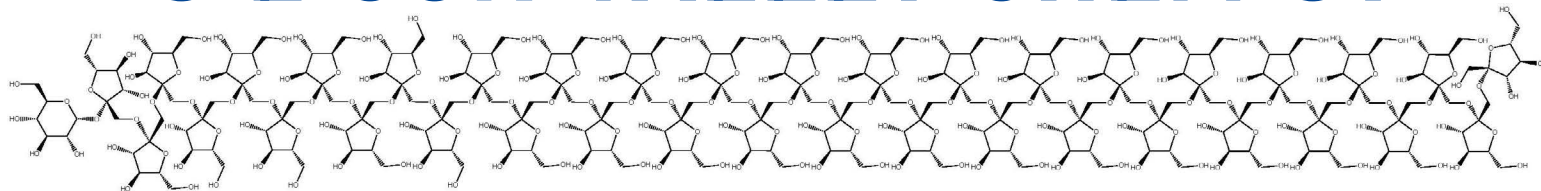


# SILICON VALLEY CHEMIST



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Webinar sponsored by the ACS Silicon Valley Section

## Art as Evidence: The Technical Study and Scientific Examination of Works of Art at the Getty Art Museum

Karen Trentelman, Getty Conservation Institute

6:00-8:00pm, online via Zoom, Free, **Registration required**

Reception 6:00-6:30pm, Lecture 6:30-7:30pm, Networking 7:30-8:00pm

What does a scientist do in a museum? The scientific study of works of art addresses questions related to conservation (material identification, degradation processes, compatibility of treatment methods), curatorial (artist's technique, workshop practice, attribution/provenance), and material issues (physical properties and behavior). Answering these questions frequently

requires detailed analyses of cultural heritage materials and the reconstruction of historic technologies. The precious nature of works of art creates unique analytical challenges, often necessitating the development of new analytical approaches or specialized instrumentation. A premium is placed on those techniques that either can be used completely non-invasively (i.e.,



*continued on next page*

## Chair's Message

Matt Greaney



It is tough to believe that the year is nearly over, and this is the last Chair's message I'll be writing. This year as Chair didn't go exactly as planned, but I think that would be a fair statement for just about everyone to make. We started the year off strong with Professor Chad Mirkin receiving the annual SVACS Mosher Award in January, and then in February hosting Professor Dick Zare where he presented Chemistry in

the Kitchen: Promoting Appreciation of Chemistry and Science. We were also greeted with amazing news early in the year: Councilor (and former Chair) Jane Frommer received the prestigious Perkin Medal. COVID-19 hit home hard in early March, and we decided (and shortly thereafter were mandated) to either switch to virtual formats or postpone all our planned future events.

This was not our ideal approach, but this year has forced us to adapt

*continued on next page*

## UPCOMING EVENTS

- Dec 7** **Rising Inequalities: A Conversation on College Access, Diversity, and Social Mobility in the U.S.**  
Anthony Jack, Harvard University and author; and Paul Tough, author  
Sponsored by McCoy Family Center for Ethics in Society, Stanford University  
5:00-6:30pm, online via Zoom, Free, **Registration required**
- Dec 8** **Executive Committee Meeting for the ACS Silicon Valley Section**  
7:00-8:30pm, online via Zoom, visitors welcome: **contact us** if you want to attend.
- Dec 9** **Metals, Alloys and Salts, Oh My - Mining a wealth of Inorganic Chemistry with SciFindern**  
Hosted by CAS (Chemical Abstracts Service)  
Offered 7:00-7:45am, 1:00-1:45pm, & 6:00-6:45pm, Free, **Registration required**

*continued on next page*

*Art as Evidence, continued from front page*

without the removal of any sample, such as X-ray fluorescence and Raman spectroscopies), or can provide new and vital information with the removal of only minimal amounts of material (such as trace analysis via inductively coupled plasma mass spectrometry (ICP-MS) or chemical state information via X-ray absorption near edge spectroscopy (XANES)). Underlying all the work is the common goal of furthering the understanding of the materials and methods used in the creation, interpretation and conservation of works of art.

This talk will present examples of research focused on objects in the collection of the J. Paul Getty Museum, ranging from Egyptian mummies, to medieval manuscripts, to Italian gilded panel paintings, to 19th century French drawings, to paintings by Rembrandt.

Karen Trentelman is a senior scientist at the Getty Conservation Institute (GCI) where she leads the Technical Studies research group. Current areas of research include: the application of non-invasive spectroscopic and imaging technologies to the study of paintings and illuminated manuscripts, reverse engineering of ancient and historic artistic technologies, and the elucidation of pigment degradation pathways. She is also active in the education and training of scientists and conservators in the application of X-ray fluorescence spectroscopy to study works of art, having organized bi-annual workshops since 2002. She received a Ph.D. in Chemistry from Cornell University and carried out postdoctoral research at Northwestern University and the University of Illinois, Chicago. She was a research scientist at the Detroit Institute of Arts before joining the Getty in 2004.

