

Silicon Valley Chemist

Santa Clara Valley Section

American Chemical Society

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JUNE 2017 NEWSLETTER TOPICS

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Connect with Chemists

An early morning chat with fellow chemists

Thursday, June 15, 2017, at 7 a.m.

Coupa Café

538 Ramona Street, Palo Alto

Look for Ean at a table with an ACS card.

Joint Meeting with Golden Gate Polymer Forum Genetically Encoded Polymers Construction of Multifunctional Therapeutics without Sacrificing Homogeneity

Dr. Volker Schellenberger

Abstract

Historically, pharmaceuticals had very simple designs. Most drugs would bind to a single receptor to turn in on, off, or to block binding of its natural ligand. Our rapidly expanding knowledge of human physiology at the molecular level allows us to dream of much more complex functions for a pharmaceutical. We may want it to interact with multiple receptors, differentiate between diseased and healthy tissues, or use certain physiological cues to turn its activity on or turn off. We now have the means to rapidly design binding domains that interact with receptors. Amunix has been working on protein polymers (called XTEN®) that allow us to assemble multiple such domains into a single molecule with precise control of spacing between domains. We can insert weak links that break upon certain physiological events (a bleeding event) or upon entering into a particular tissue (tumor, inflamed tissue) and we can modify the size of the pharmaceutical, which affects

its ability to penetrate into various tissues. This seminar will describe the concept of protein polymers as well as our rapidly expanding toolbox that allows us to design increasingly complex molecules while

continued on next page

Joint Meeting with Golden Gate Polymer Forum

Date: Tuesday, June 13, 2017

6:00 p.m. Social Hour

7:00 p.m. Dinner

8:00 p.m. Presentation

Speaker: Dr. Volker Schellenberger

Amunix

Genetically Encoded Polymers

Location: Michael's at Shoreline Park
Mountain View, CA

<http://michaelsatshoreline.com/>

Cost: Register by June 5:

\$30 for members, \$15 for students,
unemployed and retired

Register after June 5:

\$35 for members, \$20 for students,
unemployed and retired

Menu: Broiled salmon, Breast of chicken
Florentine or Mushroom crepes

Registration: www.ggpf.org

Len Radzilowski 650-361-3264

Reservations should be made by June 12, stating your name, address, company/school affiliation, number of people in party. Visit [our website](#) and the [Golden Gate Polymer Forum website](#) for more information. If you are unable to honor your reservation please cancel by June 12. We have to pay for all ordered dinners.

SCVACS Annual Picnic, Wine Tasting and Awards Ceremony

Date: Saturday, July 8, 2017

4:00 Wine Tasting

5:30 Barbeque Dinner catered by Armadillo Willy's

7:00 Awards

Deadline for Reservations: Wednesday, July 6, 2017

Location: Stanford University Chemistry Gazebo
behind "Old Chem" [Map](#)

Registration online at: www.scvacs.org

Cost: Adults: \$20.00

Children under age 12: \$5.00

Student: \$10.00



June Dinner Seminar, continued from front page
maintaining perfect homogeneity.

Biography

Volker Schellenberger is President and CEO of Amunix Operating Inc, which he co-founded with Willem Pim Stemmer in 2006. He initially served as Amunix' Chief Scientific Officer and is the lead inventor of the company's XTEN technology. Volker has over 20 years of industry experience in protein engineering and drug discovery. Prior to co-founding Amunix, he served as head of Genencor's protein engineering department.

Volker received his Ph.D. from Leipzig University (Germany) in 1986. After post-doctoral work at the Institute for Protein Research in Pushchino (Russia), the University of Göttingen, and with Bill Rutter at the University of California, San Francisco, he joined Genencor in 1994. Volker is author of over 40 scientific papers and inventor of more than 70 issued or pending patent applications. He is a recipient of the Karl Lohmann prize of the German Society of Biochemists.



Chair's Message

Todd Eberspacher



Help Wanted. As we roll into summer, those two words are welcomed by recent graduates as they begin new careers. We need help too. Are you interested in being an officer, councilor, or helping in another way? If you are interested in being on the nomination committee or running for a position, please contact me (chair@scvacs.org). Experience is not necessary and on-the-job training is available. I welcome any inquiries. I am available to discuss duties and expectations with anyone interested.

