Newsletter

November 2018

Silicon Valley Chemist

Silicon Valley Section American Chemical Society

Volume 40 No. 11

NOVEMBER 2018 NEWSLETTER TOPICS

Connect with Chemists

An early morning chat with fellow chemists

Thursday, November 15, 2018, at 7 a.m.

Coupa Café, 538 Ramona Street, Palo Alto

Contact Ean Warren (*ewarren@scvacs.org*) for more information or ask for ACS at Coupa.

REMINDER **SVACS November 14th Dinner Seminar** REMINDER

Disrupting the Energy Value Chain Distributed Scale Olefins

Erik C. Scher, Ph.D., COO of Siluria Technologies Inc.

Abstract:

Long term global trends are contributing to sustained downward pressure on the value of natural gas and, more generally on any fuel gas streams whose value is directly linked to their intrinsic energy content rather than their potential to act as carbon feedstock for manufacturing.

As a result, resource owners around the world are now faced with the considerable challenge of identifying attractive options to monetize their natural gas resources and provide sufficient net-back to justify the capital investments required for new upstream capacity.

At the same time the remarkable ubiquity, abundance and affordability of gas resources provide a unique opportunity for non-integrated downstream producers to obtain access to lower cost carbon feedstock, to expand capacity in traditionally feedstock-constrained areas and/or to re-optimize their operations via back-integration into base chemicals production.

Siluria's unique process technologies (based on Oxidative Coupling of Methane or OCM) represent the ideal solution to this upstream challenge and are an enabler of this new downstream opportunity by converting short-chain alkanes (methane, ethane and propane) into olefins (ethylene and/or propylene) via a carbon-efficient, cost effective, and highly scalable (up and down)

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Chair's Message

Melody Esfandiari

4 performances, 4 universities, over 1200 audience members, 4 receptions, a whole lot of interaction, and some tears. That pretty much sums up the No Belles. I am so proud of our section for pulling off one of the bigger events our section has ever organized. It took two inspiring women, Jane Frommer and Natalie McClure, to bring the No Belles show to our local universities: Santa Clara, UC Santa Cruz, Stanford, and San Jose State.

If you have missed this in our previous newsletter, the No Belles performance is presented by thy Portal Theatre and highlights the gender bias in the sciences and the fact that very few women have been awarded the Nobel Prize in the STEM area.

The timing of this show has been very serendipitous! When we started to plan this last year, we had no idea that a woman in physics, for the first time in 55 years, and a woman in chemistry, only for the 2nd time in 54 years, would be awarded the Nobel Prize this year. So the timing of this show could have not been more perfect, and I'm so glad that many of our students and local communities got a chance to enjoy it. On behalf of our local section, I would like to thank every-

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SVACS November Dinner Seminar

Date: Wednesday, November 14, 2018

Time: 6:00-9:00 pm

Speaker: Dr. Erik Scher
Siluria Technologies

Location: Basque Cultural Center
599 Railroad Avenue
South San Francisco, CA

Costs: $30 regular
$15 student

Registration:
https://www.brownpapertickets.com/event/3584710

Dinner Seminar, continued from front page

single-step process.

Since its inception, Siluria has taken the core competencies it built in order to develop its OCM technology and applied it to develop multiple process technologies. Siluria is currently commercializing its Gemini (methane to ethylene), Modus (refinery waste gas upgrading) and Orion (natural gas to propylene) technologies with its EPC partners; Linde Engineering, Wood (formerly AmecFosterWheeler), and Maire Tecnimont respectively.

Biography:

With a background in chemistry and engineering, Dr. Erik Scher is a technology executive who is commercializing solutions to long-standing challenges in the chemical industry. At Siluria Technologies, he has been both an innovator and a leader, taking the company from a two-person concept to a 70-person operation that has proven its proprietary natural gas conversion processes at pilot and demonstration plants in California and Texas. Dr. Scher has led efforts to develop and commercialize novel technologies at three venture-backed energy/chemicals companies over the last 16 years. He has built and managed technology organizations, including R&D, catalyst scale-up, pilot engineering, plant operations, and process engineering, as well as led commercial teams spanning intellectual property, business development, licensing, project development, and strategic partnerships. He is currently the COO at Siluria where he manages the; R&D, Development/ Scale-up, Technology, Operations, and Intellectual Property groups amongst others.