*Chair's Message, continued from front page*

on the fly. And I honestly believe that many of the changes made to our daily routines and how we go about them have opened the possibility that the future in which we "return to normal" may look considerably different than pre-2020. Surely the increased awareness regarding sanitary practices and hygiene is a good thing. A greater acceptance of meeting and working remotely affords us more personal time, reduces pollution and congestion, and overcomes geographic (and economic) limitations. The Spring 2020 ACS National Meeting was cancelled and the Fall 2020 ACS National Meeting was held virtually. The Spring 2021 ACS National Meeting will be an all-virtual meeting lasting two weeks. I've personally heard from several SVACS members that this virtual option would enable their participation in future National Meetings in which they would otherwise not be able to attend for health and/or financial reasons. I strongly believe there is great value in person-to-person interactions. While I eagerly await the return to freely traveling and seeing each other's faces, it should not come at the expense of the virtual participation options to which we've so quickly become accustomed. Let's not forget that it does work.

I believe the SVACS Executive Committee has done a commendable job adapting to the requirement of meeting and hosting in an all-virtual format. Several Councilors and Officers have stepped up to the call and figured out ways to organize section-wide events, collaborate with sister sections and societies, and initiate new programs. I'd especially like to thank and recognize Chair-Elect Jigisha Shah, Immediate Past-Chair Grace Baysinger, and Councilor Natalie McClure for their persistent efforts to maintain the active participation and visibility of SVACS in the greater community. I could use a full Chair's Message to highlight the selfless efforts of each one of my SVACS colleagues, but I feel special thanks are justified for these three.

As the year closes, we still have some noteworthy events on the horizon. Don't miss a virtual SVACS presentation by Dr. Karen Trentelman of the Getty Conservation Institute on December 10, 2020 (6-8pm), as she discusses "Art

## UPCOMING EVENTS (continued)

- Dec 9** **22nd Annual ChemLuminary Awards Virtual Ceremony**  
Hosted by the American Chemical Society  
1pm, Virtual event, Free, [Virtual Ceremony Registration](#)
- Dec 10** **Systems Thinking in Chemistry Education: Preparing Global Citizens for a Sustainable Future ([Learn more](#))**  
MaryKay Orgill, Univ. Nevada-Las Vegas; and Peter Mahaffy, The Kings University, Edmonton  
Webinar Sponsored by the American Chemical Society and the ACS Green Chemistry Institute  
11am-Noon, Free, [Registration required](#)
- Art as Evidence: The technical study and scientific examination of works of art at the Getty**  
Karen Trentelman, Getty Conservation Institute  
Webinar sponsored by the ACS Silicon Valley Section  
6:00-8:00pm, online via Zoom, Free, [Registration required](#)
- Dec 15** **Synthesis and Application of Super-Soft Elastomers**  
Prof. Christopher M. Bates, UC-Santa Barbara, Materials Department  
Webinar sponsored by the Golden Gate Polymer Forum (GGPF)  
6:30-8:00pm, online via Zoom, Free/\$5 Donation, [Registration required](#)
- Jan 21** **Stereoselective Construction of Challenging C-C Bonds: Total Synthesis of Complex Bioactive Agents (Harry and Carol Mosher Award presentation)**  
Professor P. Andrew Evans, Queen's University, Ontario Canada, Chemistry Department  
Sponsored by the ACS Silicon Valley Section  
Time TBD, online via Zoom, Free, Registration link available in January
- Apr 5-16** **ACS Spring 2021 National Meeting**  
Macromolecular Chemistry: The Second Century  
Fully virtual event, [Learn more](#)
- Apr 16** **2nd Annual Bay Area Chemistry Symposium ([Learn more](#))**  
An ACS-sponsored event  
Location: Gilead Sciences, 333 Lakeside Drive, Foster City, CA

as Evidence: The Technical Study and Scientific Examination of Works of Art at the Getty". Register at <https://karentrelman.brownpapertickets.com/>. The annual ACS Chemluminary Awards Symposium will be held virtually on Wednesday, December 9. SVACS has been selected as a finalist for seven different Chemluminary Awards as a result of our 2019 efforts. I look forward to reporting back to the membership on the outcome of these awards early next year. Finally, although we've had to postpone all of our in-person events since March, all of our initially scheduled speakers have agreed to join us in person or virtually in 2021. We will actively update the membership as things develop.

**Matt Greaney**

2020 SVACS Chair

2020-2022 SVACS Councilor

ACS Committee on Economic and Professional Affairs member

## 2020 Teacher-Scholar Award

Professor Sewan Fan, Hartnell College

For contributions to students across the science disciplines at Hartnell College and beyond, the Silicon Valley ACS has awarded Professor Sewan Fan the 2020 Teacher-Scholar Award. Created in 2009 by the Silicon Valley ACS section (then called the Santa Clara Valley ACS section), this award is the first of its kind in the ACS to recognize excellence in community college chemical education.

