

## A Message from Your Executive Committee

Your CALPACS executive committee works very hard to make each year memorable and eventful. We've had a successful 2010 season complete with industry tours, recognition of our 50 year members, wine tasting, and supporting local events throughout the region. We were pleased to feature so many colorful talks on topics such as flavor chemistry, lead in the environment, global warming, and famous mad hatters. If there is something you would like to see CALPACS do, send us an email at [calpacs@chem.ucsb.edu](mailto:calpacs@chem.ucsb.edu). Committee email addresses can be found on the CALPACS website [www.chem.ucsb.edu/~calpacs](http://www.chem.ucsb.edu/~calpacs). You can also visit our new Facebook page at "[California Los Padres ACS](http://www.facebook.com/CaliforniaLosPadresACS)". We are always interested in hearing your ideas and we invite you to share any thoughts on events or information you'd like to see in the upcoming year. Thank you!

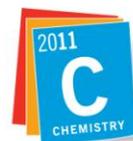
### 2011 Executive Committee

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Chair, Richard Hurst  
Chair Elect, Curtis Musser  
Immediate Past Chair, Simone Aloisio  
Secretary, James Pavlovich  
Treasurer, Ata Shirazi  
Councilor, Al Censullo  
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#### Executive Committee Members

Stephen Contakes  
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Allan Nishimura  
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Jaime Dwight  
Michelle Fortin



## International Year of CHEMISTRY 2011

The international year of chemistry celebrates how chemistry has contributed to the well-being of humankind. This year's theme, "Chemistry – Our life, our future", serves to increase public appreciation of chemistry, increase interest in chemistry among young people, and generate enthusiasm for the future of chemistry. During the year, there will also be celebrations for the 100<sup>th</sup> anniversaries of the Mme. Curie Nobel Prize as well as the founding of the International Association of Chemical Societies. Go to [www.chemistry2011.org](http://www.chemistry2011.org) for more information about how you can get involved with the International Year of Chemistry.

#### Upcoming IYC 2011 Events (sampling)

- Advanced Culinary Chemistry – Sizzles for the Summer  
*June 30 – Online at [www.acswebinars.org](http://www.acswebinars.org), 2-3pm ET*
- Challenges in Renewable Energy  
*July 5-8 – MIT, Boston, Massachusetts*
- Summit Conference on ChemEd Research  
*July 11-14 – Washington, D.C.*
- 21<sup>st</sup> Biennial Chem Ed Conference for chemistry educators  
*July 24-28 – Western Michigan University, Kalamazoo, Michigan*
- Distinguished Women in Chemistry/Chemical Engineering Symposium  
*August 2 – San Juan Puerto Rico, IUPAC World Chemistry Congress*
- World's Largest Chemistry Lesson  
*August 13 – Grout Museum District, 503 South St. Waterloo, Iowa*
- Sustaining the Blue Planet: Global Water Education Conference  
*September 13-16 – Holiday Inn, 5E. Baxter Ln, Bozeman, Montana*

For more events go to

[www.chemistry2011.org/participate/events](http://www.chemistry2011.org/participate/events)

# *Lead in the Environment*

## **A CALPACS Earth Day Event**

On Sunday, April 17, CALPACS sponsored a lecture by CSU, Los Angeles Professor Emeritus, Richard W. Hurst (Geology & Geochemistry) entitled, “The Duality of Lead in the Environment: Environmental Bane and Boon.” Dr. Hurst has over three decades of experience in the area of forensic geochemistry, having redirected the use of geochemical and stable isotopic techniques commonly used to determine the ages of rocks to the study of environmental contamination. In addition to teaching university courses on the subject, he has also been a consultant in this area since 1978; his firm, Hurst & Associates, Inc. provides services to a wide variety of professional and industrial entities.

The first portion of his talk provided the 30 – 35 attendees with an overview of the history of lead and its uses. He explained that the first use of lead dates back to the Egyptians, circa 3500 BC. Based upon studies of the lead content of bones recovered from archaeological digs at Roman sites, many archaeologists attribute the decline of the Roman Empire to lead poisoning of the ruling classes. Not only did the Romans use lead for pipes that delivered drinking water, but they used it to construct wine goblets; as a result their bodies acquired very high, toxic levels of the harmful metal.

