

THE VORTEX

AMERICAN CHEMICAL SOCIETY
VOLUME LXXVII NUMBER 6

CALIFORNIA SECTION
JUNE 2016



UC Berkeley Professor Jeremy Thorner presents the California Section 2016 Lloyd Ryland Award to Berkeley High School teacher Evy Kavalier.

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All are welcome

CA Section

ACS Meeting

Saturday, June 4, 2016

Chevron

Building 10 Auditorium

100 Chevron Way

Richmond, CA 94801



Title

New Analytical Methods for Improving Crude Oil Corrosivity Estimates

Speaker

Dr. Monica Barney, Ph.D.

Abstract

Traditional methods for measuring corrosion cannot be used under high-temperature, non-aqueous conditions, preventing better evaluation of corrosion reactions active during the distillation of crude oil. To address this gap, we have been developing several new methods that can measure the chemical nature and amount of the reactants and products of the relevant corrosion reactions, allowing for the creation of better measures of the corrosivity of different crude oils and their distillation fractions. With this more detailed and chemically specific data, we will be able to improve current estimates of corrosion rates.

About the Speaker



Dr. Monica Barney is currently an Advanced Materials Research Scientist in the Materials and Corrosion R&D Group in the Chevron Energy Technology Center. In this role, she uses her background in chemistry and materials science toward developing new oil-based analytical tools to measure and better predict rates of high-temperature corrosion. Throughout her career, she has specialized in developing and using advanced analytical approaches and methods to solve tough ongoing engineering problems.

While working toward her B.S. in Chemistry from California State University, Fresno, she interned at the Santa Clara County Crime Lab compiling GC spectra of commercially available accelerants for the arson department, allowing them to identify complex mixtures without needing to identify each peak. She switched into Materials Science, earning a Master's and Ph.D. from the University of California, Berkeley with a focus on mechanical properties of materials. Since then, she has worked in industry and national labs, bridging the gap between science and engineering.

Time

- 11:00 am: Arrival
Meet the speaker over coffee
- 11:15 am: Talk
- 12:15 pm: Talk concluded
Walk to Pt. Richmond for lunch
(Bring your own)

Cost

Free
(Bring your own lunch)

Reservation

Please register (including lunch or for talk only) by email to office@calacs.org, or by phone 510.351.9922. If mailing a check in advance, please make payable to "California Section ACS" and send to Cal Section Office, 2950 Merced Street #225, San Leandro, CA 94577, postmarked no later than June 3, 2016.

California Section 2016 Election

The California Section, ACS, will hold an election this fall for the following positions: Chair-elect, Secretary, Director, three Councilors, three Alternate Councilors, and two Members-at-Large. All these positions are members of the Section's Executive Committee, and the first three positions are members of the Section's Board of Directors. If you have an interest in being a candidate for one of these positions or would like more information, please contact Michael Cheng, Secretary, [(510) 242-2588, mtch@chevron.com], Paul Vartanian [(510) 763-0195, pfvartanian@gmail.com], a member of the Nominations and Election Committee,

or Charles Gluchowski [(925) 640-0550, charles.gluchowski@gmail.com], the chair of the committee, by September 12, 2016.

While the first five elected positions may be filled only by full members of the ACS, the positions of Member-at-large are open to both members and student members of the Society.

The 2016 election will be conducted electronically via SurveyMonkey; instruction will be sent to you, as well as in future *Vortex* issues. If you wish to cast your vote on a paper ballot, please call the California Section of ACS office at 510-391-9922, and a paper ballot will be mailed to you.

