

THE VORTEX

AMERICAN CHEMICAL SOCIETY
VOLUME LXXVII NUMBER 4

CALIFORNIA SECTION
APRIL 2016



Dr. Elaine Yamaguchi, Chair, Project SEED, Doris Feng, previous Project SEED Student/UC Davis graduate, and in the background, Dr Wally Yokoyama, Project SEED coordinator. See page 2 for story.

WCC/YCC APRIL MEETING	PAGE 2
PROJECT SEED	PAGE 2
CHAIR'S MESSAGE	PAGE 3
EARTH DAY CELEBRATIONS	PAGE 4
EARTH DAY POEM CONTEST	PAGE 5
CALL FOR VOLUNTEERS	PAGE 5
SALTY SOLUTIONS PART II (W. MOTZER)	PAGE 6
FUTURE SECTION MEETINGS	PAGE 7
APRIL SECTION MEETING	PAGE 8
SCIENCE CAFE	PAGE 9
EYH MEETING REPORT (M SEQUIN)	PAGE 10
BUSINESS DIRECTORY	PAGE 11
INDEX OF ADVERTISERS	PAGE 11

*California Section
Women Chemists Committee and
Younger Chemists Committee
April Meeting
“Women Chemists’ Careers and Motherhood”*

Date and Time: Saturday, April 16. 10:30 am – Arrival, meet the speakers, 10:45 am – Panel starts, 12:30 pm – Lunch and discussions

Speakers: Dr. Yue-Rong Li, Chevron, Dr. Trudy Lionel, Bayer, Dr. Miki Park, UOP School of Pharmacy, Dr. Anne Taylor, Schering-Plough (Retired), r. Sarah Batt Throne, USDA, Dr. Sheila Yeh, Chevron (Retired), Dr. Qinliang Zhao, UOP Department of Chemistry.

Registratio: Register online at:

<https://www.eventbrite.com/e/career-and-motherhood-how-does-it-affect-women-chemical-professionals-tickets-22557597381>

Alternative Reservation Method: 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 April 8th, 2016.

Cost: \$15.00 Lunch (Students and Unemployed Chemists \$7.50). Presentation is free.

Driving Directions: • From Oakland: Take I-80 North, exit Buchanan Street, turn right onto Buchanan Street, continue east one block, turn right into USDA driveway.
From Vallejo: Take I-80 South, exit Albany, turn left onto Cleveland Avenue (S), continue under freeway onramp that exits on Buchanan St, Take the first driveway to the right.

Project SEED

In two years, we will be celebrating the 50 year anniversary when a seed of an idea entered the mind of Alan Nixon, President of ACS, that resulted in the, now, national ACS program known as Project SEED where disadvantaged youths are introduced to chemistry and science by doing real lab experiments. This program was initiated in the California Section by Alan Nixon and through his guidance carried on by Elaine Yamaguchi, the late Glenn Fuller, Wally Yokoyama and help from a lot of people.

Recently, the US Department of Agriculture became aware of the impact of the outreach work of their scientists at the Albany Laboratory through Project SEED, resulting in a feature article in ARS Magazine (<http://agresearchmag.ars.usda.gov/>). In the article a letter from former

SEED student soon to graduate from UC Berkeley who was mentored by Dr. Gary Banuelos, USDA, Parlier, CA took the time to write Dr. Banuelos a letter. She thanked him and the Project SEED program stating that she would never had been able to go on to college and get her advanced degrees without Project SEED and the help of the USDA and her Mentor.

Earlier in the week, Wally organized an impromptu coffee and cake welcome reception for Mentors at the lab and a thank you to various lab managers for their kind help and cooperation. It was at this reception that another alumni of Project SEED, Doris Feng, introduced herself and announced that she had been mentored by Lisa Gorski at the Lab and had just started

(Continued on page 4)

THE VORTEX

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EDITOR:

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

ADVERTISING MANAGER:

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

OFFICE ADMINISTRATIVE MANAGER:

Julie Mason
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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

Lou Rigali

Spring has arrived in Northern California and along with some sunshine there are a number of Section related programs during April.

First, there is the Executive Committee Meeting (EXCOM) on Tuesday April 5 at Denny's near the El Cerrito Del Norte BART. Some will read this message after the meeting but it still gives me the opportunity to invite all to future Section's business the first Tuesday of every month. The May meeting is on the 3rd. Meeting announcements can be found on the website or a call/email will confirm place and date. Section business is discussed and implemented at this meeting and your input is valued. We have tried to use teleconferencing but were not able to overcome the technical difficulties. The objective of having a system where members can attend and participate in meetings from their office or home continues to be pursued. Meanwhile come in person or email your comments and ideas.