At the last dinner meeting, we got to see XRF (X-ray fluorescence) in action, determining heavy metals in cosmetics and food products! Thanks to Matt Greaney for arranging the meeting. If you have an idea for a speaker, please contact the Program Committee (programming@scvacs.org) and get your

speaker on the calendar.

The Annual Awards Picnic will be held on July 8 at Stanford University in the Sapp Center, the newly remodeled Old Chem building. At this meeting, we honor the award winners and our 50-, 60-, and 70-year members. Please mark your calendars and bring the family. As usual we will

have a catered BBQ dinner and wine tasting.

In just a few days, on June 13, we will jointly host a dinner meeting with the Golden Gate Polymer Forum. Volker Schellenberger, CEO of Amunix Operating, will present a talk on Genetically Encoded Polymers.

Finally, our section was selected as a finalist for an ACS ChemLuminary Award for the successful launch of a sub-section in the Monterey Bay area. Congratulations to everyone involved. Look for future events to be hosted by this southern half of the section.

Steven Liu Is Going to the Study Camp!

Steven Liu, a senior at Monta Vista High School, has qualified the second time to attend the National Chemistry Olympiad study camp. Congratulations, Steven! He again ranked among the top 20 chemistry high school students in the United States who participated in the Olympiad this spring. To obtain this honor, he competed against 1,000 students from across the nation in a full day of testing on April 22nd.

This study camp will be held at the Air Force Academy, where it has traditionally been held for many years. He will be in Colorado from June 6th - 24th. Included will be six students who are returnees from the 2016 camp and 14 new students. The students will be mentored, taught, and crammed full of chemistry in anticipation of representing the U.S. at the 49th International Chemistry Olympiad in Nakhon Pathom, Thailand, July 6th - 15th.

Now a little about Steven – he lives in Cupertino and is an only child, so he has time for extracurricular activities. Besides chemistry



he loves playing the piano and has been playing for 10 years. He actually played at Carnegie Hall in 2016. Steven also plays on the school's varsity badminton team.

As a true chemistry nerd, Steven has a lab at home. He is currently working on the synthesis of scents. Other than minty methyl

salicylate, he has made methyl anthranilate (from latex gloves), limonene and cinnamaldehyde. I asked him if his Mother was concerned about this!

As for the future, he will be attending MIT in the fall with his friend and former Monta Vista classmate, David Wang. David, if you remember was our 2015 participant in the International Chemistry Olympiad. Steven is currently leaning towards majoring in biochemistry or computer science!

In addition to congratulating Steven on his accomplishments, we also have to congratulate Ms. Kavita Gupta, the AP chemistry teacher at Monta Vista! She brings chemistry alive to her

students! Three of her students in the past 4 years have attended the Olympiad study camp and 2 of them have gone on and won medals at the international Olympiads! Steven, we hope you get to carry on that tradition and make it 3 out of 3 for Ms. Gupta's students!

Chemistry Quiz

In the Santa Clara Valley in 2015, which two air pollutants exceeded the EPA's National Air Quality Standards most frequently?

Last Month's Chemistry Quiz

Which membrane-bound protein has 46 chains, weighs more than 1MDa, and performs the first step in respiratory electron transport?

Complex I, also known as NADH:ubiquinone oxidoreductase.

2017 Outstanding High School Chemistry Students

By **Sally Peters**, Chair of the SCV Chemistry Olympiad committee

On April 22nd, sixteen of Silicon Valley's top high school chemistry students met at Santa Clara University to compete in the national testing for the 2017 International Chemistry Olympiad. We joined seventeen students from the California Section for a grueling day of exams.

The students gave up a beautiful Saturday to spend 6 hours indoors working on problem sets, multiple-choice questions, and the 'killer' lab problems.

This year 22 high schools and over 300 Santa Clara Valley section students participated in the local standardized exam at their high schools. The top scorers then represented our section in this national exam. No more than two students from a high school can participate in the national exam. Monta Vista was allowed three students, because Steven Liu automatically qualifies, since he attended the study camp in 2016. Some schools gave the local exam to all of their AP or Honors chemistry classes as a warmup for the AP exam that is given in May. Other schools administer it only to interested students. The ACS national exam, given on the 22nd, was sent to national ACS for the ACS Olympic committee to grade. The national committee, composed

of about 40 professors and teachers, has over 1,000 exams to grade and compare!

