Newsletter April 2013

# Silicon Valley Chemist

Santa Clara Valley Section American Chemical Society

Volume 35 No. 4

APRIL 2013 NEWSLETTER TOPICS



## May Dinner Meeting

## Small-scale Gasification

**Jim Mason, PhD, Founder of ALL Power Labs**

***Abstract:***

ALL Power Labs is a leader in small-scale gasification using biomass gasifiers. The resulting gas can be used as fuel for industrial internal combustion engines that will deliver electrical generation, heat and torque. ALL Power Labs also manufactures integrated, palletized systems called Power Pallets that produce electricity from woody biomass "out of the box." Jim will describe the development of the gasifiers, integrated systems, the biomass that can be used, and some of the worldwide applications currently operating.

***Biography:***

Jim Mason is a General Specialist working at the intersection of engineering, anthropology and information science. He is a graduate of Stanford University, with degrees in Anthropology and Philosophy, after a long tour of Mechanical Engineering (yes, he has difficulty sticking to one discipline).

From 1999-2006, he was the Founder and Director of the Rosetta Project: ALL Language Archive at the Long Now Foundation – a project to create an online archive of all documented human languages, currently the largest linguistic resource on the web. He also directed the New Guinea Sculpture Garden at Stanford – an effort which brought 11 artists from Papua New Guinea to campus to build a permanent outdoor sculpture garden.

Jim is also the Founder and Director of The Shipyard collaborative art/build space for large scale mechanical, kinetic and electronic art. As the Founder of ALL Power Labs, Jim is focused on creating tools for distributed power generation and open source comparative research in biomass thermal conversion.

## Chair's Message

Chairs have a lot to do, but one of the things I found most interesting was to review the statistics for our online newsletter readership. We started the online newsletter delivery instead of mail delivery to save significant cost. That worked. The part of the annual budget for newsletter distribution is significantly reduced leaving more budget for other activities.

Now comes the scary part. We send about 3,000 email reminders each time a newsletter is ready. Between 4% and 6% never get to the intended recipient as they are "bounced." Let's say 95% get through the e-mail systems.

For each newsletter, there's a tiny few (fewer than 10) recipients who "opt-out" never to be contacted again.

That leaves about 2,900 emails received and ready to open, of which, only 17-24% are opened by the recipients.

That leaves about 500 recipients who now know that the newsletter is ready for them to read. Now comes the really difficult part. Only a few readers actually click on the link to open the newsletter.

Overall, only 3% (three percent) of the Santa Clara Valley Local Section membership actually gets to the newsletter. The probabilities for spawning salmon are better

*continued on next page*

## May Dinner Meeting

**Date:** Thursday May 16, 2013

**Time:** 6:00 p.m. Social Hour
7:00 p.m. Dinner
8:00 p.m. Presentation

**Presentation:** Jim Mason, PhD
Founder, ALL Power Labs
"Small-scale Gasification"

**Location:** Biltmore Hotel & Suites
2151 Laurelwood Road
Santa Clara, CA

**Cost:** $26.00, Apricot Chicken or Eggplant Parmesan

**Reservations:** *www.scvacs.org*
Sally Peters, 650-854-4614

Reservations should be made by May 13th stating your name, address, company/school affiliation, and dinner selection. If you are unable to honor your reservation, please cancel by May 14th.

*Chair's Message, continued on next page*

than for the Silicon Valley Chemist.

So, to you fewer than 50 members reading this electronically, please encourage other members to read the newsletter and join in the varied activities of our Local Section.

Watch the newsletter for this month's and for May's dinner meetings and speakers. We hope that you find the topics interesting and will attend. In April, our speaker will combine nanotechnology with food. In May it's a combination of waste and power generation.