Wednesday April 13 the Science Cafe, sponsored by the Lafayette Library and CalACS, presents a talk by Dirk Rosen, the founder of Marine Applied Research & Exploration (MARE). Their technology and effort to monitor the health of our oceans will be discussed.

Saturday April 16, the Women Chemists Committee, (WCC) and the Younger Chemists Committee, (YCC) have co-

sponsored a panel discussion on how raising a family and children affects career choices. While we all cannot be mothers, we all have families and are impacted when our spouses and daughters struggle with these important issues.

On Thursday April 21, we are pleased to have Dr Justin Siegel, Professor of Chemistry and Biochemistry, UC Davis, speak on his research with enzyme catalysis, and the application for novel proteins of therapeutic or commercial interest. As the founder of PVP Biologics, a new biotech company, Dr. Siegel will share this experience as well. You will benefit from attending this presentation by this entrepreneurial scientist.

On April 23, the Section joins with others to celebrate Earth Day and the Centennial of John Muir's legacy. This is a great family function where one can experience the benefits of a sound ecological policy

One more meeting in April 2-5, the National ACS meeting in San Francisco, 2017. Join others in the section and help plan and the Section's participation.

I am please to announce that Dr. Xiaoxi Wei, CEO and founder of X-Therma, a new Bay area startup developing not-toxic and highly effective cryoprotective molecules, has accepted the position of Alternate Councilor through the end of this year. Dr. Wei is active in the Section as Vice-Chair

(continued on page 9)



Celebrate-Earth Day "The Great Indoors – Your Home's Ecosystem"

The California ACS Section will again join with other community groups for a combined celebration of Earth Day and A Centennial Celebration of John Muir's legacy on 23rd April 2016 on the grounds of the John Muir National Historic Site in Martinez, CA. (10 AM- 4 PM). This celebration will allow interaction with hundreds of families, kids, and adults, at the Cal ACS canopy location. The hands-on demonstrations and activities will be related to the ACS Earth Day theme of "The Great Indoors – Your Home's Ecosystem". We are looking forward to presenting Salute to Excellence to John Muir Association during the event.

We are looking for volunteers and contact our Section office for information at office@calacs.org or Sushila Kanodia (Earth Day Coordinator" at sushila.kanodia@gmail.com>

JOHN MUIR NATIONAL HISTORIC SITE
4202 Alhambra Ave.
Martinez, CA 94553

For directions check on this link: <https://www.nps.gov/jomu/planyourvisit/maps.htm>

SEED continued from page 2)

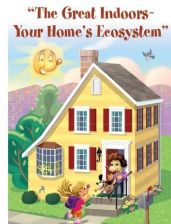
her new job there. Doris graduated from Galileo Academic High School, a student of Paul Matsumoto, a 20-year SEED teacher participant.

Each year in the California Section some 45-55 high school students, the number depending on the amount of funds and mentors available, are selected that meet a set of requirements, one of which is a maximum family income level. The local Section SEED Committee, chaired by Elaine, goes about the tasks of locating Chemists or like professionals who can mentor and supervise the students during the summer months. It is not a small task to find these mentors and the companies who generously allow their employees to conduct this very worthy community-centered endeavor. Over the years a number of Bay Area organizations, like UCB, Chevron, USDA,

California State University San Francisco, and California State University East Bay have participated.

We always have need for more mentors. If you work for a company that has laboratory facilities, think about recommending the SEED Mentoring program to your company. Not only is this a worthwhile activity for the community, it can also be a rewarding recruiting tool for the company. If this does not apply, possibly the company can donate \$2500 or more to support a student or more for the summer. Each Student is paid while they are in the program so that they do not have to find other work to help support their family. The money is put to good use and is tax deductible. All the Section's officers and members are unpaid volunteers. Best of all, the donation will make an important difference in the life of a student and in their family.





Chemists Celebrate Earth Day 2016 Illustrated Poem Contest

The **California** Section of the American Chemical Society (ACS) is sponsoring an illustrated poem contest for students in Kindergarten - 12th grade.

Contest Deadline: **April 25, 2016**

Prizes: **ACS store gift**

Contact: CalACS, 2950 Merced st., Suite 225, San Leandro, CA94577
office@calacs.org or sushila.kanodia@gmail.com

Winners of the **California** illustrated poem contest will advance to the ACS National Illustrated Poem Contest!