Dr. Scher earned his PhD in Materials Chemistry from the University of California, Berkeley. Prior to his PhD, Dr. Scher received his Bachelors degree in Chemistry from Rice University in Houston. He is an inventor on over 80 issued patents, over 100 pending patent applications, and was recognized as a MIT Technology Review Top 100 Innovator under 35 in 2004.

Chair's Message, continued from front page

one who helped us bring this show to their campuses. It was a very moving and thought provoking play. As I watched the performers bringing to life the women scientists who struggled to be heard, one question was going through my mind. In 50 years, if someone rewrites this show, will a different story be told? A more balanced one? I hope.

Now I would like to divert your attention to our next event, as you are getting ready for Thanksgiving. In November, we have our annual beer brewing competition. This also is well-timed as a few beers made by chemists might be needed to make the holiday shopping and errands more tolerable. Have a wonderful Thanksgiving with your family and friends!

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! To encourage you to attend a monthly section seminar meeting, we would like you to be our guest. When you register, 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. If you are unable to attend inthe evening, perhaps you would 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. Then, there is our annual wine tasting and awards picnic in July. The local section is a volunteer organization. Please attend an event, volunteer to help and get to know your local fellow chemists. Welcome!

New SVACS Members

Catherine Emma Albrecht
Leah Marie Bouthillette
Tim Chen
Celia Dudley
Krisha L. Kerr-Poole
Roberto Ladino
Jason Lango
Dr. Jiwen Liu
Michael R. McCarthy
Priya Moni
Kevin Nguyen
Michael Nshanian
Anish Sangari
Chenfei Shen
Nicole Shimshock
Bryan Sierra-Rivera
Ching-Ting Tsai
Sheryl Turner
Steven H. Unger
Dr. Korin Wheeler
Katherine Woo

Councilor on Campus Report

by Linda S. Brunauer

The Councilor update this month is a focus on the fabulous activities of the ACS student member chapters in our local section. These ACS-affiliated student groups have distinguished themselves as active vibrant parts of our ACS community. They are always willing to volunteer to assist the section as well as their home institutions with a wide range of activities. Here is a sampling of activities that these four groups have engaged in during the last year or two as well as some future plans.

San Jose State University:

The Chemistry Club at SJSU has been very active in their local chemistry community. They sponsored weekly departmental seminars, providing both snacks and active advertising to get the word out to their colleagues. They organized an annual Chemistry Winter Formal that featured a wonderful meal and an opportunity for faculty and their families to interact with students in the Department. The SJSU Chemistry Club was also active in outreach activities. They organized a series of hands-on demonstrations to present at local high schools in the San Jose area and volunteered to assist the local section with the annual National Chemistry Week demonstrations at the Martin Luther King Jr. Library in San Jose. In May 2017 the Chemistry Club hosted the 29th Northern California Undergraduate Research Symposium. This event, which originated back in 1989 at Santa Clara University, brought about 150 undergraduate chemistry students to the SJSU campus, along with their faculty research mentors, for a full day of oral and poster presentations capped off by a great keynote address.

University of California, Santa Cruz:

The Chemistry Club at UC Santa Cruz is a student-led club that focuses on supplementing the rigorous curriculums of chemistry and related majors with valuable, immersive experiences primarily through the form of tours, speakers, and most importantly community outreach. Last year kicked off with a tour of SLAC National Accelerator Laboratory. In February, the club hosted high school students participating in the Santa Cruz Police Department PRIDE program. Together club members and visitors experimented with liquid nitrogen and balloons to demonstrate the ideal gas law. Gummy bears