After earning his Ph.D. in Physics at the University of Hong Kong, Professor Fan moved to the S.F. Bay Area to work at the Stanford Linear Accelerator Center. In the ensuing years, Prof. Fan brought his cross-disciplinary research interests to his students at Hartnell College. Utilizing a U.S. Department of Education Grant to pay for materials, Prof. Fan volunteered his time and expertise to engage students in a wide range of projects including, for example, the preparation of silver nanoparticles, the assembly and testing of silicon photomultipliers and the study of perovskite solar cells.

Several of his students have presented their research at American Chemical Society and American Physical Society conferences.

Professor Fan's contributions extend well beyond Hartnell College, as his outreach engages students from community colleges and high schools throughout the SF Bay Area. In addition to his teaching, he organizes field trips and connects students to valued internship opportunities. As his colleagues attest, Professor Fan embodies the spirit of the Teacher-Scholar. He gives students confidence in their scientific abilities, inspires them to explore and experiment, and encourages them to pursue careers in science.

Prof. Fan will receive a \$500 award, as will the Physical Science and Math Division at Hartnell College, a Latinx-majority community college in Salinas, CA. We look forward to a future day when the SVACS community can gather to present Professor Fan his award in person.



## 2020 SVACS Election Results

Voting was open from 12:01am, October 23, 2020 to 11:59pm, November 15, 2020.

Total voters for ballot: 259 (10.7% of 2,431 members and 9 additional abstentions, 0.4%) as of 9:40pm on Monday, November 16, 2020 (U.S. Pacific).

Many thanks to the 259 members who voted this year. This number is 10.7% of the 2,431 eligible voters as determined by ACS records. Your participation as members is appreciated and we encourage you all to continue your membership. We thank all the candidates who ran for office and look forward to an exciting and eventful 2021.

Please consider ways to participate and to support the ACS, Silicon Valley Local Section, and the various committees that accomplish our MISSION: **“Engaging the chemistry community by providing professional development, educational opportunities, networking, and recognition; and by sharing innovative, exciting, and fun chemistry with our diverse broader community through education and outreach.”**

**Chair-Elect** ( 255 total voters this ballot; vote for 1):

Votes	Name	%	
254	<b>Stephanie Benight</b>	99.6%	
1	Write-in	0.4%	
1	Write-ins		

**Secretary** ( 253 total voters this ballot; vote for 1):

Votes	Name	%	
252	<b>Prasad Raut</b>	99.6%	
1	Write-in	0.4%	
1	Write-ins		

**Councilor** ( 257 total voters this ballot; vote for 2):

Votes	Name	%	
243	<b>Natalie McClure</b>	94.6%	
240	<b>Grace Baysinger</b>	93.4%	
2	Write-in A	0.8%	
1	Write-in B	0.4%	
3	Write-ins		

**Alternate Councilor** ( 254 total voters this ballot; vote for 2):

Votes	Name	%	
237	<b>Dipti Shingnapurkar</b>	93.3%	
236	<b>Howard Peters</b>	92.9%	
1	Write-in A	0.4%	
1	Write-in B	0.4%	
2	Write-ins		

## 2020 Harry and Carol Mosher Award Winner

Professor P. Andrew Evans

Alfred R. Bader Chair in Organic Chemistry  
Department of Chemistry  
Queen's University, Ontario Canada



Professor Evans will be honored by zoom on January 21, 2021. He will give a presentation on his research: **Stereoselective Construction of Challenging C-C Bonds: Total Synthesis of Complex Bioactive Agents.**

More details will be provided in the January newsletter.

# Making a Difference - SVACS Brings Science to Life through Outreach in 2020

Sogol Teschler

A positive and valuable lesson that COVID-19 has taught us is that we, humans, can be so creative and adapt to make the most out of everything. With the help of the remote tools available to us, Silicon Valley ACS was able to have one of the most successful outreach programs this year, in collaboration with the Redwood City (RWC) library.

This event was led by Natalie McClure and Jigisha Shah, two of the most dedicated SVACS volunteers, with great cooperation from Pam Evans, RWC librarian, and other SVACS scientist volunteers Dahyun Oh, Kristin Schmidt, Avni Gandhi, Dipti Shingnapukar, and Sogol Teschler.

Every Wednesday during the month of October we prepared and handed out bags containing all the required materials and instructions for experiments targeted for middle school students. These experiments were selected from ACS 'Celebrating Chemistry' booklets:

- Sept 30/Oct 1: *Energy-Now and Forever (NCW 2013 theme)*

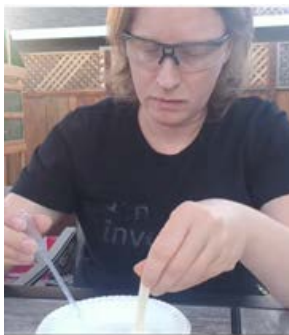
Experiments: a) thermal expansion to blow up a balloon and b) making a solar-powered pinwheel.