Reminder **April Dinner Meeting** Reminder

# Industrial Nanoparticles in the Food Chain

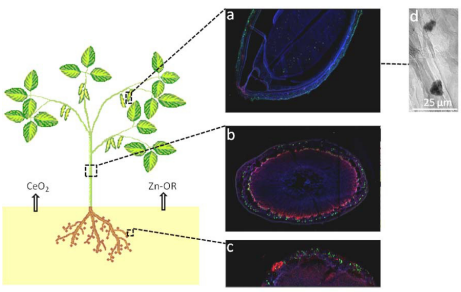
## Tracing Nanoparticle Transformations in Soybean Plants

*Dr. Joy C. Andrews*

***Abstract:***

The global production of engineered nanoparticles (ENPs) is currently a trillion-dollar industry, with nanoparticles now found in products ranging from sunscreen, gas sensors and pigments (ZnO ENPs), to catalysts for internal combustion and oil cracking processes (cerium-based ENPs). While their benefits in such products are known, much is yet to be determined regarding their fate, transport, and toxicity in the environment, including the implications of the potential storage of these ENPs or their biotransformed products in the edible and reproductive organs of crop plants.

Scientists from the University of Texas El Paso, UC Santa Barbara, ESRF and SSRL studied ENP uptake in soybean plants (Glycine max). The team used X-ray imaging and spectroscopy to study the transformation of ZnO nanoparticles within soybeans, finding that they are transformed into a chemical form bound to organic acids within the plants. $CeO_2$ nanoparticles within these plants were found to persist in the nanoparticle form even within the edible soybean, and therefore may persist into future plant generations, with potential health implications.




*Tricolor micro X-ray fluorescence maps (red = Zn, green = Ca, blue = K) of soybean a) pod, b) stem and c) nodule. d) Full-field transmission X-ray microscopy image depicts Zn precipitates in the soybean pod. Figure from: Hernandez-Viezcas et al. 2013, ACS Nano, 10.1021/nn305196q*

***Biography:***

Joy C. Andrews earned a PhD in Physical Chemistry from UC Berkeley, where she researched photosynthesis with Prof. Ken Sauer. After a postdoctoral fellowship at the Lawrence Berkeley National Laboratory, she became Professor of Chemistry at CSU East Bay in Hayward CA, where she continues currently as Professor Emerita. In 2008, she joined the staff at SSRL and leads the transmission X-ray microscopy program. She uses many synchrotron X-ray techniques to study nanoparticle uptake and transformation in plants, and chemical transformations in energy materials including batteries, fuel cells and catalysts.

## April Dinner Meeting

**Date:** Thursday, April 18, 2013

**Time:** 6:00 p.m. Social Hour
7:00 p.m. Dinner
8:00 p.m. Presentation

**Presentation:** Joy C. Andrews, PhD
Staff Scientist, Stanford Synchrotron Radiation Lightsource; Professor Emerita of Chemistry, California State University, East Bay

**Location:** Biltmore Hotel & Suites
2151 Laurelwood Road
Santa Clara, CA

**Cost:** $26.00, Turkey Parmesan or Shiitake Mushroom Ravioli

**Reservations:** ***www.scvacs.org***
Sally Peters, 650-854-4614

Reservations should be made by April 15th stating your name, address, company/school affiliation, and dinner selection. If you are unable to honor your reservation, please cancel by April 16th.

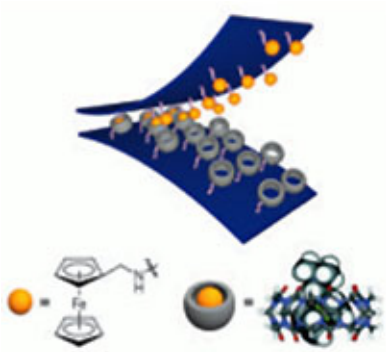
# Molecular Velcro is Sticky When Wet

**By Lauren K. Wolf**
**(C&E News)**

Aquatic creatures such as mussels are experts at sticking to wet surfaces, providing inspiration for researchers to design glues based on the animals' secretions. However, these synthetic adhesives typically require curing agents and are then irreversibly sticky.