Write and illustrate a poem using the CCED theme, "**The Great Indoors—Your Home's Ecosystem**". Your poem must be **no more** than 40 words, and in the following styles to be considered:

HAIKU • LIMERICK • ODE • ABC POEM • FREE VERSE • END RHYME • BLANK VERSE

Possible topics related to water and chemistry include:

- Indoor Air
- Mold
- Odor
- Indoor Plants
- Water
- Perfume

Entries will be judged based upon:

- Relevance to and incorporation of the theme
- Word choice and imagery
- Colorful artwork
- Various physical properties of water
- Any other relevant topics



Contest Rules:

- Poems must conform to a particular style. No poem may be longer than 40 words.
- The topic of the poem and the illustration must be related to the CCED 2016 theme, "**The Great Indoors – Your Home's Ecosystem**".
- All entries must be original works without aid from others.
- Each poem must be submitted and illustrated on an unlined sheet of paper (of any type) not larger than 11" x 14". The illustration must be created by hand using crayons, watercolors, other types of paint,

colored pencils or markers. The text of the poem should be easy to read and may be printed with a computer, before the hand-drawn illustration is added, or the poem may be written on lined paper which is cut out and pasted onto the unlined paper with the illustration.

- Only one entry per student will be accepted.
- All entries must include an entry form.
- All illustrated poems and/or digital representations of the poems become the property of the American Chemical Society.
- Acceptance of prizes constitutes consent to use winners' names, likenesses and entries for editorial, advertising and publicity purposes.

American Chemical Society

The entry form for the Poem Contest can be downloaded from the Section home page, www.calacs.org

Call for volunteers

Your help is requested at beautiful John Muir National Historic Site at Martinez, CA on 23rd April, 2016. The shifts are from 10-1 PM and 1-4 PM or any part of it to suit your needs. We will do enjoyable hands on activities with young children and adults.

Please contact sushila.kanodia@gmail.com or office@calacs.org



Salty Solutions (Part 2)

Bill Motzer

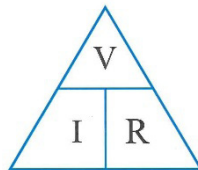
In Part I (December 2015 Vortex) I discussed the relationship of total dissolved solids (TDS) and electrical conductivity (EC), or conductivity, which is the ability of a substance (i.e., a solution) to conduct an electric current. Specific electrical conductivity is the conductivity of a body of unit length and unit cross section at a specified temperature. EC is widely applied as a basic tool in assessing water quality and often measured when water samples are collected for water quality chemical analyses. EC commonly is measured in micromhos per centimeter ($\mu\text{mhos/cm}$) or deciSiemens per meter (dS/m), whereas TDS is measured mg/L . As we shall see, there is a relationship between the two. EC's value is that modern instrumentation allows one to easily measure it in the field using a conductivity meter.

General Principles of Conductance and EC

In metals an electric current is transmitted by electrons, whereas in solutions it is carried by both cations and anions. How well a solution conducts electricity depends on several factors, including temperature and ionic valences, mobility, and concentrations. In most aqueous solutions, ionic strength varies from those electrolytes having negligible to very low conductivity (i.e., distilled or deionized water) to the high conductivity of concentrated chemical samples and salty solutions. Therefore, water with few ions is less conductive than solutions with more ions.

Conductance in the laboratory is often measured by applying an electrical current (I) to two electrodes immersed in a solution and measuring the resulting voltage (V). During this process, cations migrate to the negative electrode and anions to the positive electrode; thus the solution acts as an electrical conductor (Figure 1). A solution's resistance (R) to current flow can be calculated using Ohm's law which states that the current through a conductor

between two points is directly proportional to the voltage across the two points. With the constant of proportionality, one arrives at the simple equation that we all memorized in introductory physics and chemistry using Ohm's law triangle:



Therefore:

$I = V/R$; $V = I \times R$, and $R = V/I$, where I is the current through the conductor measured in amperes, V is the voltage measured across the conductor in volts, and R is the resistance of the conductor in ohms [Ω]. More specifically, Ohm's law states that R in this relationship is a constant, independent of current.

Using $R = V/I$, we may determine conductance (C) which is defined as the reciprocal of the electrical resistance (R) for a solution occurring between two electrodes. As stated above, it's measured in Siemens [S] which equals [Ω^{-1}] and is represented as $\bar{\Omega}$ and measured in mhos (the reverse of ohms):
 $C = 1/R$

A conductivity meter therefore can be used effectively to measure a solution's conductance and converting and displaying the instrumental reading as conductivity. It does this by using a cell constant (K), which is the ratio of the distance (d) between the electrodes to the area (a) of the electrodes, thus:

$K = d/a$ where:

K = cell constant in m^{-1}
a = effective area of the electrodes in m^2 , and
d = distance between the electrodes in m
However, K is often expressed as cm^{-1} because the actual cell dimensions are in cm.