- Oct 7/8: *Sustainability (CCEW 2020 theme)*  
Experiments: a) Recycling water and b) earth friendly plastics—making “water pods” from calcium lactate and alginate powder



- Oct 14/15: *Adhesives (NCW 2020 theme)*  
Experiments: a) how many times can you stick a Post-it note and b) making glue and testing its strength against commercial glue products



- Oct 21/22: *Marine Chemistry (CCEW 2018 theme)*

Experiments: a) seashell-antacids of the seas and b) salt water rainbows



Then on Thursdays, we all got together with the students and families through a Zoom virtual meeting to watch a recorded instruction video of the activities and to answer live questions. An average, 21 students attended each of the four virtual live events and enthusiastically participated in the activities. The grand finale was on Saturday

October 24, when normally we would have had our Bay Area Science Festival at Oracle Park. Instead, this year, we hosted a live Zoom event with 56 students and their families solving a mystery through chemistry:

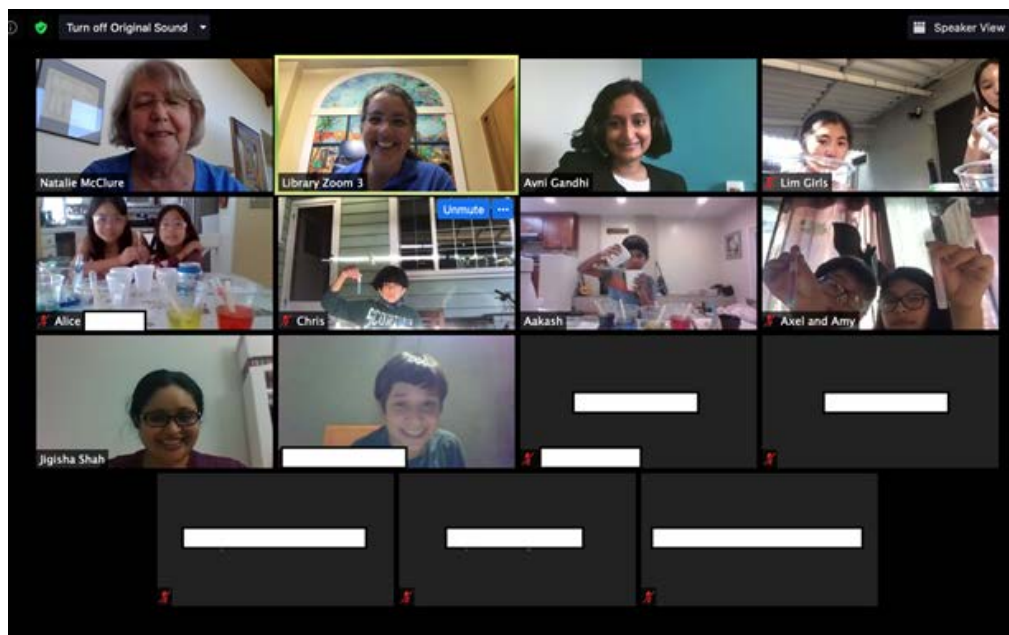
- Oct 24 (family day): *Solving Mysteries through Chemistry*

Experiments: a) hidden messages (goldenrod paper) and b) identifying the unknown powder.



We were thrilled to hear all the positive comments that came back from the students that participated. Our all-time favorite one was when one child called out “I feel like a chemist”. That comment by itself paid off all our outreach volunteer efforts and made us feel accomplished. Other feedback included quips “Whoa, cool! The color changed”, “Is that a chemical change or a physical change?”, “Oh wait, I’m not done. I made a mistake in my logic”, and “This is so fun!” on showing us a secret message come into view.

Stay tuned for our future program of this interactive nature as we are planning to continue our virtual outreach events.

