

# THE VORTEX

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CALIFORNIA SECTION  
DECEMBER 2011

Congratulations



Dr. Marinda Wu, American Chemical Society President-Elect 2012

## *Table of Contents*

CHAIR'S MESSAGE	PAGE 3
2013 WESTERN REGIONAL MEETING	PAGE 4
SECTION ELECTION RESULTS	PAGE 4
WCC PROGRAM REPORT	PAGE 5
2011 CHEMISTRY NOBEL PRIZE	PAGE 5
RECYCLING WATER ( BILL MOTZER)	PAGE 6
FAMILY SCIENCE NIGHT PHOTOS	PAGE 7
100 YEAR ANNIVERSARY OF SOUTHERN CALIFORNIA SECTION	PAGE 8
CALL FOR GREEN CHEMISTRY AWARD NOMINATIONS	PAGE 8
HISTORICAL EVENTS IN CHEMISTRY ( LEOPOLD MAY)	PAGE 10
BUSINESS DIRECTORY	PAGE 11
INDEX OF ADVERTISERS	PAGE 11

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## Chair's Message

Bryan Balazs



I will end the year by remarking on the most memorable impression I've had as Chair: Our members and volunteers define our Section's mission, not the other way

around. In contrast to many organizations, which determine their staffing needs and workscope by their products, deliverables, or other outside constraints, our members and volunteers determine our goals and activities. If we can think of an activity which helps communicate the excitement of chemistry in some manner, and we're good at doing this, than we support and engage in this activity. This also means that we have fun in what we're doing, and it comes naturally!

This is perhaps a critical difference between a volunteer organization and a work environment. We accept any and all volunteers into our organization, and we don't go scouting for needed talent just to meet an objective that happens coming up, nor do we exclude anyone because their interests don't overlay exactly with our plans for the year. We adjust our programs based on our members' feedback, what the volunteers feel comfortable doing, and what is within our resources to do. This does

mean that our section evolves over the years as our membership base changes, and thus our volunteers, but this change is gradual and I also think healthy for us to maintain relevancy. Have you noticed that the California Section is much more outward-focused in our activities than it used to be, perhaps 30 year ago? This is no accident, and I believe it is exactly a result of what I have noted above. Our Section is slowly morphing to better match what we think the ACS should be doing in today's world, and where we should be headed. To do otherwise has lead to the demise of many an organization or institution, primarily because they did not see that the world had changed around them and that they (in retrospect) needed to adapt.

I should also state that we are fortunate, in that we have a very high level mission statement from the National ACS organization, but the choice of how talent and resources at the local level is left almost entirely up to the local sections. A unique arrangement, and one that works extremely well and is the envy of many other scientific professional societies. I have been proud to be a member of the California Section, and I have been proud to be your Chair in 2011.

I now leave you in the capable hands of our Chair for 2012, Jim Postma. Thank you, and Happy Holidays!



**Save the Date !!!**  
**44<sup>th</sup> Western Regional Meeting**  
**October 2-5, 2013 in the Bay Area**  
**The Flavors of Chemistry!!**

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Co-hosted by the California and Santa Clara Valley Sections!

The Western Regional Meeting in October 2-5, 2013 is a major activity for both the Santa Clara and the California Sections. The success of this meeting will depend largely on how well we can plan and implement that plan. Now is the time to get involved; be part of the planning process and part of the team that will make this meeting a success. There are many things to do, but with enough help, they will all get done. Co-Chairs Neal Byington and Lee Lattimer will appreciate hearing from you, your ideas, and your help. Send them an email [office@calacs.org](mailto:office@calacs.org).

*Section Election Results*

The following Members were elected for the term beginning January 1, 2012

Chair-elect	Wallace Yokoyama
Treasurer	I-Feng W. Kuo
Director	Attila Pavlath
Members-at-Large	Daniel Calef, Glenn Fuller, Margareta Sequin
Councilors	Sheila Kanodia, Alex Madonik, Michael Cheng
Alternate Councilors	Mark Frishberg, Jim Postma, Neal Byington