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were exploded into purple flames to display the wonders of combustion reactions. Students left with a better understanding and appreciation of chemistry. In March, the club facilitated workshops for middle school students at Gavilan College in Gilroy, CA, for the Science Alive Program. In these workshops, students explored the process of sublimation using dry ice to make foggy bubbles filled with carbon dioxide, learned about the pH scale by testing household materials with a red cabbage indicator, and crafted their own lava lamps with water and oil. These hands-on experiments allowed the Chemistry Club to fully engage with students and grow their curiosity. For the last outreach event of the year, club members visited several science classes at Watsonville High School to perform demonstrations including salt flame tests, elephant toothpaste, and igniting methanol to make a loud boom. After the demonstrations, students were divided into two groups where each student was able to extract DNA from strawberries. Students again experimented with liquid nitrogen, but this time they placed flowers in it only to watch them shatter as they emerged from the liquid. Through these exciting hands-on demonstrations, students were able to experience science in a way they do not often encounter. Additionally, the club invited graduate students from UC Santa Cruz, a scientist from USGS, and another retired senior scientist from a biotechnology firm to present on their experiences and offer advice. The club plans to visit more high schools in addition to all of the activities last year and is looking forward to another exciting school year.

Stanford University:

Alpha Chi Sigma (AXS), the chemistry club at Stanford, focuses upon community service, outreach, and building community. AXS is widely known for their participation and assistance in the laboratory coat distribution for the chemistry and biology departments at the start of each quarter. This year, AXS is planning new events for members and the community which include the organization of a journal club to discuss recent publications in chemistry, expanding free tutoring services, and hold weekly events such as Jasper Ridge tours, lunches with faculty, career development activities, hiking the dish, and board-game nights. Finally, members teach in the campus-wide Splash program, which is designed to spark interest in science for middle and high school students. The most recent Splash course focused upon non-Newtonian fluids and the synthesis of slime.

Santa Clara University:

The Santa Clara University Chemistry Club kicked off the year with a flurry of activities, many of which involved work done in partnership with the local section. We assisted with preparations for two different Teach the Teachers' workshops, attended the section's "Nobelles" play, helped out at the annual Martin Luther King Library National Chemistry Week event, and held a Speed Networking event, organized in large part by Matt Greaney of YCC. The icing on the cake for the speed networking event is that it fell on National Mole Day! This Fall both SCU and SJSU were thrilled to work with Matt and his group of industrial and governmental colleagues to bring the networking event to our campuses. During the past year, the Chemistry Club also hosted three webinar viewing parties (making good use of the ACS "Program in a Box" webinar series and the ACS webinar archives), provided snacks and support for the Departmental seminar program, and participated in a "research panel" presentation for the "Introduction to Research" class. Of course, student groups always have to have some social interactions and the SCU Chemistry Club made sure to have plenty of those! In addition to several pizza parties, we celebrated the various "days": Mole Day, Earth Day, and, of course, Pi Day. For Earth Day in 2018 we celebrated by having a disposable lab coat decorating party. The event was followed by a brief fashion show to select the lab coat with the best Earth Day themed embellishments. Finally, we are proud to announce that our 25+ year string of consecutive National awards from the ACS is intact! We just found out that our club won an Honorable Mention for our activities in 2017-2018. As the faculty advisor of the group I am justifiably very proud of the hard work and enthusiasm of the club!

2nd Annual YCC and Senior Chemists Home Brew Competition

A Tasting, Judging, and Networking Event

Date: Saturday, November 10, 2018

Time: Noon - 3 pm

Location: Golden State Brewery, 1252 Memorex Drive, Santa Clara, CA 95050

Lead Contact: Matt Greaney (SVACS Councilor and YCC Lead) ***greaney19@gmail.com***