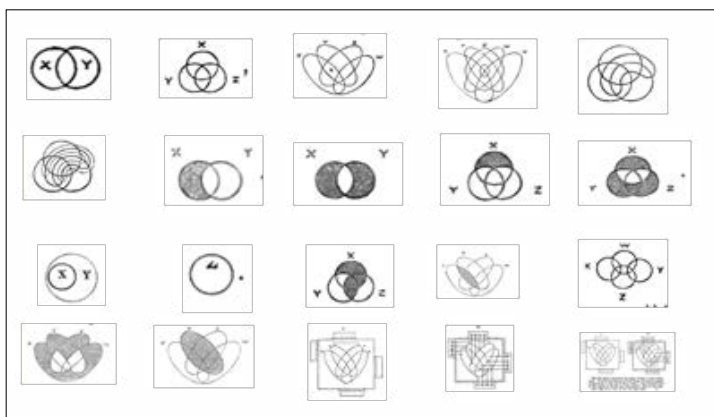


## Worth Knowing About

by Stephen Boyer, PhD

### "Eulerian Circles"

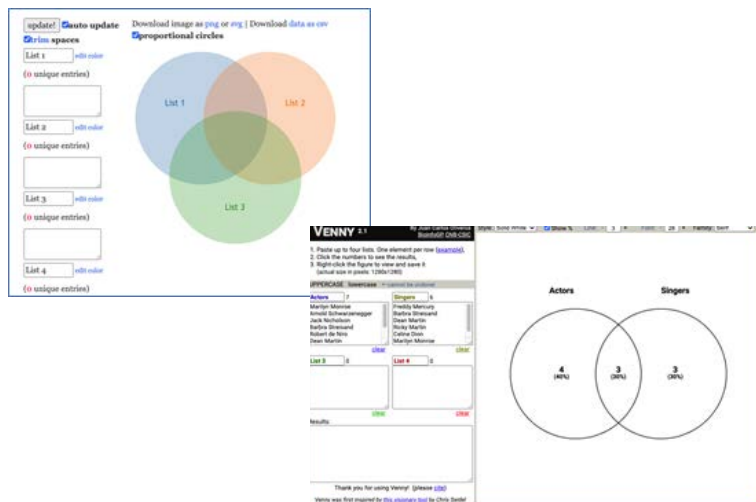
Eulerian circles date back to the 1750's in the Physics Department of the University of Basel although precedence dates back to the 13th century. These extensions of Leonhard Euler's diagrams are a means of visualizing relationships between sets of objects or concepts. Today, they are commonly referred to as Venn diagrams, named after **John Venn** who referred to them as Eulerian circles in his 1880 seminal paper "On the Diagrammatic and Mechanical Representation of Propositions and Reasonings". Drawings from Venn's paper are shown below. It wasn't until 1918 that the term Venn diagram was coined, by American academic philosopher Clarence Irving Lewis in his book A Survey of Symbolic Logic.



Original drawings from British logician and philosopher John Venn, illustrating the different ways to represent propositions by means of diagrams

These representations are truly useful in many of life's endeavors, including chemistry. In the field of chemical and bio informatics, they are routinely used to compare output from data mining experiments, e.g., comparing lists of molecules (*as InChIkeys*) and their properties. It's insightful to visualize the overlaps, illustrated in the example of international patents, below. The star of this month's Worth Knowing About column - **Venny** - is a free web-based application developed by Juan Carlos Oliveros that generates Venn diagrams. This well-designed tool is user-friendly and allows the user to simply drag a list into box 1 and another list into box 2 (or more) and visualize output on shared and nonshared properties.

Venny goes beyond facile visualization of overlapping datasets. It automatically eliminates duplicates, and allows downloading inner joins, outer joins, and overlap. It is a stalwart application in the toolkit of data analysis.



Venny screen captures illustrating the user-friendly GUI

## 22nd Annual ChemLuminary Awards Virtual Ceremony - Please Join Us

Wednesday, December 9, 2020 at 1:00pm Pacific Time



The 22nd Annual ChemLuminary Awards ceremony will be held virtually and will include a keynote address by Janet L. Bryant, recipient of the 2020 Award for Volunteer Service to the American Chemical Society, and the presentations of awards given by 23 committees of the Society will follow.

The Silicon Valley Local ACS Section has been selected as a finalist for the following ChemLuminary Awards for activities held in 2019:

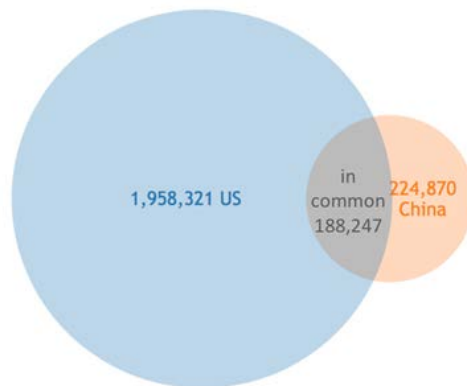
- Outstanding Local Section Career Program
- Outstanding New Local Section Younger Chemists Committee
- Best Activity or Program Highlighting ACS Change Drivers or Strategic Planning
- Outstanding Local Section Industry Event
- Outstanding Performance by a Local Section (Large Size)
- Membership Affairs Committee Industry Engagement & Outreach
- Best New Senior Chemists Activity within a Local Section

Award-winning Local Sections, Technical Divisions, International Chapters, and Regional Meetings will receive a \$500 cash prize and a ChemLuminary award plaque that will be shipped immediately following the ceremony.

Registration is complimentary. Attendees will receive an access code to enter the event. [Virtual ceremony registration](#)

Venny's diagrams are calculated through javascript; therefore, no data is sent to the server. Users can use and modify the source of this page.

In an example of investigating overlap between the occurrence of molecules in worldwide patents, all the molecules (in claims) from China's patent office and from the US patent office were identified in curated Google Patents data. Those massive lists - numbering 413,117 and 2,146,568 molecules for China and the US, respectively - were entered into Venny (in their machine-readable InChI formats).



This figure provides powerful visualization of the extent that molecules occur uniquely or redundantly in different patent-issuing authorities.

**An earlier version of Venny** allows output of circles drawn in proportion to each other, illustrated in this example.

# Month-by-Month: A Summary of 2020 Programs and Outreach Events Organized or Co-Sponsored by the Silicon Valley Section of ACS (SVACS)

## January

- Prof. Chad Mirkin (Northwestern University), Ushering in the Era of Digital Drug Design, Harry and Carol Mosher Award dinner meeting. (Holiday Inn, South San Francisco on Jan. 23rd).