To overcome these limitations, a research group at Pohang University of Science & Technology, in South Korea, has created a new adhesive that works under water. It has molecular hooks and loops akin to the fabric structures that hold together Velcro (Angew. Chem. Int. Ed., DOI: 10.1002/ anie.201209382). The team coated one polymer surface with aminomethylferrocene and another surface with cucurbit[7]uril, a large doughnut shaped molecule. The aminomethylferrocenes (the hooks) fit snugly into the hydrophobic cavities of the cucurbit[7]urils (the loops). The sticky system is strong enough to support a 2-kg weight, even under water. The added bonus, the team says, is that the adhesive can be chemically switched off: When immersed in a solution of sodium hypochlorite, which oxidizes aminomethylferrocene, the silicon surfaces come apart with only the pull of a 0.5-kg weight.

The researchers have filed a patent for their molecular Velcro, says team leader Kimoon Kim. They will work next on attaching the hook and loop compounds to polymer surfaces.



# 2013 Synopsys Championship

The 53rd annual Santa Clara Valley Science and Engineering Fair, the Synopsys Championship, was held Wednesday, March 13th, at the San Jose Convention Center ***http://sites.google.com/site/synopsyschampionship/***. As our regional competition, it showcased and celebrated over 1,100 local 6th-12th grade students who will become our future scientists, engineers, technologists, and mathematicians. While their parents, teachers/mentors, and schools supported these students, they performed and presented independent research that exceeded the bounds of their normal classroom studies. Whether or not they were selected for the SCV-ACS awards, or to represent Santa Clara County at the Intel International Science and Engineering Fair, they are all winners.

The SCV-ACS special award team (right) of Dr. Gary Bullard, Mark Kent (co-chair), and Susan Oldham-Fritts (co-chair) judged 190 incredible projects to select the winners of our three section awards:

**$500 First Place Individual Award:**
***Arpita Singhal***, 9th grade, Saint Francis High School, for Herbalism as an Anticancer and Anti-inflammatory Agent: Characterization and Evaluation of Bioavailability of Curcumin Particles

**$200 Second Place Individual Award:**
***Vadim Korolik***, 10th grade, Archbishop Mitty High School, for Ground Water Treatment: Removal of Dissolved Iron

**$300 Team Award:**
***Roxanna Hashemi*** and ***Zahra Bismah Masood***, 8th grade, Magnolia Science Academy of Santa Clara, for Drinkable or Nondrinkable?

*From left to right: Dr. Gary Bullard, Mark Kent, and Susan Oldham-Fritts*

In addition, our team judged for the Promethium Chapter of Iota Sigma Pi, the national honor society of women in chemistry. We selected ***Hilal Nur Atesoglu***, 8th grade, Magnolia Science Academy of Santa Clara, for Using Sesame Leaves as Low Cost Absorbent to Effectively Reduce Heavy Metal such as Lead, Copper and Cadmium from Contaminated Water Samples as recipient of their book award.

Susan Oldham-Fritts and Mark Kent will present these awards on Sunday, April 7th, at the Synopsys Championship Middle School and High School Award Ceremonies, to be held at Great America in Santa Clara.

In addition to our special award judges, we'd like to thank the category award judges for volunteering their time and expertise. We also extend our thanks to Dr. Art DeGeus, CEO of Synopsys, and Gary Robinson and Heidi Black of the Synopsys Outreach Foundation for their continuing generous support of local science students and their teachers. Science fairs don't happen without these committed students, teachers, judges, and sponsors.

Join us in 2014 as either part of our SCV-ACS judging team or as a category judge at your local fair.

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# CALL for NOMINATIONS
## Shirley B. Radding Award

The Santa Clara Valley Section of the American Chemical Society (ACS) announces the call for nominations for the 2013 Shirley B. Radding Award.

First awarded in 1994 to its namesake, the Shirley B. Radding Award annually honors someone who has been a member of the ACS for at least 20 years. Nominees must have demonstrated dedicated, unselfish leadership, service and significant contributions over a sustained period of time to industrial, applied or academic chemistry and to the ACS through elected or appointed positions at local, district and national levels.

**Award Criteria**

- Member of the American Chemical Society for more than twenty (20) years.
- Demonstrated dedicated and unselfish service to ACS and its members over a sustained period of time.
- Provided leadership through elected and appointed ACS positions at local, district and national levels.
- Made significant contributions to industrial, applied or academic chemistry.

