of it. I believe this was one of the influences on the designs for various versions of the hand in the movie.

I had two further interactions with the cast and crew of the movie. The first was in a studio where a shot of a shower scene of a body double for the now one-handed artist was under way. In the script the artist loses his right hand. Since I had lost my left hand another amputee was doubling for Michael Caine in the shower. I saw, but alas did not meet, another star of the film, Viveca Lindfors. A week later I was asked to come for location work at the UCLA prosthetics laboratory. The usual array of trucks and trailers was in evidence and filming soon began in the laboratory – a large open room with benches. The action involved designing a prosthesis for the artist, and it took many takes to get the scene right. Oliver Stone asked me to appear as an extra – a prosthetist in a white coat in the background of the shot, hammering away at something. For this I received the standard \$50 for an extra plus an excellent lunch (union rules) from the food trucks.

And so ended my brilliant movie career. A couple of weeks later I received a check for my consulting work, and eventually I saw the movie on VHS. Michael Caine was excellent but the plot was unbelievable. Two stars out of five.

SAN GORGONIO SECTION



CHAIR'S MESSAGE



Hello!

I want to begin this letter by thanking you for being a member of the San Gorgonio Section. Every year when you renew your ACS membership, you are offered the option to pay your Section dues (\$10). It might seem like a small amount, but our Section is able to continue to do what we do because of those dues. Just this year alone, your dues have helped us to provide scholarships to high school students, support research, and donate giveaway items to local outreach events, as well as helping us to host various events, including a dinner for local professors, an Environmental Health and Toxicology talk for community college and university students, a talk on algae and luncheon for Earth Week, the local Chemistry Olympiad exams and banquet, and a bowling event for local University and College students. And the year is not over yet! Thank you so much for paying your dues and helping us to continue to support chemistry in the San Gorgonio Section.

It's the most wonderful time of the year again! How are you planning to celebrate **National Chemistry Week (October 15-21)** this month? This year's theme is "The Healing Power of Chemistry." If you participate in any NCW party or event at your school or place of work, feel free to tag us in your Instagram photos (@SanGorgonioACS) so we can share them with others in the Section. Save the date for our community outreach event in celebration of NCW: Saturday, Oct. 21st at Cal Baptist University in Riverside. This event will be geared toward K-8 student, teachers, and parents. This is our third time hosting this event and it is always one of the highlights of our year. Stay tuned for more info on this event on our website.

For over fifteen years the San Gorgonio Section has participated in **Project SEED**. A key aspect of this ACS program is to provide a summer research experience to high school students with diverse identities and socioeconomic backgrounds. For the past ten years the Section has collaborated with UC Riverside in offering these research opportunities. This year we were pleased to have two high school juniors as participants. Edward Kim (Diamond Bar HS) worked in the laboratory of Dr. Kevin Kou

SAN GORGONIO SECTION

investigating “Cobalt-Catalysis for the Chemical Synthesis of Medicinally Important Molecules” Noor Muhammad (Rancho Cucamonga HS) worked in the laboratory of Dr. Jingsong Zhang continuing the study “Investigation of Heavy Metal Pollution in Roadside Soil along Southern California Highways.” Both students enjoyed the experience and will be asked to tell about what they did at the **Section’s Annual Meeting in November.**

The San Gorgonio Section is committed to cultivating a diverse, inclusive, and respectful community. We realize that we may be falling short in our efforts thus far though. Please email me if you have any suggestions on how we can implement any changes or accommodations to our events and meetings that would help us to achieve this goal.

With the beginning of the new school year, one topic that was discussed on campuses all over the world was the use of **AI (Artificial Intelligence)** in the classroom. In early 2024, we are interested in holding a panel on the responsible use of AI in the field of chemistry. We are seeking experts in the field of AI and STEM professors that are using it in their classroom to join this panel. Please email me with suggestions of speakers/panelists for this exciting event.

Beginning in January 2024, the San Gorgonio Section will no longer appear in the SCALACS magazine (where you are currently reading this message). For the past two years, we have emailed most of our members twice a month- once through the SCALACS magazine email and once through a separate email newsletter. We have continued to publish in the SCALACS magazine since it has allowed us to mail out hardcopies to our members who lack email addresses. Our move away from publishing in the SCALACS magazine will free up some funds for us to use for student travel grants in the future. If you would like to continue to receive a hardcopy of my messages or if you are not currently receiving my email newsletters but would like to do so, please email Eileen DiMauro (edimauro@mtsac.edu).

Connect with us!

Website: <https://www.sangorgonioacs.com/>

LinkedIn: <https://www.linkedin.com/company/american-chemical-society-san-gorgonio-section/>

Instagram: @SanGorgonioACS

Volunteer to help with our events: <https://forms.gle/26CZmwuWP1qjMWbc6>

Feel free to email me if you have any questions or suggestions for the Section. Have a great month!

Dr. Jenifer N. Nalbandian
Chair of the San Gorgonio Local Section
jnalbandian@calbaptist.edu

**SOUTHERN CALIFORNIA SECTION
AMERICAN CHEMICAL SOCIETY**

**2700 East Foothill Blvd #209
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**IMPORTANT
Do Not Delay!**

Contains Dated Meeting Announcement

PERIODICALS

THE HEALING POWER OF CHEMISTRY



October 15-21 | 2023 | #NationalChemistryWeek



Bi-Section ACS Calendar

OCTOBER

- 15-21** National Chemistry Week: The Healing Power of Chemistry — see page 5
28 AACT/ACS/Occidental College Chemistry Teachers Meeting — see page 2

NOVEMBER

- 15** Call for Nominations for Paul Shin Memorial High School Teacher of The Year Award & Tolman Award Deadline — see page 2 & 3

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