Finally, the conductivity reading of a solution or water sample changes with temperature, and the instrument corrects for this by using conductivity κ in which:

(continued on page 7)

(Motzer continued from page 6)

$\kappa = C \times K$, where:

C = conductance [S]

K = cell constant [m^{-1} or cm^{-1}]

The conductivity κ is now expressed in S/cm, or a more convenient unit such as $\mu S/cm$. However, when calculating TDS from a conductivity measurement, a TDS factor or constant must be applied that is dependent

on the type of solids dissolved in water. Depending on the water source, this constant changes. Most conductivity meters use a common, approximate constant of 0.65. Fresh or nearly pure water generally has a lower TDS constant of ~ 0.47 to 0.50 . However, when measuring mixed water types or saline water (with a conductivity values $>5000 \mu S/cm$), the TDS constant should be higher or ~ 0.735 to 0.8 . Next time we will explore this relationship in more detail.

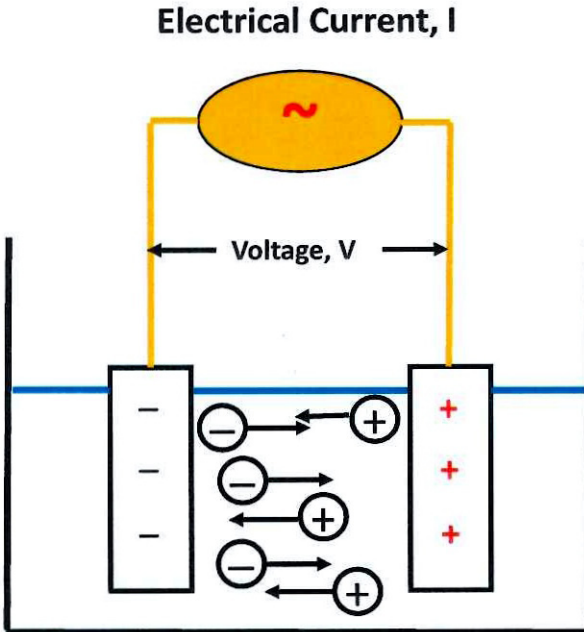


Figure 1: Simple flow cell diagram showing migration of ions in solution.



Future CalACS 2016 Programs

May—Awards Luncheon

Other potential Meetings

Torey Arvik, Sonomaceuticals, LLC. Obesity, inflammation and grape seed prebiotics
Ruihong Zhang, UC Davis, Recycling waste for energy self sufficiency

California Section April Meeting

Molecular Modeling Of Novel Enzymes And The Startup Of PvP Biologics To Produce Therapeutics To Treat Food Allergies

Date and Time: Thursday, April 21, 5:30-6:45 pm Social Hour, 7:00-8:15, Presentation, Q&A.

Speaker: Dr. Justin Siegel, Assistant Professor of Chemistry and Biochemistry, UCD.

Reservations: Please register for meal 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 CalACS Office, 2950 Merced Street#225, San Leandro, CA 94577.

Cost: \$15.00 Lunch (Students and Unemployed Chemists \$7.50). Presentation is free.

Driving Directions: From Oakland: Take I-80 North, exit Buchanan Street, turn right onto Buchanan Street, continue east one block, turn right into USDA driveway.

From Vallejo: Take I-80 South, exit Albany, turn left onto Cleveland Avenue (S), left on Solano Avenue (E), right on Taylor Street (S), cross Buchanan

Summary:

Dr. Siegel's scientific efforts are focused on combining computational and experimental tools to develop a fundamental knowledge of enzyme catalysis, and applying those principles to design novel proteins of therapeutic or commercial interest. Currently he is working with an international community on the development of Rosetta computational methodology for predicting and designing macromolecular structures, interactions, and functions. Using this methodology he has completed the *de novo* design of enzymes capable of catalyzing chemical reactions not found in nature, such as the Diels-Alder reaction. This was followed up by working with an online community, Foldit, to further engineer these proteins for enhanced activity. Most recently Dr. Siegel has worked on the redesign of naturally occurring enzymes for the degradation of immunogenic gluten proteins, to develop a novel CO₂ fixation pathways and design of a novel anthrax therapeutic. His current focus is on the design of novel biofuel and commodity chemical biosynthetic pathways, the development of novel therapeutics, and the general understanding of the relationship between protein sequence, structure, and function.