The 1,000 students who participated in the national exam on the weekend of the 22nd are narrowed down to the top 20 students in the country. Those students will attend an intensive study camp for two weeks. The camp traditionally is held at the Air Force Academy. From those 20 students four will be chosen to travel to Nakhon Pathom, Thailand, in July to compete internationally. Good luck to our students.

For the past five years three of our section's students were chosen to attend the study camp. Two students, Stephen Ting and David Wang, went international and won gold medals! Both young men are now majoring in chemistry at Stanford and MIT. Last year, Steven Liu from Monta Vista High was selected for the study camp and he was chosen as the first alternate. He did not travel internationally.

Again, a special thanks goes to our volunteers who helped on April 22nd, George Lechner, Dave Parker, Howard Peters, Tara Baney and Slava Bekker for their help proctoring the sections' activity this year. Linda Brunauer was our sponsor at SCU. She had the daunting task of lab prep for the 33 students. Several of her students helped during the day and with

the lab cleanup.

A very special thanks goes to the high school teachers who make it possible for their students to participate. They gave up personal and classroom time to communicate the program, organize the testing, and grade the local exams. Tie-breaker questions were not needed this year! The scores of our top 16 students ranged from 45 to 58 out of 60.

The Santa Clara Valley outstanding high school chemistry students and their teachers are:
Carlmont High School – **Sammy Zhang** and **Brian So** – Felix Guzman
Fremont High School – **Michael Wang** – Anita Wu
Gunn High School – **Cory Pan** (H) – Heather Mellows
Harker School – **Alexander Young** and **Linus Li** – Robbie Korin
Lynbrook High School – **Pranav Lalgudi** (H) and **Robert Yang** (HH) – Lester Leung
Monta Vista High School – **Steven Liu** (HH), **Eric Tang** (H) and **Forest Yang** (H) – Kavita Gupta
Mountain View-Los Altos – **Eumice Yang** – Katie Thornburg
Palo Alto High School – **Mibir Singhal** (H) – Ashwini Avadhani
Saratoga High School – **Ryong Im** and **William Hu** – Janny Cahatol
School for Independent Learners – **Freya Edholm** (HH) – Matt Solt

Additional high schools that participated in the local exam were: Aragon High School, Archbishop Mitty, Basis Independent Silicon Valley, Bellarmine, Evergreen Valley, Kehillah, Leland, Mercy (Burlingame), Nueva School, Oak Grove, Piedmont Hills, and St. Francis..

Thank you everyone!

National just released the names of the students who received High Honors (HH) and Honors (H) out of the 1,000 students who participated in the national exam. These students scored in the top 141 students in the country! Our section had three High Honors and five Honors! Way to go students!! By my count, there is only one other section, the Chicago section, with more students (10) in these categories!

If you want to match wits with the students, go to the following ACS [website](#) (and no peaking at the answers!) for the 2017 local and national exams:

This year a special thanks goes to Dr. Tara Baney and Dr. Slava Bekker for helping me organize the Olympiad!!



INTEL International Science and Engineering Fair ISEF 2017

by Howard Peters

For years, local INTEL Corp. has sponsored the largest and most visible high school science and engineering fair in the world (ISEF). ISEF 2017 was held at the LA Convention Center from May 15-19.

About \$5,000,000 in awards, trips, scholarships, internships, etc., are awarded and usually about 25% of the 1700 high school students will have filed a patent application on their project.

The many Grand category awards can be found [here](#).

The ISEF Special Awards by colleges, universities, professional associations, armed services and the like can be found [here](#).