During the 20<sup>th</sup> Century, lead was used as a gasoline additive (Tetraethyllead) and in paint; in the case of paint, lead significantly enhances the durability of paint.



Dr. Hurst summarized the historic modern use of both gasoline lead additives and lead paint, covering their rise during the early part of last

century to the mandated phase out of both products in the 1970s for lead paint and circa 1990 for automotive leaded gasoline in the United States. However, he emphasized the point that despite the discontinued use of leaded gasoline, residual contamination of soil and groundwater from leaded gasoline combustion and accidental releases of gasoline, particularly in urban areas, continues to this day.

Despite this lead contamination, stable isotopes of lead have been used to evaluate the fate, transport, and sources of lead contamination in the environment. Dr. Hurst, briefly reviewed his development of the ALAS Model in which systematic changes in leaded gasoline isotope ratios during the 20<sup>th</sup> Century have been used to estimate the year leaded gasoline at various contaminated sites throughout was released. He provided one example from the Los Angeles area where three local, operating unleaded gas station owners were identified as potentially being responsible for gasoline seeping into an underground parking structure in the early 1990s. Lead isotope analyses, however, indicated the gasoline seeps were derived from leaded gasoline releases that occurred decades earlier, hence, the current gasoline station operators were released from any cleanup responsibility.

The last portion of the talk focused first on garden snails who, quite cleverly, store excess lead in their shell in order to avoid toxic accumulations of the metal in their tissue. These snails, sampled from southern England, live in areas contaminated by lead deposited over centuries of coal mining and, more recently, by leaded gasoline combustion. The second topic included an overview of lead contamination, supposedly from lead paint, in older, sometimes rundown urban homes. Through the use of lead isotopes and analyses of house dust, Dr. Hurst showed that although circa 5 – 10% of the samples indicated lead paint was the primary contaminant, the remaining, samples were more likely impacted by leaded gasoline combustion and, perhaps, other industrial sources of lead. Hence, despite this element's toxicity, the “Bad Cop” aspect, through the use of lead isotopes, it is possible to utilize lead’s “Good Cop” aspect in order to resolve contamination issues, and correctly identify those who are responsible for the contamination.

## 2011 Chemistry Olympiad



on April 23<sup>rd</sup>. These were Greg Schein and Evan Crook (Rio Mesa High School), Geneva Miller (The Thatcher School), Caleb Choban and Owen Sebo (Templeton High School), David Tompkins (Mission Prep HS), and Matthew Russell (Atascadero HS). The three part national exam contained multiple choice and essay sections as well as a lab practical which required students to construct a battery using coins, salt, and paper and to measure the heat of crystallization of potassium nitrate.

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## Sandra Lamb Award

CALPACS would like to recognize Dr. Richard Hurst who was awarded the Sandra Lamb Award in recognition of his contributions to the society and environmental geochemistry. Dr. Hurst received the award during the 2009 fall luncheon meeting.



Dr. Richard Hurst

This year, the California Los Padres local section sponsored a local competition to help select candidates for the 2011 US Chemistry Olympiad team. Eleven local teachers and 105 students participated in the first of a three round competition: John Forte (Atascadero HS), Richard Smith (Buena High School), Dan Lucas (Channel Islands HS), Barnaby Dillon (Dos Pueblos HS), Beth Maas (Laurel Springs), Peggy Randall (Mission Prep HS), Mike Tomac (Morro Bay High School), Corene Duarte (Rio Mesa High School), Susan Valle (Saint Bonaventure HS), Lara Wilson (Templeton High School), and Chris Vyynal (The Thacher School). Seven of the top students took the national exam at Westmont College

Dr. Hurst is a Professor Emeritus of Geology and Geochemistry at California State University, Los Angeles where he has instructed and performed research since 1978. He is also an Adjunct Professor of Environmental Geology, Mineralogy, and Petrology at California Lutheran University. His primary research interests have centered on forensic environmental isotope geochemistry and mineralogy.

Since 1980, Dr Hurst has studied the use of naturally-occurring, stable isotopes, especially those of lead, as a means of tracing the sources of hydrocarbon and other types of contamination in the environment. He is recognized for his development of the ALAS Model which employs lead isotopes to estimate the age of leaded gasoline releases; the model is used throughout the United States, Canada, and South America.