Registration: ***www.scvacs.org***

Registration Cost: $20 regular, $10 students and 50-yr members

Description: Come join the Silicon Valley ACS section for the 2nd Annual Younger Chemists-Senior Chemists Home Brew Competition. Back by popular demand, this event will be held on Saturday, November 10 from noon-3pm at Golden State Brewery. Meet your YCC and SCC members, and network with like-minded, beer-appreciating chemists & friends. All are welcome. The event will begin with unlimited beer tastings of any and all of the home brews entered, followed by judging and announcement of awards. Registration includes lunch from a local food truck, unlimited home brew sampling, and a pint or flight of beers from the Golden State Brewery lineup. Anyone interested in entering a home brew (or more than one) is encouraged to contact Matt Greaney at ***greaney19@gmail.com***. All home brewers entering a beer will be given a visa gift card as partial compensation for materials. The People's Choice and the Judges' Choice winners will be awarded an apparel package from the brewery's gift shop. As a special bonus, the Judges' Choice winner will be invited back to brew a commercial-scale batch of their beer with head brewer Seth Hendrickson. This is a great opportunity for networking and exploring your home-brewing know-how. Don't miss out!

New Definitions of SI Base Units

by Peter F. Rusch

Part I

The metric system, more correctly known as the International System of Units or SI Units, was founded in 1875 with an international treaty. The United States was one of the original signers.

The SI Base Units are: length (meter); time (second); mass (kilogram); electric current (ampere); thermodynamic temperature (kelvin); luminosity (candela) and the mole. Each Base Unit is of more or less importance in chemistry. All other units in the SI are derived from these seven Base Units.

Initial definitions of the base units related to the physical world. Time was a fraction of an Earth day. Length was a fraction of a great circle of the Earth. Mass was that of a cubic decimeter of water. Temperature was the triple point of water. All of these were easily understood and reproducible (within certain limits) anywhere in the world. As science developed, the other base units were introduced with corresponding physical definitions.

Metrology is the science of standards. Its two tenants are: traceability and uncertainty. That is, all measurements must be traceable to some accepted standard and the uncertainty of any measurement must be known. Metrology also separates the definition of a base unit from the method used to determine the underlying value of the base unit. This method is known by the French term "mise en pratique" or putting in practice.

The long-time and current definition of the kilogram is in the form of an artifact known as the International Prototype of the Kilogram or IPK. Many duplicates (traceable to the IPK and known as "witnesses") have been produced and now reside in national metrology labs around the world. This is a hierarchical system with the IPK being the standard; it is, by definition, one kilogram. On several occasions, many of the witnesses were compared to the IPK. The result was a disaster! Some had more mass than the IPK; some had less mass; none was identical in mass. What if the IPK was also changing in mass? Unthinkable!

Part II

Confronted with the fact that the IPK and its witnesses did not agree, the metrology community set about re-thinking the definition of this base unit, the kilogram. Over the years, one thing led to another and eventually it seemed best to re-define each of the seven base units. In particular, the IPK must be replaced as it was possibly unstable. Bear in mind that the definition and the mise en pratique are different things. Therefore, new definitions were needed that were useful and preferably invariant.

Science had advanced considerably since the treaty of 1875. Throughout modern times, many fundamental constants had been discovered. These constants are believed to be universal invariants. What is now proposed is that one of these constants shall define each SI Base Unit. For time, the microwave emission of the Cs-133 atom; for length, the speed of light; for mass, the Planck Constant; for temperature, the Boltzmann Constant; for electric current, the elementary charge; for the mole, the Avogadro Constant; for luminous intensity, a specified monochromatic radiation of specified frequency and power. To complete these new definitions each constant would have an invariant numerical value accepted by consensus from the best available experimental data. Once accepted, there would be no uncertainty in the numerical values of the constants.

That original treaty of 1875 established an organizational structure to be in charge of the SI. The world organization is the General Conference on Weights and Measures (CGPM from the French name). Modifications to the SI must go through a rigorous process leading to a vote of acceptance by the CGPM that meets every four years. In the next scheduled meeting, November 2018, the new definitions of the SI Base Units (including their physical constants with accepted invariant numerical values) will be put to a vote. It is anticipated that the majority will accept the proposal and the new definitions will fully replace the former definitions.

The ACS Committee on Nomenclature, Terminology and Symbols took a long look at two questions concerning the new definition of the SI Base Units: What is being proposed and what it means to the practice of chemistry? What is proposed is described above.