**Previous Award Recipients**

| | |
|---|---|
| 1994 Shirley B. Radding (deceased) | 1995 Agnes Ann Green (deceased) |
| 1996 John F. "Jack" Riley (deceased) | 1997 Howard M. Peters |
| 1998 Alan C. Nixon (deceased) | 1999 Valerie J. Kuck |
| 2000 Halley A. Merrell | 2001 Norman A. LeBel (deceased) |
| 2002 Paul H. L. Walter | 2003 Jean'ne M. Shreeve |
| 2004 Maureen G. Chan | 2005 Glenn Fuller (deceased) |
| 2006 Janan M. Hayes | 2007 Merle I. Eiss |
| 2008 Dorothy J. Phillips | 2009 Bryan Balazs |
| 2010 Herbert B. Silber | 2011 Carol A. Duane |
| 2012 Bonnie Charpentier | |

The award consists of an honorarium of $1,000 and a suitably inscribed memento. Nominations must consist of at least one letter of nomination stating how the nominee's work relates to all aspects of the award. It is strongly recommended that seconding letters accompany the nomination.

Nominations are due on or before May 1, 2013, and may be sent electronically to Radding-Award@scvacs.org or be mailed to:

Radding Award Committee
Santa Clara Valley Section ACS
Post Office Box 395, Palo Alto, CA 94302-0395

# Mass Spectrometry Detects Cancer Biomarkers in the Chemical Cloud Hovering Over Urine Samples

**By Erika Gebel (C&E News Online)**

Urine tests can help doctors diagnose a wide range of diseases, such as bladder infections and diabetes. Cancer may be next. Researchers report a chemical signature linked to gastroesophageal cancers in the plume of volatile organic compounds floating above a urine sample (Anal. Chem., DOI: 10.1021/ac4000656). Looking for the urine chemicals may someday help doctors detect these deadly cancers in their early stages.

Only 20% of people with cancers of the stomach or esophagus receive treatment because the diagnosis often comes too late for doctors to stop the cancer. Also patients don't usually experience symptoms until the cancer is advanced. "They have a very poor prognosis," says George B. Hanna of Imperial College London. "There is a need for diagnostic tests that would be able to screen patients" to catch the disease earlier, he adds.

Hanna's lab uses mass spectrometry to analyze volatile compounds wafting off biological samples in hopes of finding diagnostic chemical signals. This cloud of chemicals is called the headspace of a sample. The team recently found high levels of several compounds, including formaldehyde and hexanoic acid, hovering over gastric juices from people with gastroesophageal cancers. Unfortunately, scanning gastric juices doesn't make for a good diagnostic screen, Hanna says: Obtaining the fluids from a patient is invasive and yields small volumes. Urine, on the other hand, is plentiful and easy to come by, making it ideal for clinical tests, he says.

To see if they could find the cancer-linked compounds in the headspace of urine samples, Hanna and his team obtained samples from three groups of patients: 17 patients diagnosed with gastroesophageal cancer, 13 people with healthy guts, and 14 patients with noncancer stomach conditions. The researchers transferred 10 mL of each urine sample into a specimen cup and sealed it. They then punctured the seal with a hypodermic needle attached to a tube that fed gaseous samples directly into a mass spectrometer.

When the scientists compared the concentrations of chemicals in the urine headspace of samples from cancer patients to those from people without cancer, they found significant differences in seven compounds. For example, levels of acetylaldehyde and hydrogen sulfide were greater in samples from cancer patients than in those from cancer-free people. These two compounds have been linked to gastroesophageal cancer in other studies in the literature, Hanna says. Using a statistical method, Hanna's team found that they could use the concentrations of six of the seven chemicals to reliably distinguish between people with gastroesophageal cancers and those without.

Using the volatile part of urine to diagnose cancer is novel and interesting, says Robert H. Weiss of the University of California, Davis. He wonders whether the method will only work for gastroesophageal cancers or if it could be a general cancer detection method. Hanna says that he doesn't know yet whether the signals are specific to these cancers, but plans to next look at volatile compounds from the urine of people with colon cancer.