## February

- SVACS' Younger Chemists Committee (YCC) held a speed networking event (Santa Clara

University on Feb. 6th).

- Prof. Richard Zare (Stanford University), Chemistry in the Kitchen: Promoting Appreciation of Chemistry and Science. (Michael's at Shoreline, Mountain View on Feb. 19th).
- Teach the Teachers Workshop (Biocurious, Santa Clara on Feb. 29th).

## June

- Dr. Molly Morse (CEO of Mango Materials), Replacing Plastics: Can Bacteria Help Us Break the Habit? SVACS and Golden Gate Polymer Forum 2020 Joint Event (online via Zoom on June 24th).

## October

- Pop Up Chemistry for Ages 9-12. Co-sponsored with the Redwood City (RWC) Public Library. Held every Wednesday and Thursday in October. Participants picked up kits at the RWC Public Library on Wednesdays and workshops were conducted live online via Zoom on Thursdays. The family day event was held on Saturday.
- "Picture a Scientist" Weekend Movie Screening. Co-sponsored by ACS California Section, ACS Silicon Valley Section, and Association of Women in Science East Bay Chapter (online via Zoom on Oct. 17-18).
- Dr. Christina Banks (Director of the Interdisciplinary Center for Healthy Workplaces at UC Berkeley), Healthy Workplaces during COVID-19: Work-Life Balance (webinar co-sponsored by ACS California Section and ACS Silicon Valley Section on Oct. 19th).
- Silicon Valley Advanced Water Purification Center, A Virtual Tour for Chemists (online via Zoom on Oct. 29th).

## November

- Dr. Margareta (Greti) Séquin (Dominican University and San Francisco State University), From Plant Scents to Perfumes (online via Zoom on Nov. 12th).
- Silicon Valley ACS Book Club re-initiated activity, holding its first meeting in 2020 to discuss 'Napoleon's Buttons: 17 Molecules That Changed History' (online via Zoom on Nov. 21st).

## December

- Karen Trentelman (Getty Conservation Institute), Art as Evidence: The technical study and scientific examination of works of art at the Getty (online via Zoom on Dec. 10th).

## Monthly Events

- Connect-with-Chemists meetings were held the third Thursday of January and of February.
- SVACS Executive Committee Meetings were held monthly, in person in January and February and online in March through December. The Annual SVACS Business Meeting was held in October.

## SVACS Grants, Awards, and Recognition: A Recap of 2020



**Chad A. Mirkin**  
Mosher Award



**Jane Frommer**  
Ottenberg Award



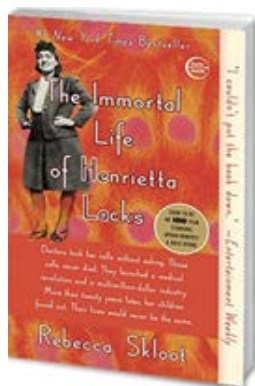
**Thomas R. Beattie**  
Radding Award

Articles about the accomplishments of recipients appeared throughout the year in our SVACS 2020 newsletters, summarized in the table below. The Grants and Awards are described on the SVACS website, <http://svacs.org/you-should-know/section-awards>

Name of Award/Recognition	Recipient	Newsletter volume 43 (issue): page (month)
Harry and Carol Mosher Award	Prof. Chad A. Mirkin	43 (1): 1-2, 2020 (January)
Abraham Ottenberg Award	Jane Frommer	43 (8): 2, 2020 (August)
Shirley B. Radding Award	Dr. Thomas R. Beattie	43 (8): 3, 2020 (August)
Teacher-Scholar Award	Prof. Sewan Fan	43 (12): 2020 (December)
Outreach Volunteer of the Year for the Silicon Valley Section	Natalie McClure	43 (4): 4, 2020 (April)
SVACS appreciation for long-term service on the Executive Committee	George Lechner and Dave Parker	43 (1): 3, 2020 (January)
SVACS appreciation for long-term service on the Executive Committee and as webmaster	Ean Warren	43 (7): 3, 2020 (July)
SVACS appreciation for long-term service as Chemistry Olympiad Coordinator	Sally Peters	Coming soon!
SVACS appreciation for long-term service as Newsletter Editor and Assoc. Editor	Kevin Greenman and Partha Bera	43 (4): 1, 2020 (April)
SVACS appreciation for completing term as Past-Chair	Melody Esfandiari	43 (1): 4, 2020 (January)
Perkin Medal (from the Society of Chemical Industry)	Jane Frommer Jose Ramirez	43 (4): 3, 2020 (April) 43 (6): 4, 2020 (June)

## SVACS Book Club

By Greg Braggin and Natalie McClure



The Silicon Valley ACS Book Club will be meeting online via Zoom in January to discuss *The Immortal Life of Henrietta Lacks* by Rebecca Skloot. To join this discussion, sign up for email alerts at [svacs-book-club@googlegroups.com](mailto:svacs-book-club@googlegroups.com). A poll will be sent out in early January to select a date for this meeting. All are welcome to join the SVACS Book Club!