What it means to the practice of chemistry is more nuanced. In the acceptance of the new definitions, there is a principle of continuity. The definitions have changed but the quantities are unchanged; a meter is still a meter in length; a second is unchanged, etc. The IPK is retired but a kilogram is still a kilogram of mass. Clearly, the loss of definitions related to the physical world means that new mise en pratique must be developed.

With the principle of continuity, the practice of chemistry goes unchanged. All previous experimental measurements remain as valid as before. Perhaps, the great impact on the practice of chemistry will be in chemical education where new explanations need to be adopted for the new definitions.

Part III

Thoughtful and well-meaning scientists can disagree. Such is the nature of scientific investigation and progress. Accordingly, there are some issues with the new definitions of the SI Base Units that have been part of a years-long debate among chemists and metrologists. For a fuller understanding of the impact of these definitions, here are a few of the concerns in the literature.

Defining the kilogram based on the Planck Constant is not intuitive for chemists. Furthermore, in arriving at this definition there is a complete mixing of the definition and its mise en pratique. In an effort to determine more precisely the value of the Planck Constant, a device known as a Watt balance was invented. This device is not "big science" as a particle accelerator but it is quite costly. It helps to understand that the units of the Planck Constant are joule-sec or meter2-kilogram/sec.

A Watt balance compares the mass of a true kilogram using two methods: gravitational and electrical. The gravitational part

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Chemistry Quiz

What are the 7 metals of alchemy?

The answer will appear in next month's newsletter.

Last Month's Chemistry Quiz

According to the NSF Survey of Earned Doctorates, what percentage of doctoral recipients in the Physical or Earth sciences reported a definite commitment of employment upon graduation for 2016?

62%

https://www.nsf.gov/statistics/2018/nsf18304/data/tab42.pdf

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depends on the Newtonian constant of gravitation and the electrical part depends on the Planck Constant. By repurposing a Watt balance to measure a kilogram rather than the Planck Constant, it is possible to define the kilogram using the Planck Constant. Thus, the only currently available mise en pratique is the Watt balance. In a sense, the mise en pratique has created the definition. Furthermore, the Newtonian constant of gravitation is rarely constant and must be continuously measured throughout the Watt balance experiment. See "Weighing the Kilogram" by Paul J. Karol, American Scientist, vol.102, number 6, page 426, 2014 (DOI: 10.1511/2014.111.426).

Controversy about the new definition for the mole derives from two factors. First, the current definition clearly states the basis for the atomic mass scale as the mass of Carbon-12 is twelve exactly. Presumably, that value will obtain in the future but it will be by convention not by definition.

Second, determination of the invariant numerical value of the Avogadro Constant comes from a new artifact, the silicon sphere. It seems retrograde to eliminate the IPK because it is an artifact and then introduce a new artifact. Observed problems with the IPK and the witnesses may also accrue to the silicon sphere and future replicas leading to uncertainty in the numerical value that is supposed to be invariant. See for example, arXiv:1010.2317 or DOI: 10.1103/PhysRevLett.106.030801.

Election Ongoing!

Silicon Valley ACS Section members should be on the lookout for emails about our election ballot, which will be sent out November 1st and is due by November 25th. Please take this opportunity to vote for our section's executive committee and for changes to our bylaws. We need your input!

2018 Bubble Grant Awarded to Overfelt High School

Since 2011, the Santa Clara Valley Section of the American Chemical Society has provided elementary and secondary school educators funds for science programs. The Bubble Grant program was established in 2011 by a generous donation from ACS member Bryan Balazs, which supported the program through 2015. Since 2016, the program has been funded by the Silicon Valley Section of the ACS.

Qualified uses of the funds are for purchases related to the proposed project, such as scientific equipment, instructional materials and/or supplies. Over the past seven years, awards of up to $500 per year were granted to California K-12 schools for projects that helped to enhance the teaching of physical science. This year's $500 Bubble Grant was awarded to Ann Shioji, a chemistry teacher at Overfelt High School in San Jose.