THE VORTEX

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EDITOR:

Louis A. Rigali
255 4th St. Ste #101 Oakland 94607 510-268-9933

ADVERTISING MANAGER:

Vince Gale, MBO Services
Box 1150 Marshfield MA 02050-1150 781-837-0424

OFFICE ADMINISTRATIVE MANAGER:

Julie Mason
2950 Merced St. # 225 San Leandro CA 94577 510-351-9922

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CONTRIBUTING EDITORS:

Evaldo Kothny
William Motzer

EDITORIAL STAFF:

Charles Gluchowski
Evaldo Kothny
Lee Latimer
Alex Madonik
Margareta Sequin
Linda Wraxall
Wally Yokoyama

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California Section Web Site: <http://www.calacs.org>

Chair's Message

June, and its suddenly summer and vacation time. There are no July or August issues of the Vortex. The next issue is in September. This is a good time to remind members that the Vortex has a very open policy regarding letters to the editor. The comments should pertain to science in the most general sense, and Section activities. All submittals will be acknowledged even those that are rejected for publication because of lack of relevance. Articles of a technical subject are likewise always encouraged. While there may be space and timing restriction to placement in the Vortex, publishing on the Section website may be an option. Deadline for submissions are due the middle of the month prior to publication. Articles for the September issues are due the middle of August. The staff and editor of the Vortex wish all a pleasant summer.

There continue to be Section activities in June that are described in some detail in this issue. The Executive Committee meeting (Banana Leaf Thai Restaurant in El Cerrito) is Tuesday June 7. I repeat myself, but this is the place to be and present your suggestions, ideas and recommendations for improving Section business.

Later in the summer, August 21-25, there is the National fall meeting in Philadelphia.

In September the Section will once again participate in the Solano Stroll with a booth and volunteers demonstrating various chemistry related principles. You could be

one of those volunteers and experience the excitement of youngsters as they encounter the "magic of chemistry" Send me an e-mail for details to participate.

A last minute activity was finalized too late to be included in this issue, but too interesting and important not to give some space in the Chair's message. Sunday June 12, starting at 10:00 am... A Field Trip .. "Walking in the Woods with Chemistry" at the UC Davis Arboretum, UC Davis Arboretum, meet: at the Arboretum Gazebo off La Rue Rd. on Garrod Drive. The exhibit is free; parking is available at no charge on weekends.

This is a walking tour followed by independent exploration of the exhibit. Wear comfortable walking shoes. Sun protection recommended. Bring lunch picnic if you wish. The temporary exhibit Walking in the Woods with Chemistry focuses on plants and their chemistry. The exhibit reveals some of the research of UC Davis Chemistry Professor Dean Tantillo, Plant Biology Professor Philipp Zerbe, and Chemistry Ph.D. candidate Nhu Nguyen. We are grateful to obtain a tour to the exhibit by members of this group. Professor Philipp Zerbe will lead us around the garden to see some of the signs and tell us some fun stories about plants and their applications. RSVP: Reservations are required. For reservations, please contact California Section office at office@calacs.org. Sign-up

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Medical Marijuana

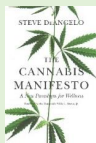
Wednesday, June 15, 2016

7:00pm

Community Hall

Join the conversation as Science Café looks at the health benefits of medical marijuana, its use in treating serious illness, managing chronic diseases, and alleviating pain from chronic conditions.

Featuring guest speakers:



Steve DeAngelo, Founder of Harborside Health Center, a cannabis advocate and educator, and the author of *The Cannabis Manifesto*.*

Uwe Blesching, a contributor to *Mind-Body-Medicine*, and a medical journalist who focuses on cannabinoid medicine. Uwe is the Editor-in-Chief of *Healing Times* and author of several books including *The Cannabis Health Index*.*



Eloise Theisen, Cannabis Consultant and Founder of Green Health Consultants, a clinic providing patients with consulting to safely and effectively use cannabinoids to manage health conditions.

*Books available for purchase.

Tickets \$10 Reserve at: tinyurl.com/ScienceCafeCannabis
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CalACS nominated for two awards

The California Section has been selected as finalist for two ChemLuminary Awards as noted below. Recipients will be announced and the presentation of awards will occur at the 252nd ACS National Meeting in Philadelphia, PA on Tuesday, August 23, at the Pennsylvania Convention Center in Terrace Ballroom One. The presentations will include awards given by 19 committees of the Society.