**About *The Immortal Life of Henrietta Lacks*:** “Her name was Henrietta Lacks, but scientists know her as HeLa. She was a poor black tobacco farmer whose cells—taken without her knowledge in 1951—became one of the most important tools in medicine, vital for developing the polio vaccine, cloning, gene mapping, in vitro fertilization, and more. Henrietta’s cells have been bought and sold by the billions, yet she remains virtually unknown, and her family can’t afford health insurance.

Made into an HBO movie by Oprah Winfrey and Alan Ball, this New York Times bestseller takes

readers on an extraordinary journey, from the “colored” ward of Johns Hopkins Hospital in the 1950s to stark white laboratories with freezers filled with HeLa cells, from Henrietta’s small, dying hometown of Clover, Virginia, to East Baltimore today, where her children and grandchildren live and struggle with the legacy of her cells. *The Immortal Life of Henrietta Lacks* tells a riveting story of the collision between ethics, race, and medicine; of scientific discovery and faith healing; and of a daughter consumed with questions about the mother she never knew. It’s a story inextricably connected to the dark history of experimentation on African Americans, the birth of bioethics, and the legal battles over whether we control the stuff we’re made of.”



[Watch the book trailer](#)

## Hydrogen Fuel: Insights into a Growing Market



“The emerging, transformative potential of hydrogen as an alternative renewable fuel source is widely recognized, propelling intense interest across multiple industries including electricity, heating and transportation.

With new innovations driving rapid progress, the worldwide hydrogen market is expected to see dramatic growth to exceed \$200bn by the end of 2025 creating opportunity across commercial, academic and government sectors. For researchers, funding agencies, investors and business stakeholders in this space, it is essential to keep up to date with emerging trends in the dynamic and complex research and intellectual property landscape to maximize innovation progress and commercial opportunity.

**Download this in-depth CAS Market Report** to gain insight into the evolution of hydrogen fuel technology, the global innovation landscape, key market trends and potential applications and opportunities.”

## Welcome to the Silicon Valley Section of ACS

Each month, the section receives a spreadsheet from national ACS with the names of members new to our section. The members are either new to ACS, have transferred in from other areas, or are the newest members – students. To welcome you to the section and get to know you, the Executive Committee offers new members a free dinner at a monthly section seminar meeting, once we return to meeting in person! When you register for the event, make certain to mention that you are a new member and you and a friend will be our guests. The seminar meetings are held at a number of local venues. We hope you will also join us for an outreach event, like judging a science fair, proctoring the Chemistry Olympiad, or participating in a National Chemistry Week event in October. Plan to be at our annual beer & wine tasting and awards picnic each July on the Stanford campus. The local section is a volunteer organization. Attend an event, volunteer to help, and get to know your local fellow chemists. Welcome!

Please note: in-person events have been suspended during the pandemic but we are meeting virtually. The offer for a free dinner stands for new members once we start getting together in person again.

### NEW ACS MEMBERS

Ragiah El Shantaly  
Dr. Bryan Scott Fales  
Elizabeth Flynn  
Samantha Green  
Alexia Gutierrez Ledesma

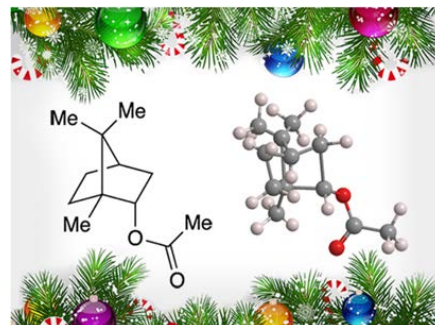
Kenny Lineker  
Renmeng Liu  
Supriya Moore  
William Oliver  
Valery Ortiz

Dr. Peter T. Palmer  
Zachary Smith  
Dr. Anna W. Tai  
Dr. Shou Wong  
Dr. Minglang Wu

CHEMISTRY

## Quiz

I provide a key aroma this time of year.



What molecule am I?

Answer

## Apply Now: 2021 IUPAC Young Observer Program

Deadline: December 18, 2020



The International Union for Pure and Applied Chemistry (IUPAC) Young Observer Program allows young scientists and engineers

to collaborate internationally with acclaimed scientists in their fields, gain knowledge of global research activities, and participate in IUPAC

projects. Young Observers will also get to attend the next IUPAC General Assembly and Congress on August 13-20, 2021 in Montreal, Canada.

**Applications are now open for the 2021 Young Observer Program.** U.S. scientists and engineers (U.S. citizens and permanent residents) under the age of 45 from industry, academia, and national laboratories are welcome to apply. Applicants under 35 will also have the opportunity to be considered to serve as a U.S. delegate to *the International Younger Chemists Network (IYCN)*. For more information on the review criteria and to access the link to the application form, [click here](#).