Ms. Shioji's project introduces students to the scientific method of problem solving and gets them to start thinking "scientifically." By manipulating a black box '***Ob-Scertainer***', students use indirect observations to develop and test hypotheses about configurations inside the box.

Another phase of the project is a fermentation activity where students will apply their knowledge gained on observations from the Ob-Scertainers to follow the steps of the scientific method when making root beer. A master brewer has agreed to be a guest speaker and assist the students in their understanding of the anaerobic process of fermentation.

Most of the schools awarded a Bubble Grant serve communities that have a high level of minority students including many who are disadvantaged. Overfelt High School, for example, has eighty percent of students classified as economically disadvantaged. Ms. Shioji hopes that these projects will instill an excitement in the students and inspire them to pursue higher education so that they may improve their economic situation and give back to their communities.

The 2018 Bubble Grant Committee consisted of Rex Maimait, Peter Rusch, Jane Frommer and myself. Please contact me by e-mail if you have any questions, comments or suggestions.

Joseph A. Castellano, Ph.D.
50-year ACS Emeritus Member
E-mail: ***drjcast@aol.com***

This Week in Chemical History

November 3

- Daniel Rutherford, born 1749, first to distinguish between carbon dioxide and nitrogen; invented maximum and minimum thermometer; in 1772, discovered nitrogen (N, 7) ("noxious gas").
- American Association of Textile Chemists and Colorists founded in 1921.
- Carlton E. Schwerdt crystallized poliomyelitis virus at University of California in 1955.

November 4

- Boris A. Arbuzov, born 1903, discovered formation of free radicals of triarylmethane derivatives; investigated properties of terpenes and phosphorus-containing heterocyclics.

November 5

- Paul Sabatier, born 1854, researcher in organic chemistry catalysis; codiscovered process for hydrogenation of oils to solid fats; Nobel Prize in Chemistry (1912).

November 7

- Marja (later Marie) S. Curie, born 1867; in 1898, codiscovered radium (Ra, 88) and polonium (Po, 84); Nobel Prize in Physics (1903); Nobel Prize in Chemistry (1911).
- Lise Meitner, born 1878, explained nuclear fission; in 1917, codiscovered protactinium (Pa, 91).
- Chandrasekhara V. Raman, born 1888, discovered the Raman effect; Nobel Prize in Physics (1930).

Over 1000 residents in the SF Bay area who didn't know about the ACS now consider us rock stars! How did that happen? No Belles.

The Silicon Valley and California local ACS sections joined forces to bring the Portal Theatre Company from Oregon for a week of "No Belles" performances. "No Belles" - a play about the legends of women scientists who *have and have not* won the Nobel Prize – was performed on six campuses in the SF Bay area in October: San Jose State, UC Santa Cruz, Santa Clara University, Stanford, Mills College, and Dominican University. On each campus dedicated organizations secured the venues, advertised the shows, and hosted talk-back sessions and receptions. Benefactors supported the "No Belles" educational mission with generous donations.

By far the largest audiences came from the community. A surprising number of school-age students attended and actively participated in the talk-back session that followed each performance. They asked how the cast chose the eight portrayed scientists, who were their favorites, and when the number of Nobel Prize science winners will more closely reflect the population. An appreciation of the scientific accomplishments was also gained by all attendees.

The ACS has an impressive track record of support for inclusion, demonstrated by their statement on diversity and a number of ACS committees, programs and partnerships. Nonetheless, the numbers show that women lag behind men in recognition of their achievements. Medical physicist Rosalyn Yalow's 1977 Nobel ceremony banquet speech boldly stated "The failure of women to have reached positions of leadership has been due in large part to social and professional discrimination. ... We must believe in ourselves or no one else will believe in us. ... The world cannot afford the loss of the talents of half its people if we are to solve the many problems which beset us."

Thanks to "No Belles" enhancing audiences' awareness of hidden biases, we are one step closer to achieving the benefits of inclusion and diversity.

A happy occurence of *two* science Nobel Prizes were won by women the week before our performances: Donna Strickland (physics) and Frances Arnold (chemistry), making their way into our program and boosting the percentage of women who have won science Nobel Prizes above the long-held 3% mark.