## *Report WCC Fall Program-IYC 2011 Event on October 1 Profes- sor Darleane Hoffman on Marie Curie*

To commemorate the International Year of Chemistry and celebrate the centenary of Marie Curie's Nobel Prize in Chemistry, the California Section Women Chemists Committee gathered at Lawrence Berkeley National Laboratory on October 1st. We were thrilled to hear UCB Professor Emerita Darleane Hoffman speak on some career highlights and the influence of Marie Curie on women scientists. Dr. Hoffman spoke about Marie Sklodowska-Curie's career and some of her less well-known contributions as Teacher, Mentor, Research Center Founder, and Director of the Laboratory or "la Patronne" as she was sometimes called. Her influence as a role model for women scientists was discussed, both when she was a wife

and mother and researcher, and in her later role as a "single mother" after her husband Pierre was tragically killed. Marie was left alone to pursue their scientific research and raise two young daughters, ages 8½ and ~1½ years old. Dr. Hoffman also commented on the celebration this year of the 100th anniversary of the Award of the 1911 Nobel Prize in Chemistry to Marie Curie as the sole recipient. Several rare books and articles from Dr. Hoffman's personal collection were on display. This talk was part of a symposium at the August National ACS meeting in Denver, and the other presentations and attending international experts were described.

Following lunch at LBNL our group of 60 attendees were split into smaller groups for tours of the 88 inch cyclotron led by graduate student Oliver Gothe. We saw the facilities where many of Dr. Hoffman's heavy element studies in nuclear chemistry have taken place.

Trudy Lionel

## *Impossible Crystals, Quasicrystals: Nobel Prize in Chemistry, 2011*

Quasicrystals that were supposed not to exist were discovered by Daniel Shechtman of the Technion Institute of Haifa, Israel. Examining the electron diffraction pattern of a rapidly solidified alloy of aluminum and manganese on April 8, 1982, he found that the atoms were not packed in symmetrical patterns that were repeated periodically in the crystal as was found with crystals previously. He had prepared the first quasicrystal. A periodic mosaics that are found in medieval Islamic mosaics of the Alhambra Palace in Spain and the Darb-I-Imam Shrine in Iran

help to understand the appearance of quasicrystals at the atomic level. The patterns are regular but never repeat themselves. In the course of defending this very controversial discovery, he was asked to leave his research group. As more examples of quasicrystals were found in the laboratory and in mineral samples from a Russian river, the concept of quasicrystals was accepted leading to awarding of the 2011 Nobel Prize in Chemistry to Daniel Shechtman for the discovery of quasicrystals. Who said that there is nothing new under the sun.

Leopold May



*The Vortex staff and the  
Members of the Execu-  
tive Committee wish you  
and yours a joyful holiday  
season and the very best  
wishes for the New Year.*



## Recycling Water (Part 1)

Bill Motzer

*All the water that will ever  
be, is right now<sup>1</sup>*

### Introduction

In the June, September, and October 2011 issues of the *Vortex*, I described how the Sanitary Revolution supplied modern urban areas with both clean (chlorinated) drinking water and helped make urban life possible with the establishment of wastewater treatment in the early 20<sup>th</sup> century. We Californians tend to take our water use for granted because it's relatively inexpensive, abundant, and easily available by just turning on the tap. However, California is now encountering increasing water supply problems and limitations because two-thirds of available fresh water exists in the water-rich north, but two-thirds of a thirsty population inhabits the south. And because of periodic droughts, potential climate change that may result in less snowfall in the Sierra Nevada, lack of additional water storage behind no new dams, and increasing overdrafts of groundwater supplies, we are now facing a potential water crisis. This is also exacerbated by our expanding population of approximately 37.3 million people (2010 census) that may increase to between 41.5 to 52 million by 2025 and perhaps to even 63.4 million by 2040. Therefore, our water resources are now becoming stretched to the limit, no longer meeting current or future needs. Consequently we must search for additional supply. This is where the third part of the sanitary revolution comes in: re-using treated municipal wastewater (also known as recycled water or reclaimed water).

### Recycled Water

This is water produced from wastewater treatment or water reclamation plants that can purify wastewater to meet or exceed state and federal drinking water standards and thereby render the water safe to use. Modern water reclamation plants use at

least three purification stages or processes (see The Sanitary Revolution – Part 2 in the September 2011 issue of the *Vortex*). Essentially these are accelerated versions of natural processes. Some water reclamation plants also provide additional purification procedures using a membrane process (e.g., reverse osmosis or RO) to remove excess salts and other constituents; others use additional advanced oxidation techniques such as ultra violet light and ozonization to destroy pathogens.