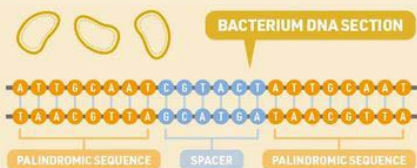
**Please submit your application by 5:00 PM (ET) on Friday, December 18, 2020. [Apply now](#)**

**Contact Us:** If you have any questions, please contact Dr. Maggie Walser at [mwalser@nas.edu](mailto:mwalser@nas.edu).

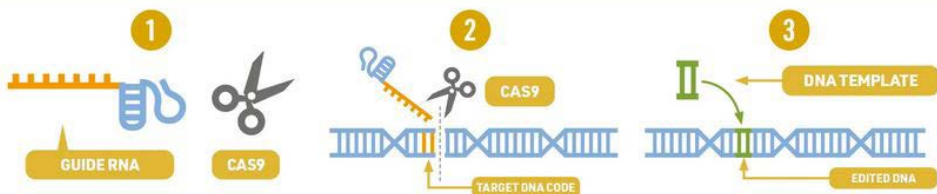
## 2020 Nobel Prize in Chemistry

### 2020 NOBEL PRIZE IN CHEMISTRY

The Nobel Prize in Chemistry 2020 was awarded to **Emmanuelle Charpentier and Jennifer A. Doudna** for the development of CRISPR-Cas9 genetic scissors, a method for genome editing.



CRISPR stands for clustered regularly interspaced short palindromic repeats. It refers to repeated sequences in bacteria and archaea DNA. These sequences are part of an immune system; if a bacterium survives a viral infection, it adds a section of the virus genetic code to the CRISPR region of its own to serve as a memory in case it's infected again. **Charpentier and Doudna** saw that this could be used as a gene editing tool.



The first step in the CRISPR gene editing process is the creation of a strand of guide RNA. This matches the DNA sequence where we want to make a cut. A scissor protein, Cas9, binds to the guide RNA.

The guide RNA searches for the target section of DNA and transports the scissor protein to it. The scissor protein cuts the DNA at this point.

The cell will try and repair the cut DNA. This process is error-prone, disrupting the gene function. If we add a template, the cell will use this to carry out the repair, allowing us to edit the genetic code.

### WHY DOES THIS RESEARCH MATTER?

The ability to edit genomes has already found uses in plant breeding. Therapies which use it to treat some types of cancer are already in clinical trials, and it's hoped it may lead to cures for inherited diseases.

Nobel Prize in Chemistry press release: <https://www.nobelprize.org/uploads/2020/10/press-chemistryprize2020.pdf>



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**The 2020 Nobel Prize in Chemistry: Using genetic scissors to edit the genome**  
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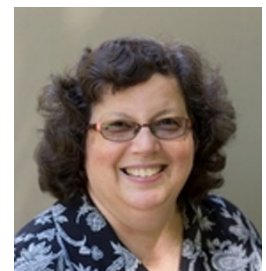
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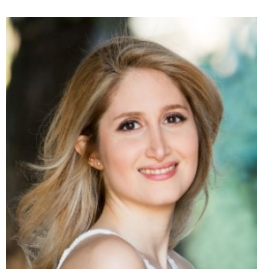
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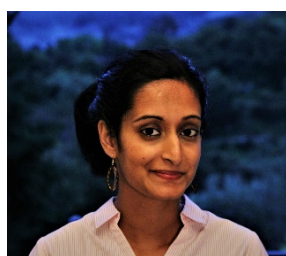
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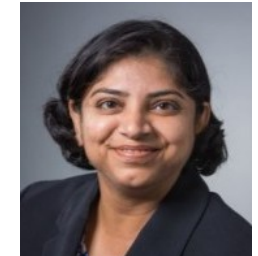
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# THE CHEMISTRY OF LED LIGHTS

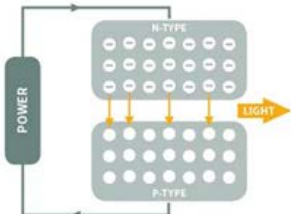
LED lights come in a full range of colours – this graphic takes a closer look at the chemistry behind how their light and varied hues are achieved.



## HOW DO LEDS WORK?

Light emitting diodes (LEDs) use semiconducting materials to produce light and colour. Many of the materials used are based on gallium, such as gallium phosphide (GaP) and gallium nitride (GaN).

Layers of the semiconductor are "doped" with impurities. This creates an n-type layer, which has electrons spare, and a p-type layer, which has electron "holes". When a current is applied, electrons from the n-type layer combine with the "holes" in the p-type layer. When the electrons fall into these holes, they release energy in the form of visible light.



## HOW ARE DIFFERENT COLOURS MADE?

A variety of colours are made possible by the use of different semiconducting materials, and "doping" them with different types and amounts of impurities. This affects the energy gap between the n-type and p-type layers, affecting the wavelength of light produced when a current passes through the LED.

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Just in time for decorating with lights for Christmas!

*A Basic Guide to How LED Lights Work* – The Chemistry of LED Lights [click to enlarge](#)

Also see *The Chemistry Advent Calendar 2020: Christmas chemistry at home*

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