Dr. Hurst is a founding member of the California Los Padres local section and has twice served as section chair, as well as an Executive Committee member. In 2001 he chaired the Western

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### ...Award

Regional ACS meeting hosted by the California Los Padres section in Santa Barbara and was instrumental in making that meeting a success. His leisure time is spent hiking with his wife and dog, Olive, training in martial arts, and rekindling his association with the acoustic guitar.

The Sandra Lamb Award recognizes those individuals who have made substantial contributions of their time, efforts, and talents to the section and to the local chemistry community.

## Children's Day in the Plaza

On April 9<sup>th</sup>, 2011, a group of ten Cuesta College students, all enrolled in General Chemistry courses and members of Cuesta Chemistry Club, helped over 200 children make oobleck (cornstarch and water) and a glue mixture that could be formed into a bouncy ball polymers with household ingredients at Children's Day in the Plaza in San Luis Obispo.

This event was also a great experience for the students, as designing, preparing and explaining a science activity for non-scientists was challenging and rewarding. The students were having as much fun playing with the polymers as the kids they were helping! The Chemistry Club at Cuesta College and faculty advisors Bret Clark, Praveen Babu and Greg Baxley thank CALPACS for their sponsorship of this activity.

*"I applaud the generous donation from the American Chemical Society for supplies pertaining to our demonstration at Children's Day in the Plaza. The event was very beneficial to everyone that was involved. Not only were we successful in entertaining the passers-by, but I think we also catalyzed the growing interest of chemistry in the kids and much more significantly our own. Thank you so much for giving Cuesta College Chemistry Club this opportunity."* – Student Comment



This community event was sponsored by the San Luis Obispo Child Abuse Prevention Council and provides a host of interactive exhibits and activities for children. The children that came to our booth had a great time getting sticky and feeling the various textures, were amazed by the non-Newtonian properties of the cornstarch and water mixture.



*"Where do I start? The event was meant to be for children, and it was, but there were intrigued and curious people of all ages. I had a grandma with her hands buried in a non Newtonian fluid and having tons of fun with it too!"* (continued)



### *...Children's Day*

*The kids were eager to get their hands in it and it was easy to recruit kids to mix more. All the members of chemistry club who participated had enjoyed their interactions with both kids and parents, and liked explaining the mystery of cornstarch and water. One kid said that the fluid was neither liquid nor a solid, rather it was both and gave it a unique description of "lollid." Overall it could not have been a more successful event. A big thanks to the California Los Padres section of the ACS for funding us this year!"*

– Student Comment



## *NuSil Tour*

The CALPACS membership had an opportunity to tour the NuSil facilities earlier this year on January 29. We were initially treated to excellent pastries followed by an excellent talk by Michelle Valderrain on silicone technology and NuSil's presence in this area. Michelle gave us a wonderful introduction to silicone chemistry and passed around several samples that varied remarkably in rheological properties. We learned that silicones are important in a wide variety of fields, ranging from lubricants, adhesives, medical applications and sealants. NuSil's main market is the medical field, with an important presence in supplying materials for breast implants. They acquired this technology from Dow Corning who exited the field after filing for bankruptcy. Their business consists of providing raw materials and building blocks to other manufacturers. NuSil seems to be doing quite well, employing quite a number of people at the Carpinteria facilities. We had a tour of the manufacturing facilities in two buildings. We got to see some impressively sized mixers along with their research facilities. At the end of the tour we were informed that they were looking for bright graduates and to pass the word around. CALPACS would like to thank NuSil Corporation, and in particular Michelle and the rest of her colleagues who made this tour such an enjoyable experience.



# *Mole Day and the Kilogram*

By Albert Censullo, CALPACS Councilor

Another Mole Day has come and gone. (Reminder: Mole Day is always on October 23, starting at 6:02 A.M.). Our section's 2010 Mole day activities were centered on the Westmont College campus. Our guest speaker was Dr. Peter Rusch, who is currently the Chair of the ACS Nomenclature, Terminology and Symbols Committee. His topic, chosen appropriately to honor the day, was "The Kilogram and the Mole".