The American Chemical Society (ACS) Education Division promotes excellence in science education and science literacy through a number of activities supporting teachers and learners of chemistry. Through its participation in Intel ISEF, ACS encourages and supports high school students in their exploration of the chemical sciences through research experiences. The 2017 ACS awards at ISEF include:

First Award of \$4,000

Discovery and Characterization of an Undocumented Ferric Sulfate Compound Formed by the Reaction of Gold Ore with Sulfuric Acid

Kyle Fridberg, Fairview High School, CO, United States of America

Second Award of \$3,000

Solution Grown and Tunable Plastic Magnets: Room Temperature Ferromagnetism in Mesoscopic Conjugated Polymer Rings

Arnob Das, Jesuit High School, OR, United States of America

Third Award of \$2,000

Spin-Orbit Coupling Induced Heterogeneous Excited-State Dynamics of 6-Coordinate Transition Metal Protodyes

Archana Verma, Jericho High School, NY, United States of America

Fourth Award of \$1,000

Utilization of Carbon Monoxide as a Reducing Agent for C-C and C-N Bond Formation: Application to Asymmetric Catalyst and Synthesis of New Effective Fungicide

Alexandra Samoylova, Moscow Chemical Lyceum of Moscow South-Eastern Lyceum and Grammar School Complex, Russian Federation

Maria Makarova, Moscow Chemical Lyceum of Moscow South-Eastern Lyceum and Gram-

mar School Complex, Russian Federation

Honorable Mention

Caffeine Termiticide: Caffeine as a Novel and Eco-friendly Termiticide

Xian Jing Koay, Chung Ling High School, Malaysia

Zhan Yi Chng, Chung Ling High School, Malaysia

Conductivity of Doped Polypyrrole Films Synthesized by Electropolymerization

Vijay Shah, Niles West High School, IL, United States of America

Organic Dyes Based on [1,2,5] chalcogenadiazolo [3,4-c] pyridine: New Effective

Materials for Solar Cells

German Chkhetiani, Moscow South-Eastern

Lyceum and Grammar School Complex, Russian Federation

Olga Ustimenko, Moscow South-Eastern Lyceum and Grammar School Complex, Russian Federation

Starch-Based Bioplastic as Optical Indicator for Ammonia in Processed Meat

Stasa Gejo, II. Gimnazija Maribor, Slovenia

Optimization of Temperature Conditions for Pristine Graphene Synthesis

Govind Krishna, duPont Manual High School, KY, United States of America

Synthesis of Iron Oxide Nanorods

Andrea Noronha, Redlands High School, CA, United States of America



Welcome to the Santa Clara 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 in the 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 SCVACS Members

Dr. Brian David Adamson	Jason M. Crowley	Dr. Feng Qu
Stephen Peter Arvedson	Dr. Alessandro Faldi	Melissa Ramos
Stephanie Aurand	Dr. Peter Fung	Jessy Rivest
Christian Batres	Aditi Gogineni	Dr. Jagadish C. Sircar
Jean C. Baum	Emmett Daniel Goodman	Chenchen Song
Philippe Bergeron	Kirk Hayenga	Patrick Staley
Megan Blewett	Dr. Inez Lees	Dr. A A Tomchenko
Khoi Nguyen Ngoc Bui	John Lemas	Eric Ureno
Kevin Cao	Dr. Dong Li	Adam B. Weinstein
Stephanie Cardinali	Han He Liu	John Charles Widen
Dr. Stephen Byars Carroll	Dane Madsen	Christopher Williams
Dr. Aroop Chandra	Andrew Maier	Susan Williams
Huajun Chen	Dr. Stanistaw Henrik Nowak	Dr. Abraham Wolcott
Jared N. Copher	Professor Scott Oliver	Lance Wong
Dr. Ryan E. Cowley	Oleg V. Petrakovsky	

New Nanothermometry Techniques Give Cell Biologists Ways to Measure Temperature at the Subcellular Level

Alla Katsnelson, ACS Cent. Sci., 2017, 3 (5), pp 364–366

Luis Carlos first realized he might be able to make a nanothermometer while developing light-emitting diodes more than 15 years ago. His team observed that lanthanide ions in the diodes reacted to changes in temperature by reliably shifting the color they emitted.

Carlos, a nanomaterials scientist based at the University of Aveiro, immediately realized that these ions might have a destiny beyond simply supplying the color for LED lights or displays. So he and his colleagues submitted a paper demonstrating that lanthanide ions could be used as temperature sensors.

But its publication was initially turned down. What's the point of using light emission to detect temperature, one reviewer asked, when easier and more robust techniques, like thermocouples or infrared imaging, are already commercially available?