# 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 dinner 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 spouse (or friend) will be our guests.

The dinner meetings are often the 3rd Thursday of the month at a local spot, somewhat convenient to the entire section. If you are unable to attend in the evening, perhaps you would join us for an outreach event, like judging a science fair, participating in the Chemistry Olympiad, or 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 Members List for March

Dr. Sree Alavattam
Danielle Carter
Kelly Kim Chau
Gustavo E. Chavarria
Joanne Couling
Nchedochukwu Jennifer Ezeokoli
Ace G. Galermo
Dr. Chris F. Grant
Ayako Honda
Samira Imanian
Mingzhe Ji
Dr. Mariliz Ortiz Johnson
Morris Jones
Paul Kawulok
Dr. Thomas J. Kimbrough
Clive Tristan Kittredge
Dr. Hui-Chen Li
Dr. Wenguang Li
Dr. Linda Lee Lopez
Anita Ly
Dr. Victor Markov
Shanique Martin
Carlos Medina
Dr. Gilles Muller
Professor Scott Oliver
Dr. Sebastian Osswald
Ankit Patel
Pranathi R. Perati
Dr. Malati Raghunath
Gayatri Sankaran
Dr. Alan Shaw
Tomoaki Shibata
Jessica St. John
Ryan Thatcher
Brad Zaro
Yansheng Zhai
Dr. Wenkai Zhang

# Latest Elected Honorary Life Member of the ACS Division of Chemistry and The Law

## Donald J. Polden - Dean, Santa Clara University, School of Law

**Howard and Sally Peters**

In August, the Executive Committee of the ACS Division of Chemistry and the Law (CHAL) voted and elected its newest Honorary Life Member of the 25 year old Division - Donald J. Polden – current Dean of the School of Law at Santa Clara University. The presentation of the ACS plaque by former CHAL Chair and Councilor Dr. Howard Peters occurred in January at the regular SCU Law Board of Visitors meeting.

Dean Polden is a graduate of George Washington University in Washington, DC, and received his Juris Doctor degree *cum laude* from the University of Indiana School of Law in Indianapolis. After having teaching and deanship responsibilities at the law schools of Drake University and University of Memphis (TN), Polden became Dean at SCU Law in 2004. In his ten-year tenure, he greatly advanced the intellectual property law program and initiatives, which are vitally important to invention and innovation in science and engineering.

Prior notable Honorary Life members of ACS CHAL include:

***Dr. William Carroll, Jr.***
2005 ACS President and current Chair of the ACS Board of Directors.

***Dr. Pauline Newman***
Former member of the ACS Board of Directors, ACS Fellow and currently the senior presiding judge on the highest patent court in the US; the Court of Appeals for the Federal Circuit.

***Baroness Margaret Thatcher***
Prime Minister of the United Kingdom from 1979-1990. The Iron Lady's first degree from Oxford University was in chemistry (1947). Her early and continuing mentor at Oxford was Dr. Dorothy Crowfoot Hodgkin (Nobel Prize winner in Chemistry, 1964).



## CHEMPLOYMENT ABSTRACTS APRIL 2013

For a complete list of current abstracts, please visit: ***www.scvacs.org/Local_Folder/abstract.htm***

**CHEMPLOYMENT ABSTRACT 3982**

*Position Title:* Associate Scientist, Small Molecule Analytical Chemistry

*Job Description:* This laboratory-based position focuses on analytical characterization, method development and GMP release of formulated drug product, drug substance, intermediates, starting materials and functional excipients to support clinical and pre-commercial CMC drug development. The Associate Scientist will be a key team member working within an analytical project group.

QUALIFICATIONS DESIRED:

*Education:* A PhD degree in a relevant scientific discipline and 0-3 years in the pharmaceutical industry are required.

*Experience:* Candidates must have a strong fundamental knowledge of analytical chemistry and organic chemistry and be able to apply it to drug development. Hands-on experience in organic spectroscopy, chromatography and other separation techniques will be beneficial to your application.