### History of Recycled Water Use

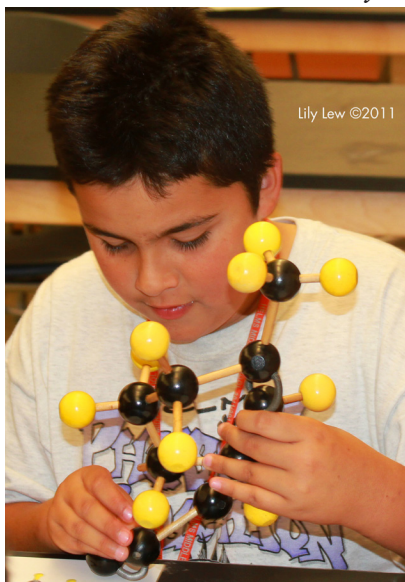
In California, using wastewater for agricultural irrigation has been documented as early as 1890, although it is likely that for many of these early projects such wastewater was untreated. With improvements in wastewater treatment, reuse increased and by the early 1950s, more than 100 California communities were using recycled water for agricultural and landscape irrigation. In 1970, a statewide survey indicated that about 175,000 acre feet per year (AFY) of recycled water were being used. (One AF is the amount of water that would cover one acre, one foot deep, which is equal to 325,851 gallons or 1,233,447 L). That amount rose to more than 400,000 AFY by 2000.

In 1991, the California State Water Resources Control Board (SWRCB) established a statewide goal to recycle one million AFY by 2010. In December 2002, the SWRCB Office of Water Recycling completed a statewide water recycling survey to determine progress towards this goal. At the close of 2001, the survey documented 276 water projects recycling approximately 525,000 AFY of which approximately 45 percent (%) of all recycled water use was for agricultural irrigation, 21% for landscape irrigation, and 9% for direct groundwater recharge, with the remainder was used for industrial purposes, seawater intrusion barriers, recreational impoundments, wildlife habitat augmentation, and geothermal energy production. In February 2009, the SWRCB issued a policy to increase recycled water usage over 2001 levels by an additional one million AFY by 2020 and another two

<sup>1</sup>October 1993 National Geographic

*(continued on page 9)*

## Family Science Night



His first molecule is limonene!

Photos from the October Family Science Night. More photos can be seen on the Younger Chemist Committee (YCC) Facebook page <https://www.facebook.com/pages/Younger-Chemists-Committee-YCC-ACS-California-Section/164045583624244>



Rich Volberg, the science teacher at Helms Middle School who invited the California Section to present its program.



Bryan Balazs, Chair California Section squeezes out another Elephant's Toothpaste demonstration.

## *The California Section of the American Chemical Society Salutes the Southern California Section on its 100<sup>th</sup> Anniversary*

In 1901 the California Section of the American Chemical Society was formed. While it was organized in the San Francisco Bay Area, its initial territory was the whole state of California. As the chemical enterprise grew in the state, it became obvious that a northern California centered organization could not effectively represent the increasing number of chemists and engineers in the southern part of California. Thus, in 1911, the ACS members in the south sought permission to form a new section.

During the 56<sup>th</sup> meeting of the California Section, held in San Francisco on February 18, 1911, a motion was made by Felix Lengfeld and seconded by Frank T. Green to “waive our right of jurisdiction of all members south of Tehachapi so as to allow members in Southern California to form a section of their own”. The motion carried. A committee of the California Section President (now “Chair”), Secretary, and Councilors was formed to deal with such items as the distribution of funds, size of sections, etc. Now there are ten ACS local sections in the state of California, formed over the years from the territory of our two Sections.

### *Resolved:*

In recognition of the Southern California Section being the first American Chemical Society local section formed from the original, state-wide territory of the California Section, and upon the occasion of its centennial in 2011, the Executive Committee of the California Section, ACS, extends its warmest congratulations to all the members of the Southern California Section and wishes them continued success in all their endeavours.

### *Nominations Sought for 2012 Presidential Green Chemistry Challenge Awards*

The U.S. Environmental Protection Agency (EPA) is accepting nominations for the Presidential Green Chemistry Challenge Awards. Green chemistry is the design of chemical products and processes that reduce both the use and generation of chemicals that are hazardous to the environment and people's health. Nominations are due to the agency by December 31, 2011.

“These presidential awards recognize technologies that create safer and more environmentally friendly chemicals, manufacturing processes, and products,” said Steve Owens, assistant administrator for EPA's Office of Chemical Safety and Pollution Prevention. “Green chemistry is driving innovation to safer chemicals and helping to create new jobs in a greener economy.”

Throughout the first 16 years, EPA received more than 1,400 nominations and presented awards to 82 entrants. Winning technologies alone are responsible for reducing the use or generation of more than 199 million pounds of hazardous chemicals, saving 21 billion gallons of water, and eliminating 57 million pounds of carbon dioxide releases to the air.