Most Creative NCW Celebration Using the Yearly Theme, Alex Madonik, Coordinator

Outstanding Project SEED Program Award, Elaine Yamaguchi, Chair

Earth Day Celebration Report, John Muir National Historic Site, Martinez, April 23, 2016

Members of The California Section of ACS set up and staffed again a CalACS booth for the full day celebration of Earth Day in Martinez, CA. This annual festival at the John Muir National Historic Site brought together representatives of 52 groups to engage the public in celebrating both Earth Day and John Muir's birthday. This was a Celebration of John Muir's legacy and the centennial anniversary of the National Park system. The program included a fashion show using recycled materials. The event featured many booths on environmental issues and included eco-friendly exhibits, several speakers, live music, a silent auction, and presentation of the 39th annual John Muir Conservation Awards recognizing the work of several groups and individuals. The event drew a crowd of hundreds of people. The highlight of the event for us was the presentation of the "Salute to Excellence" by our Chair Lou Rigali to the John Muir Association for organizing the event for the community for several decades now.

The ACS theme this year was "The Great Indoors-Your Home's Ecosystem" developed by the ACS Committee on Community Activities (CCA) as part of its Chemists Celebrate Earth Day (CCED)

Program. Dr. Alex Madonik from our Section was the theme team chair. Visitors to the booth participated in several activities: hands-on demonstrations, and Smells of Plants and Molecule Building, set up by Dr. Margareta Sequin, as this activity was a big hit with both children and adults in our last several events. We also displayed banners, T-shirts with Earth Day theme, Earth Day balloons, and handed out the Earth Day 2016 Edition of Celebrating Chemistry as well as other conceptual aids and previous years' Earth Day brochures. Several students from Las Positas College volunteered for the event (courtesy of Dr. Charles Gluchowski) in shifts and interacted with the visitors with energy and enthusiasm. Several of our members, Sheila Kanodia, Alex Madonik, Elaine Yamaguchi, Greti Sequin, Robin Charlton, and Lou Rigali in addition to student volunteers (Peace, Tanja, Harleen, Sukhchain, Rachel, Kayla, Jennifer, Olga, Ryan, Marc and Monique) made the event successful.

The response from visitors to the Cal ACS booth was positive for all our activities. Children as well as adults participated in the hard and soft water-themed suds demonstrations and the air pollutant removal

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Dr. Sheila Kanodia, Earth Day Coordinator for



Toxic Terra (Part 6)

Bill Motzer

In Part 5 (February 2016 Vortex), I discussed the toxic effects of environmental fluoride

(F⁻) particularly fluoride in groundwater.

Worldwide, perhaps more than 200 million people rely on drinking water containing fluoride concentrations exceeding the present World Health Organization (WHO) guideline of 1.5 mg/L. Most fluoride-contaminated groundwater originates from natural (geogenic) sources, generally from weathering of rocks rich in fluoride minerals such as fluorite (see below). Groundwater with high fluoride concentrations occurs in marine sediments and rocks but also in mountainous terrains containing granite and similar intrusive rocks and their derived alluvium. Geothermal areas also have groundwater with high fluoride concentrations.

Worldwide known fluoride belts (Figure 1) include those in the Mideast – westward from Jordan, Syria through Egypt, Libya, and Algeria, and eastward into Turkey through Iraq, Iran, and Afghanistan; in eastern Africa: Sudan and Kenya, and in the far east: India, northern Thailand and China. Similar fluoride-rich belts are also found in the western U.S and Japan.