Experience with automation is desirable.

LOCATION, SALARY, EMPLOYER:

*Job Location:* South San Francisco

*Salary:* DOE

*Employer:* For more than 30 years, Genentech has been at the forefront of the biotechnology industry, using innovative science to develop breakthrough medicines that improve the lives of people with serious or life-threatening diseases

Application Instructions: Please visit our website at https://roche.taleo.net/careersection/10002/jobapply.ftl?lang=en&job=00408544&src=JB-11480 or submit your resume to mackenzie.perino@ckrinteractive.com

SANTA CLARA VALLEY SECTION
AMERICAN CHEMICAL SOCIETY
P.O. Box 395, Palo Alto, CA 94302


**http://www.scvacs.org**

To receive an email when our newsletter is published on our web site, sign up at:
**http://www.scvacs.org/newsletter/**

## SANTA CLARA VALLEY SECTION

### 2013 Section Officers

| | | | |
|---|---|---|---|
| Chair | Peter Rusch | 650-961-8120 | pfrusch@aol.com |
| Chair Elect | Ean Warren | 650-329-4554 | ewarren@scvacs.org |
| Past Chair | Natalie McClure | 650-906-7831 | nmcclure@drugregulatoryaffairs.com |
| Secretary | Karl Marhenke | 831-688-4959 | karlmar@armory.com |
| Treasurer | Ihab Darwish | 650-594-1654 | darwishis@yahoo.com |

### Councilors

| | | | |
|---|---|---|---|
| 2011-2013 | George Lechner | 408-226-7262 | glechner@aol.com |
| 2011-2013 | Herb Silber | 408-924-4954 | hbsilber@science.sjsu.edu |
| 2012-2014 | Abby Kennedy | 209-640-2005 | akennedycali2007@yahoo.com |
| 2012-2014 | Ean Warren | 650-329-4554 | ewarren@scvacs.org |
| 2013-2015 | Linda Brunauer | 408-554-6947 | lbrunauer@scu.edu |
| 2013-2015 | Sally Peters | 650-854-4614 | sallybrownpeters@gmail.com |
| 2013-2015 | Peter Rusch | 650-961-8120 | pfrusch@aol.com |

### Alternate Councilors

| | | | |
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| 2011-2013 | Mark Kent | 408-736-0989 | marklent@yahoo.com |
| 2011-2013 | Harry Ungar | 831-708-2049 | haungar@cruzio.com |
| 2012-1014 | Lisa Milstein | 510-624-4019 | lisa.milstein@balazs.com |
| 2012-2014 | David Parker | 408-615-4961 | drdrparker@comcast.net |
| 2013-2015 | Stephanie Bachmann | 408-429-9681 | s_gehling@hotmail.com |
| 2013-2015 | Lois Durham | 650-322-3507 | ldurham9398@sbcglobal.net |
| 2013-2015 | Natalie McClure | 650-906-7831 | nmcclure@drugregulatoryaffairs.com |

### Newsletter

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|---|---|---|---|
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### ChemPloyment Abstracts

| | | | |
|---|---|---|---|
| Director | Liang Cao | | liang.cao@aol.com |

## FUTURE MEETINGS

| | |
|---|---|
| **Apr 7-11** | 145th National ACS Meeting<br>New Orleans, LA<br>***www.acs.org/neworleans2013*** |
| **Apr 9** | DeNardo Lectureship<br>Santa Clara University<br>***www.scu.edu/cas/enrichment/denardo/*** |
| **Apr 13** | Chemistry Olympiad National Exam<br>Santa Clara University |
| **Apr 18** | Santa Clara Valley Section Meeting<br>Dr. Joy C. Andrews<br>Industrial Nanoparticles in the Food Chain<br>Biltmore Hotel & Suites<br>Santa Clara, CA |
| **May 16** | Santa Clara Valley Section Meeting<br>Jim Mason, ALL Power Labs<br>Biltmore Hotel & Suites<br>Santa Clara, CA |
| **Jul 13** | Annual Family Picnic and Awards Ceremony<br>Department of Chemistry<br>Stanford University |