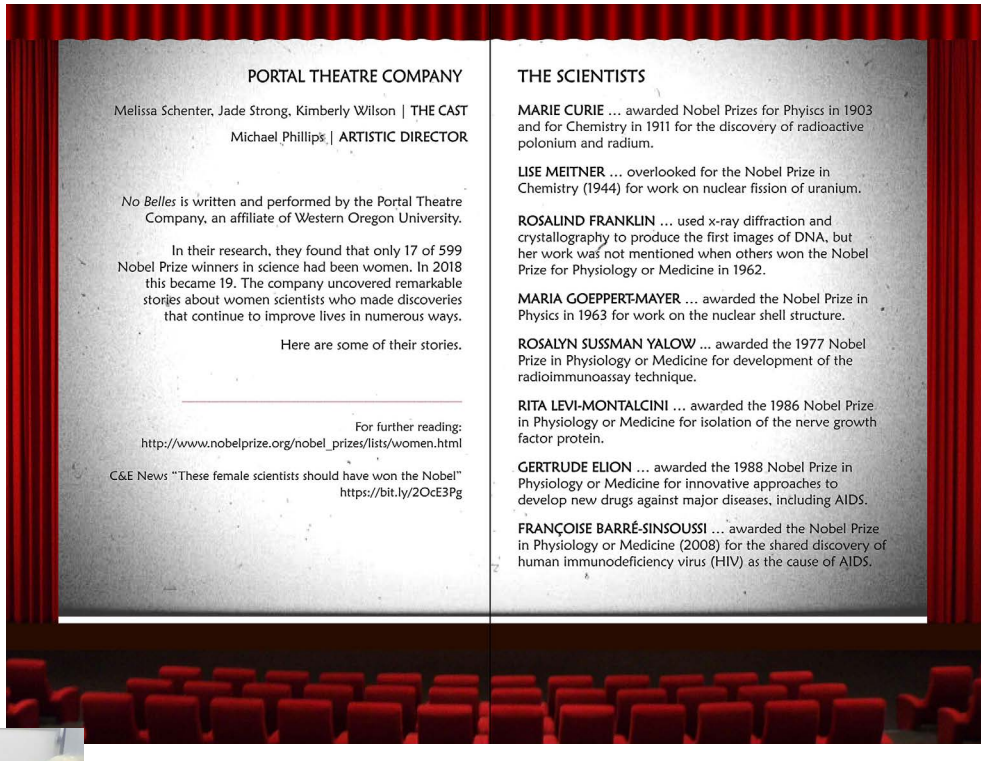
Four Silicon Valley ACS Performances of "No Belles"

Santa Clara University, Stanford University, UC Santa Cruz, and San Jose State University

On-stage SJSU

On-stage Santa Clara University

Rosalind Franklin the actress meets Rosalind Franklin the niece at Stanford!



Talk-back session

Animated discussion follows Stanford's No Belles

Talk-back at SJSU

Reception discussion UC Santa Cruz

Cast party! No Belles + ACS organizers

SILICON VALLEY SECTION
AMERICAN CHEMICAL SOCIETY
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http://scvacs.org/?page_id=99

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FUTURE EVENTS

Nov 10 SVACS 2nd Annual YCC Home Brew Competition
Golden State Brewery, Santa Clara, CA
www.scvacs.org

Nov 14 SVACS Dinner Seminar
Disrupting the Energy Value Chain Distributed Scale Olefins
Dr. Erik Scher, COO, Siluria Technologies
Basque Cultural Center
South San Francisco, CA

Dec No SVACS Events

2019

Jan 24 Harry & Carol Mosher SVACS Award Dinner
Single Electron Processes Enabling Organic Synthesis
Gary Molander, University of Pennsylvania
Biltmore Hotel and Suites
Santa Clara, CA
www.brownpapertickets.com/event/3584710

Click on links for more information or
see this newsletter at ***http://scvacs.org/?page_id=99***