There are currently 441 fluoride-containing minerals in the Webmineral data base including common rock-forming or accessory minerals such as apatite, fluorite or fluorspar (the principal fluoride mineral), phlogopite or fluormica, and biotite. Under normal or standard pressure and temperature (~1 bar and 25 °C), cryolite and fluorite are considered to be insoluble in water. But even with a solubility product (K_{sp}) of 4.0×10^{-11} , fluorite will have a calculated solubility of about 17 mg/L. However, under alkaline conditions and specific or electrical conductivities (EC) ranging between 750 and

1,750 $\mu\text{S}/\text{cm}$, fluoride mineral dissolution rates significantly increase. On a standard Eh – pH (redox) diagram, fluoride occurs as a single monovalent anion (F⁻) at all Eh – pH ranges.

Granitic rocks contain a relative abundance of fluoride-rich minerals such as apatite, and micas and amphiboles, generally occurring in trace quantities. Fluorite (CaF₂) is the principal fluoride mineral, mostly present as an accessory mineral in low temperature (hydrothermal) vein deposits, sedimentary rocks, but also occurs as a primary mineral in granite. Dissolution of such minerals constitutes a major source of fluoride in groundwater with granites, which have the highest fluoride concentrations of any rock type, ranging between 500 and 1,400 mg/kg and averaging 810 mg/kg. Granite weathering typically results in increased groundwater fluoride concentrations, particularly in alluvial sediments derived from such terrain. Longer residence times in aquifers with fractured fluoride-rich rocks increase groundwater fluoride levels.

For example, in Pakistan granite and clays derived from granite terrain have average fluoride concentrations of 1,939 and 710 mg/kg, respectively. In Nalgonda, India, granite and granitic gneiss contain fluorite (0 to 3.3%), biotite (0.1 to 1.7%) and hornblende (0.1 to 1.1%), reported from the same area that the rocks contain 460 to 1,706 mg/kg of fluoride. Laboratory studies show that leaching of fluoride from such granites contributed 6 to 10 mg/L of fluoride to water.

High groundwater fluoride concentrations may also result from evapotranspiration, which can trigger calcite precipitation resulting in a reduction in calcium ion activity. Relatively high F concentrations have been found in some deeply circulating groundwater along fault lines. Geothermal and volcanic areas also contain high fluoride in groundwater because CaF₂ solubility is also pH and temperature dependent. I will address those particular geochemical issues in my next article on this topic.

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(Motzer continued from page 6)



Figure 1: Known fluoride belts with groundwater exceeding 1.5 mg/L. Source: British Geological



Northern California Undergraduate Research Symposium

The 26th Annual Northern California Undergraduate Research Symposium was hosted at Saint Mary's College of California April 30, 2016.

This symposium provides a venue for undergraduates to report out their research efforts and it has been supported by the California and Santa Clara Valley Section's of the American Chemical Society. Educational institutions from both of the ACS local section have shared the responsibility to organize and host this symposium and educational institutions from the San Joaquin Valley Section are always invited to participate as well.

This year, the undergraduates from 12 different institutions participated and there were more than 80 student presenters. The student researchers and their mentors along with other undergraduates were treated to a keynote presentation by Dr. Ola Saad of Genentech.

For the California section, the represented educational institutions were UC Berkeley, CSU-East Bay, Mills College, Saint Mary's College, Sonoma State, San Francisco State, Humboldt State and University of San Francisco. An educational institution of the Santa Clara Valley Section will host this event next year and both Santa Clara University and San Jose State were represented this year. This year only two San Joaquin Valley section educational institutions participated and they were CSU-Sacramento and CSU-Stanislaus. This broad spectrum of educational institutions participating has made this a symposium that benefits all the undergraduate chemistry and biochemistry majors so it is truly a benefit to the American Chemical Society.

Editor's note: the complete report is on the Section website, www.calacs.org.

(Chair continued from page 3)

deadline: Wednesday, June 9th, 2016.

We hope to meet and talk with you at some of the upcoming meetings and events. Even in this age of virtual communication, face to face contact and networking continue to have significant value.