Dr. Rusch provided the audience with an historical overview of kilogram definitions, going back to the French Revolution. Prototypes of the meter and the kilogram were created and stored in the Archives of the French Republic in 1799. Following the signing of the international Meter Convention in 1875, the Bureau de Poids et Measures (BIPM), located outside of Paris, was created. It became the custodian of the international prototypes for length and mass, which were officially sanctioned in 1889. The kilogram standard, known as "Le Grand K" has been the focus of what is called "the kilogram problem".

Comparisons of virtually identical clones of the platinum-iridium mass standard have shown that there are mass variations of 50 to 100 micrograms over the past 100 years or so. Doesn't sound like much of a problem when you express it that way, does it? But a 100+ year old mass standard has failed to provide the stability needed for contemporary measurements. The search has been on for a more "reliable" standard, ideally one based on some invariant of nature, not a manmade artifact. This search is intended to produce a mass standard capable of being realized in any laboratory, as is the case with the standard for the meter.

Two approaches are now being considered. The first of these is referred to as the "electronic kilogram". It bases the definition of the kilogram on a defined value for Planck's constant. If you think about a couple of equations, it may persuade you that there indeed IS a relationship between Planck's constant and the kilogram.

Consider  $E = mc^2$  and  $E = hv$ . These could easily lead to a definition such as "the kilogram is the mass of a body whose de Broglie-Compton wavelength is exactly  $(299\,792\,458)^2 / (6.626\,068\,96 \times 10^{-34})$  hertz. This definition can be realized using a device known as a watt-balance. There are currently 3 or 4 of these worldwide (one is at the NIST site in Gaithersburg).



Dr. Rusch, Dr. Hagan, and Dr. Censullo

The second approach is to base the kilogram on a defined value for Avogadro's constant. You may be more familiar with Avogadro's number. Avogadro's constant is simply Avogadro's number, with the unit mole<sup>-1</sup> appended to it. Of course, this brings up the question- just what EXACTLY is Avogadro's number (or constant). There are at least two approaches for getting this value: one theoretical, and one experimental. The theoretical approach involves imagining a perfect cube of atoms (for example <sup>12</sup>C atoms).

If the mass of this collection is exactly one kilogram, the number of carbon atoms in this cube is Avogadro's number. If we add the requirement that the number be an exact multiple of 12 (the atomic mass of the <sup>12</sup>C atom), there are only a few possibilities for Avogadro's number that lie within its current accepted value and uncertainty. One number that satisfies these constraints is  $(84,446,889)^3$ . You can see that 84,446,889 is the number of carbon atoms on each side of the cube.

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### ...Mole Day

The experimental determination of Avogadro's number has been the subject of the Avogadro Project. A sphere of crystalline silicon has been fabricated and polished. Based on its precisely measured dimensions, the known dimension of the unit cell, and the mass of the silicon atom, the number of atoms in the sphere can be calculated, and provides the basis for Avogadro's number. Some problems inevitably arise from such a seemingly simple experiment. These problems include the effects of impurities (atomic and isotopic), as well as adsorption of impurities on the surface of the crystalline sphere.

However determined, Avogadro's constant ( $N_A$ ) can be used to provide a definition of the kilogram such as "the kilogram is the mass of  $N_A \times 1000/12$  unbound atoms of carbon-12, at rest, in their ground state."

The current state of the kilogram is that the BIPM has tentatively accepted the recommendation to define the kilogram based on Planck's constant, rather than Avogadro's constant. There is a considerable amount of "chatter" in the literature about this. In any case, the definition could not take effect before 2015.

If you are interested in your Councilor's viewpoint on this topic, you might check out an article recently published in *Metrologia* (the official journal of the BIPM) at "Towards a better definition of the kilogram", *Metrologia* **48** (2011) 83-86.

See you next Mole Day!



## Nontraditional Careers for Chemists

On March 24<sup>th</sup>, 2011, Dr. Lisa M. Balbes came to our Section and Westmont College to give a presentation on "Nontraditional Careers for Chemists." After a short time for light refreshments, a group of about 75 listened to Dr. Balbes' presentation on the various careers that are open to chemists. Some of the areas presented were chemical information, patent work, technical writing, education, human resources, sales and marketing. Dr. Balbes is known for her workshops and presentations given at ACS meetings on chemistry career options and trends. She has also published a book entitled "Nontraditional Careers for Chemists: New Formulas for Chemistry Careers" (Oxford University Press).