Biography:

Dr. Justin Siegel is an Assistant Professor of Chemistry and Biochemistry, University of California, Davis. He received his PhD in biochemistry from the University of Washington in 2011. He is the Acting Director of the Innovation Institute for Food and Health at UCD as well as the Founder of PvP Biologics, Seattle, WAS which focuses on novel therapeutics to treat food allergies. He is also the Business Development Chair of Rosetta Commons, an organization that is the central hub for over 150 developers from 23 universities and laboratories to contribute and share the Rosetta source code for computational modeling and analysis of protein structures. He was also founding member of Bio Architecture Labs, Berkeley. In 2012 He received the Grand Prize from International Genetic Engineering Machines Competition, and the Alfred P. Sloan research fellowship in 2014.





Science *café*

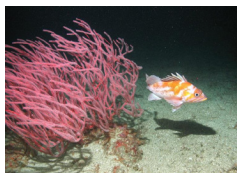


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Exploring Northern California's Underwater Wilderness

**Speaker: Dirk Rosen, MARE
Engineer and Founder**

**Wednesday, April 13, 2016
7:00pm Community Hall**



Marine Applied Research & Exploration (MARE) deploys robotic submarines to survey and assess fish populations beyond depths accessible to recreational scuba divers.

Learn how Dirk Rosen, founder and executive director of MARE, and his team of engineers and biologists track changes over time to ensure a healthy ocean for future generations.

Purchase \$15 tickets at: tinyurl.com/ScienceCafeMARE
Current LLLCF donor tickets: \$5
Donors, please call to purchase: (925) 283-6513 ext. 102

Lafayette Library and Learning Center Foundation
3491 Mt. Diablo Blvd., Lafayette, CA 94549 | 925-283-6513 x1102 | www.lllcf.org

Chair, continued from page 3)

of the Younger Chemists Committee and a recent Speaker at the March Section meeting. We look forward to seeing you at our various programs and do not forget, you are invited to the Executive Committee meeting the first Tues of the Month.

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Tri Valley EYH Event at Las Positas College, Feb. 27, 2016

Expanding Your Horizons is a full day event geared towards exciting the interest of young teenage girls in math and science. Three hundred and thirty girls attended this year's Tri Valley Expanding Your Horizons event at Las Positas Community College in Livermore. Many hands-on activities and presentations by science professionals, in the form of workshops and activities at a career fair, were part of the event. Eight members of our CalACS executive committee, five of them from the Women Chemists Committee, guided the girls in activities at a workshop and two booths at the career fair. The Women Chemists Committee also supported the EYH event with a financial contribution.

The Amazing Everyday Chemistry workshop, set-up by F. Zaka of Lawrence Livermore National Labs, included demonstrations, like the Witches Brew showing pH changes with ammonia, vinegar and phenolphthalein indicator. This was followed by an activity titled "Diaper Experiment" where teams of 3-4 girls, aided by two of our CalACS members, measured how much water a diaper can absorb and compared it to cotton absorption. The teams learned about weighing, volumetrics, lab technique, communication, safety (lab

coats, glasses and gloves) and teamwork. The winning team whose value was closest to a standard received chocolate!

The career fair was attended in three shifts of more than a hundred girls each. For our activity on the sugar content of soft drinks and fruit juices the students measured the densities of soft drink samples with hydrometers and compared their results with standard sugar solutions. They learned about density, discussed how the concentration of dissolved solutes, like sugar, affects it - and were amazed by the amount of sugar in most soft drinks. At our second booth the girls were invited to smell and guess scents from plants presented in vials. The students then built molecular models with model sets of some of the volatiles found in the smells. The teenage girls learned about organic compounds, their composition, the composition of some plant smells, and also what is typical of the molecular structures of volatile compounds. We had the great help of thirteen students from C. Gluchowski's Chem 30B class at Las Positas College. They guided the young teenagers with skill and enthusiasm and made it possible to provide the necessary support for the experiments. It was rewarding to experience the interest and eagerness of the teenagers to try the experiments and to learn about the science behind them.

Margareta Séquin.



Charles Gluchowski, past chair, and student Marc Acosta from his Chem 30B class at Las Positas College were surrounded by eager students at the CalACS activity on Plant Scents and Molecules at the EYH career fair.



BUSINESS DIRECTORY

SEARCHING FOR THAT SPECIAL JOB?

There are many companies and organizations searching for chemical and biochemical personnel to fill important jobs in their organizations.

- Companies for laboratory and management positions
- 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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INDEX OF ADVERTISERS

Promote	11
ACS Vortex	11
NuMega Resonance Labs	11
Robertson Microlit	9

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