(Continued from page 5)

based on activated charcoal adsorption and mechanical air filtration. A non-science retired teacher was mesmerized by the periodic table (provided by Ms. Patricia Galvan of ACS for volunteers) and was determined to find the right home for it in a school she had in mind. Our exhibit on guessing plant smells and then building models of some molecules found in the plant fragrances with molecule kits proved popular with children, parents, and grandparents alike, and found special interest with teachers. A few children kept coming back, trying to build ever more complex molecules. Volunteers were given T-shirts or periodic tables or both provided by ACS (Patricia Galvan and Lauren Lamoureux, both of ACS).

This year the MC Igor Skaredoff made a plug for the chemists and the CA section which precipitated a visit from an East Bay reporter to our booth. Before the 2017 Earth Day event, she will announce the CA –Section’s presence in the John Muir Historic site. We hope that this will result in our outreach efforts to a larger number of people in the Bay community, and would generate

a collaboration with local journalist(s) in announcing and covering our family science nights and other events (science café, WCC, YCC etc).

We also have had the pleasure of a visit from our congressman Mark DeSaulnier to our booth who was interested in our mission. The Section hopes to continue to work with him in its various educational and community outreach efforts.

Perfect mild temperatures on a sunny day made the event very popular and gave us the opportunity to reach out to the public with eco-friendly chemistry activities. Our section engaged children, adults of all ages, teachers and other professionals. The participation by the CalACS section in the event continues to build a positive image of chemistry and of science in general.



Smell of Plants



Chair Lou Rigali presents the Section’s “Salute to Excellence” award to the John Muir Association for organizing the event for the community for the last several decades.



2016 P3 Award for CALACS Marinda Li Wu, Past ACS President

It gives me great pleasure to announce that Dr. Alex Madonik received the 2016 P3 Salute to Excellence for the California Section at the annual CALACS Awards Luncheon on May 14. The P3 (Partners for Progress and Prosperity) Award is an award for local sections, regional meetings, and international chapters I established in 2014 to honor and raise awareness for excellent partnerships.



Alex Madonik, long time National Chemistry Week Coordinator for our local section, is being recognized for his outstanding leadership in building successful partnerships with host schools (four in 2015) and different school districts with supportive companies, national laboratories, local universities and community colleges all around the Bay Area. By working with many hundreds of dedicated volunteers in public outreach over the past two decades, Alex has been instrumental in improving the public perception and appreciation for chemistry in everyday life. Thousands of students and their families have participated via the California Section's popular Family Science Night tradition since 1997.

This P3 Salute to Excellence will be automatically submitted as a nomination for the Regional P3 Award which awards up to \$1,000 plus a silver/gold P3 Medal at the next Western Regional Meeting. See www.acs.awards/regional-awards and the May 9 issue of C&EN for more details on P3 Awards.

Networking for the Next Generation of Chemical Professionals

Zoe Adams and Liam Berryman

YCC Undergraduate Events Coordinator and Undergraduate Lead

Graduating from undergraduate studies and finding a position in the workforce has become increasingly difficult in today's chemistry community. The latest statistics predict that chemistry graduates will outnumber chemistry positions ten to one in the coming decade. Thus, it is more pertinent than ever for chemistry and chemical engineering undergraduates to start early and explore broadly to find their professional path. This spring, the YCC networking event at Berkeley was designed to expose aspiring chemistry-related undergraduates to the possibilities they can encounter after graduation. With more than 25 professionals representing Novartis, Roche, and many more firms, the event attracted more than 70 people. Attendees were asked to start off in one-on-one student-professional pairs for introductions, creating an environment in which all guests were able to break the ice and become more comfortable with each other.

The California section of YCC co-hosted this event with the Berkeley chapter of the American Institute of Chemical Engineers (AIChE). This networking session was successful thanks to the ACS professional network. YCC is continually bringing this network back into connection with the younger generation of chemists and chemical engineers, and the results have been powerful thus far. There is a clamoring for the reactivation of the ACS student chapter at Berkeley to facilitate a stronger ACS presence on campus through more of the popular events hosted by YCC in the past several months.