"Of course this is true", Carlos says, "but [the reviewer] wasn't thinking on the nanoscale"—a size regime at which established thermometric techniques are too bulky and lack the sensitivity to work. It also wasn't clear what the value of temperature sensing on such a small scale could be, he adds.

Initially, Carlos developed lanthanide nanoscale thermometers to measure temperature gradients in electronic materials, but collaborators soon guided him toward another application: thermometric probes that could monitor tumor cells. At the time, scientists had begun testing an experimental cancer therapy that would kill tumor cells by heating them to above 40 °C. However, too much heat damages surrounding tissues, so the ability to monitor temperature change in targeted cells is key.

Carlos isn't alone in applying tiny temperature-sensing particles to biological systems. Nanoparticles are the right size and have properties that make them ideal for measuring the temperature of cells and even of the organelles within them. Conditions, such as inflammation, and diseases, such as cancer are accompanied by hyperlocal temperature changes in tissues, so nanothermometers could have broad applications for both health monitoring and treatment.

The tools are also poised to address basic questions about cell biology. Chemical reactions within a cell produce heat, but researchers know little about how such heat affects

processes in the cell, or the organism in which it resides. An increase in temperature may serve as a cue to switch other reactions—or the transcription of certain genes—on or off. "Our hypothesis is that the living organism may use this ultra-locally-produced heat as another type of intracellular signaling", says

Madoka Suzuki, a biophysicist at Japan Science & Technology Agency. "But nobody knows, because there has been no method" to detect it.

You can learn more about these tiny temperature sensors at ACS Central Science.



ACS Scholars Program Reaches Milestone 280th Ph.D.

Among this season's graduates are the latest ACS Scholars alumni who are receiving their doctoral degrees. Recently, this group surpassed a milestone of 280 Ph.D. degree holders!

The *ACS Scholars Program* was founded in 1994 to address the underrepresentation of minority students in the chemical sciences. The program builds awareness of the value and rewards of careers in the chemical sciences and helps minority students acquire the skills and credentials they need to succeed. More than 2,700 African American, Hispanic/Latino and Native American undergraduates have received scholarships, mentoring and research experience through the program.

Be a part of this success by making a donation to the ACS Scholars Program. Your gift of any amount will help to encourage diversity in the chemical sciences. Visit www.acs.org/donate for more information.

YCC Networking Happy Hour with the Monterey Bay ACS Subsection

By Derek Popple

On a warm spring evening in Santa Cruz, a group of chemists convened at Humble Sea Brewing Company for networking while enjoying a variety of local craft beer and good conversation. For chemists in Santa Cruz, the happy hour was the first event held in town on behalf of the Monterey Bay ACS subsection. The Younger Chemists Committee event was co-sponsored with support from both the Santa Clara Valley and California sections. The attendees included undergraduates and graduate students from UC Santa Cruz as well as young professionals and established chemists from the SF Bay Area 'over the hill'.

A new yet already popular location, Humble Sea Brewery provided a view of the sunset while facilitating socialization and consumption of delicious pales, pilsners and saisons. The brewery's kitchen supplied muffuletta sandwiches that satisfied appetites while the attendees fueled the conversation. As the last rays of the sun finally set, attendees went on their ways with full stomachs and new friends in chemistry.





SANTA CLARA VALLEY SECTION
AMERICAN CHEMICAL SOCIETY
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is published on our web site, sign up at:

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FUTURE EVENTS

- Jun 13** SCVACS Joint Meeting with Golden Gate
Polymer Forum
Dr. Volker Schellenberger, Amunix
Michael's at Shoreline Park
Mountain View, CA
- Jun 21** *Decoding Cancer*
Dr. Jean Claude Zenklusen
Cancer Genome Atlas Director
Computer History Museum
- Jul 8** SCVACS Summer Picnic, Wine Tasting
and Awards Ceremony
Stanford Chemistry Department
www.scvacs.org
- Jul 11 & 18** Volunteers needed for Tech Trek – science
activities with middle schoolers
Stanford University
Contact us
- Jul 14** *Everything All at Once*
Bill Nye
San Mateo Performing Arts Center
San Mateo, CA

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