Students who attended were asked to write about what they learned from her presentation and all were surprised at how many different options there are for someone with a chemistry degree. A student wrote: "One thing I learned in particular was the large number of different careers in chemistry that were associated with different forms of writing, such as documentation on medical appliances or becoming a freelance technical writer or editor."

Dr. Balbes emphasized the importance of writing and effective communication skills in all areas of chemistry. She also mentioned how important networking is to finding that perfect job in chemistry as almost two-thirds of the available job openings are not publicized.



Dr. Lisa Balbes and Dr. David Marten

# Ten Ways that Chemists can Use Blogs

By Aaron Rowe

Few chemists use blogs to write about their profession, and that's a shame, because they are a great way to share news, ideas, and opinions.

Simply put, a blog is a publishing tool that makes it easy for anyone to share their writing on the web. Most of them allow visitors to leave comments, and that is why blogs are often home to lively conversations. Here are some things that you can do with a blog:

## 10. Showcase your knowledge

On the *Totally Synthetic* blog, Paul Docherty offers an analysis of recent papers in organic chemistry. He makes amazing figures and often articulates the finer points of a synthesis with far greater clarity than the authors themselves.

Link: <http://totallysynthetic.com/blog>

## 9. Public Relations

Progressive companies, including Google, 23andMe, and SpaceX, use blogs to update the public about their most exciting projects. They post announcements, video clips, photo galleries, tips, and commentaries. Since anyone who visits those websites can leave a comment, it offers a two-way connection between scientists and the public.

## 8. Online Journal Club

For academics, blogs can serve as an online journal club. When the researchers behind, *The Curious Wavefunction*, *The Chem Blog*, or *Curly, Arrow* analyze a paper, dozens of readers may join in to make insightful comments.

## 7. Write a neverending review article

Blogs are a great way to keep your colleagues abreast of the most important developments in a narrow field. By posting short write-ups of papers, conference talks, and news items, you can make a sort of review article that is constantly growing. For instance, *KinasePro* covers kinases and the molecules that inhibit them. It's a perfect example

of how scientists can use a blog to keep their colleagues posted about the most exciting developments in their field.

Link: <http://kinasepro.wordpress.com/>

## 6. Keep up with the latest news

The staff of *Chemical and Engineering News* maintains a blog with links to the most exciting chemistry stories across the web. As a bonus, they also post amusing, often silly, stories that would not be a good fit for the magazine. Some of the chemistry editors at *Nature* run a similar blog called *The Skeptical Chymist*.

## 5. Intense commentary

You can find some truly scathing opinions on blogs. Run by a profane graduate student who writes under the pseudonym Kyle Finchsigmate, *The Chem Blog* has sharply criticized Barry Sharpless, James Tour, and Jim La Clair. On one occasion, he called *Tetrahedron Letters* a journal of faked yields. Blogs provide an extra level of scrutiny, which kicks in after the peer review process is over.

## 4. Discuss the Human Side of Science

Quite a few scientists use their blogs to vent, or to discuss the experience of being a chemist. Those conversations can be hilarious, but many are quite serious, calling attention to social problems within our discipline, like the chauvinistic or abusive behavior of principal investigators. Reading them can help chemists who are having a bad experience know that they are not alone. You can find that sort of discussion at *A Scientist's Life* or on many of the science blogs run by *Seed Magazine*.

Link: <http://labcoats.blogspot.com/>

## 3. Learn about new technology

Jean Claude Bradley is constantly experimenting with new technology. He runs a blog called *Useful Chemistry*, which describes all sorts of websites and software that may be of interest to chemists.

Link: <http://usefulchem.blogspot.com/>

## 2. Specialized industry news

On In the Pipeline and OmicsOmics! you can find notes and commentary (continued)

### ...Blogs

about the latest developments in drug discovery and molecular sciences. They are two of the many sites that offer that kind of analysis.