More information on how to submit entries: <http://www.epa.gov/greenchemistry>



(continued from page 6)

million AFY by 2003. Some examples of large-scale water recycling in California include: Los Angeles County, which has been surface spreading treated wastewater since 1962; West Basin Municipal Water District (just north of Los Angeles on the Pacific Coast), which has injected treated wastewater since the 1950s to control salt water intrusion to coastal aquifers; Orange County Water District (on the Pacific Coast), which has also been injecting recycled water into a seawater barrier project since 1976; Irvine Ranch Water District, which has provided recycled water for irrigation since the late 1960s; and the Monterey Regional Water Pollution Control Agency, which operates the world's largest water recycling facility specifically designed for crop irrigation.

### **Background/History of California's Recycled Water Regulations and Requirements**

California carefully regulates recycled and reclaimed water use. In October 1968, the SWRCB issued Resolution No. 68-16, a policy statement requiring that California's water be maintained at the highest quality for beneficial uses. This nondegradation policy was placed into California law requiring that the California Department of Public Health (CDPH) also be involved

by establishing statewide criteria when issuing waste discharge/water recycling requirements. By 1999, the California Legislature authorized establishment of a Recycled Water Task Force (Task Force) and by October 2001 Assembly Bill 331 had passed and was signed into law requiring inclusion of representatives from water utilities, public interest groups, federal, state, and local governments, agency and industry associations, and the University of California. Detailed scientific studies have been conducted that have examined trace chemicals in waste water and recycled water, some of which have been designated as surrogate and indicator compounds (more about these later) that can be used to trace organic compound removal efficiency during wastewater chemical oxidation treatment. By August 2008, a draft regulation for recycled water criteria for groundwater recharge reuse projects (GRRP) had been codified into California law. An updated or revised draft regulation is being readied for public review and comment by late December 2011 or early January 2012. This regulation will include using chemicals of emerging concern to determine possible recycled water impact to aquifers. These will be discussed in Part 2.



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*December Historical Events In Chemistry*  
*by Leopold May*  
*The Catholic University of America*  
*Washington, DC*

**December 3, 1886** One hundred and twenty-five years ago on this date, Karl Manne Georg Siegbahn, a researcher on x-ray spectroscopy, was born. In 1924, he received the Nobel Prize in Physics for his discoveries and researching the field of X-ray spectroscopy.

**December 6, 1836** One hundred and seventy-five years ago on this date, Charles F. Chandler was born. He was a researcher in sugar, petroleum and illuminating gas industries and a founder of the ACS.

**December 6, 1863** One hundred and twenty-five years ago in 1886, Charles M. Hall discovered method of extracting aluminum electrolytically from bauxite in his garage as Paul Louis Tous-saint Héroult discovered the same process for isolating aluminum, which is called the Hall-Heroult process. He was born on this date.

**December 7, 1810** One hundred and seventy-five years ago on this date, Theodor Schwann named and investigated pepsin. He coined the word metabolism; discovered the striated muscle of the upper esophagus and the myelin sheath of peripheral axons, called Schwann cells. Also, he is known as the founder of modern histology and was born on this date.

**December 9, 1742** Karl W. Scheele, who discovered chlorine in 1774, phosphorus from bone ash, and the action of light on silver salts, was born on this day. He also synthesized organic acids.

**December 11, 1911** One hundred years ago on this date, Marja S. Curie (later Marie) gave her Nobel Lecture. *Radium and the New Concepts in Chemistry*, when she was awarded the Nobel Prize in Chemistry in recognition of her services to the advancement of chemistry by the discovery of the elements radium and polonium, by the isolation of radium and the study of the nature and compounds of this remarkable element.

**December 13, 1938** Casein fiber was patented on this date.

**December 15, 1863** A. D. Little, Inc. was founded as a firm for industrial research and control on this date.

**December 17, 1938** Discovery of neutron-induced nuclear fission of uranium (U, 92) was made by Otto Hahn and Fritz Strassmann in Berlin on this date.

**December 25, 1761** Two hundred and fifty years ago on this date, William Gregor was born. In 1791, he discovered titanium (Ti, 22) and analyzed minerals.

**December 26, 1838** One hundred and twenty-five years ago in 1886, Clemens A. Winkler discovered germanium (Ge, 32). He did analyses of gases and was born on this date.

Additional historical events can be found at Dr. May's website, <http://faculty.cua.edu/may/Chemistrycalendar.htm>

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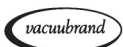
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