Young Professionals Event: Properties and Applications of Bioinspired Adhesive Polymers

Prof. Phillip Messersmith, Depts. of Bioengineering and Materials Science & Eng., UC Berkeley

Hosted by CalACS YCC and NorCal AIChE Young Professionals

Date: Thursday June 30

Location: Two Mile Wines, Oakland, CA

Time: 6:00 Networking 7:30 Presentation

Abstract:

Mussels are masters of wet adhesion, employing very specialized proteins with unusual biochemical properties and amino acid compositions. The attachment organ of the mussel, the byssus, contains several proteins rich in 3,4-dihydroxy-L-alanine (DOPA), a catecholic amino acid that is believed to confer cohesive and adhesive properties to these proteins. In this talk I will discuss the role of DOPA in mussel adhesion, including model studies of catechol cross-linking and single molecule

force spectroscopy measurements that shed light on the interfacial role of DOPA and other key amino acids found in these proteins. Our experiments provide insights into key mechanisms of biological adhesion, and also inform the design of synthetic mimics of these proteins. Examples of biomimetic materials include surgical adhesives and coatings for a variety of uses. Finally, I will briefly introduce our related work with polyphenols found in tea, chocolate, red wine and other foods and beverages. Plant polyphenols are chemically similar to DOPA due to an abundance of resorcinol, catechol, and gallol functional groups, and therefore can be exploited in similar ways as DOPA.

LBL Professor of Chemistry receives the National Medal of Technology

President Obama presented the nation's highest honors for advancing science and technology to three University of California faculty on May 19 at a special White House ceremony.



Paul Alivisatos, the former director of the Lawrence Berkeley National Laboratory and a professor of chemistry at UC Berkeley, received the National

Medal of Science for his foundational contributions to the field of nanoscience, for the development of nanocrystals as a building block of nanotechnologies and for his leadership in the nanoscience community.

Two UC engineers received the National Medal of Technology, which acknowledges those who have made lasting contributions to the country's competitiveness and quality of life and helped to strengthen the nation's technological workforce.

Chenming Hu, a professor emeritus of electrical engineering and computer science at UC Berkeley, was honored for pioneering innovations in microelectronics, including reliability technologies, the first industry-standard model for circuit design, and the first 3-D transistors, which radically advanced semiconductor technology.

Arthur Gossard, a professor emeritus of materials science and of electrical

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2016 Lloyd Ryland Outstanding Chemistry Teacher Award

The California Section of the American Chemical Society selected Evy Kavaler, chemistry teacher at Berkeley High School, as the 2016 recipient of the Lloyd Ryland Award. The Lloyd Award is presented annually to a high school chemistry teacher who has demonstrated an excellent ability to teach and inspire students to pursue careers in science. The award includes a certificate and a check for \$500. In addition, the winner's chemistry department will receive a check for \$500 for supplies.

The award is named after Mr. Lloyd Ryland, a member of the California section for 65 years and a strong believer in chemistry education. He was born in San Francisco in 1912 and lived his entire life in the Bay Area. Mr. Ryland received his bachelors degree from U.C. Berkeley and was employed by Chevron Development Company for 65 years as a chemist. During World War II he joined the U.S. Coast Guard Auxiliary and after the war became a member and officer of three Yacht Clubs. Mr. Ryland made a generous contribution to the Section and we are pleased to honor him by naming this award after him.

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and computer engineering at UC Santa Barbara, was recognized for innovation, development and application of artificially structured quantum materials critical to ultrahigh performance semiconductor device technology used in today's digital infrastructure.

"Science and technology are fundamental

to solving some of our nation's biggest challenges," President Barack Obama said in a statement. "The knowledge produced by these Americans today will carry our country's legacy of innovation forward and continue to help countless others around the world. Their work is a testament to American ingenuity."



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- Universities & Colleges for teaching positions and laboratory personnel
- Hospitals for technical and research personnel

There are several web sites that may help you search for these open positions.

- www.mboservices.net
- <http://www.calacs.org/page.asp?id=22>

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