Link: <http://pipeline.corante.com/>

### 1. Share something fun

If you find something wonderful, like a beautiful crystal or an amazingly complicated piece of

glassware, consider taking a picture of it and posting it to a blog. The graduate students behind *Carbon Based Curiosities* have shared countless pictures of colorful solutions, beautiful crystals, and funny drawings from their labs. Several writers from *Chemical and Engineering News* posted pictures of the free stuff that they collected on the exposition room floor at American Chemical Society meetings.

## 2010 Holiday Wine Tasting

### Firestone Vineyard and Winery

The annual wine tasting event was held Saturday, December 2<sup>nd</sup> 2010 at the Firestone Vineyard and Winery in the beautiful Santa Ynez Valley.

Firestone Vineyard was founded in 1972 by father and son, Leonard and Brooks Firestone and was later acquired by Santa Barbara vintner, Bill Foley. Bill has continued in the Firestone tradition in striving for cutting edge vineyard management and winemaking techniques. Firestone Vineyard is composed of a series of mesas with gravelly sub-soils, which are ideally oriented for perfect exposure. These Santa Barbara County vines produce Estate Chardonnay, Cabernet Sauvignon, Merlot, Sauvignon Blanc, and Syrah that are brightly flavored, crisp and delicious.

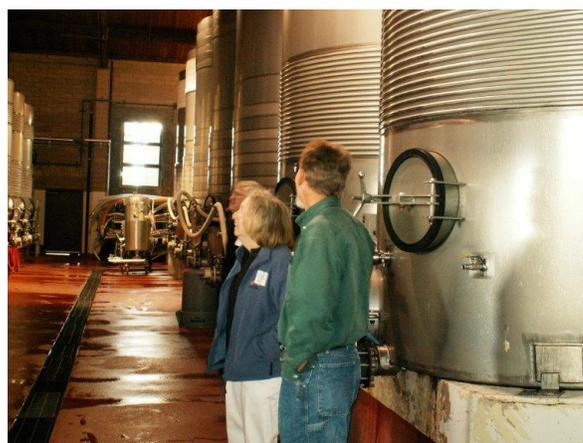
The tour kicked off at a lovely cork tree where we were able to feel the rugged bark and compare it to wine bottle corks.



The cork layer of the bark is harvested every 9-12 years to produce cork. After the harvest, a new

layer of cork re-grows, making it a renewable resource. Portugal accounts for 50% of the world's cork harvest.

The tour leader guided us through the production of wine from the vineyard to the crush pad, fermentation cellar, and the barrel cellar. At the end of the tour, we viewed Firestone family photos and artifacts charting the first estate winery in Santa Barbara County.



After the tour, we enjoyed tasting a variety of wines in Firestone's lower barrel room, with live accordion music! Thank you to Ivan Lorkovic's brother for the entertainment!

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### *...wine tasting*

Thank you to Ramona Marten and Cathy Pavlovich for putting together the great fruit and gourmet cheese spread and Jaime Dwight and Dr. John Hagan for providing the delicious soups.



Don't miss the 2011 wine tasting event which will take place the first Saturday of December!

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***“Satisfaction of one’s  
curiosity is one of the  
greatest sources of happiness  
in life.”***

- Dr. Linus Pauling

## ***CALPACS Milestones***

Every year, CALPACS honors our 50-year members at the Fall Luncheon. Stay tuned for more information about this year's luncheon in October.

***2009 50 Year Members***

Dr. Leland S. Endres  
Mr. John L. Shellabarger

***2010 50 Year Members***

Dr. Thomas M. Hooker

***2010 60 Year Members***

Dr. Peter Coad  
Dr. Joseph Gaynor  
Dr. Hewitt G. Wight

## ***Western Regional Meeting News***

The 2011 Western Regional Meeting of the American Chemical Society will be held November 10-12, 2011 at the Westin Hotel in Pasadena, California. The Southern California Section of the ACS will be hosting the meeting with the theme, “Celebrating 100 Years of Outstanding Chemistry in Southern California!”

A special program will be hosted by the Beckman Center at Caltech featuring *The Legacy of Arnold Beckman Symposium* to celebrate the life and lasting impact of this remarkable scientist and entrepreneur.

For additional information go to the Western Regional Meeting website at [www.wrmacs.org](http://www.wrmacs.org).

