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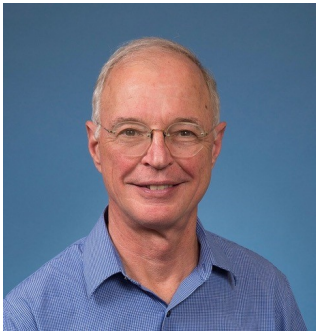
# SCALACS

**April 2018**

A Joint Publication of the Southern California and
San Gorgonio Sections of the American Chemical Society

## Southern California Section

### Tolman Award Dinner
### Tuesday, May 1, 2018



### Honoring the 2017 Richard C. Tolman Award Recipient
### Prof. Jeffrey Zink, University of California, Los Angeles

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## San Gorgonio Section

### An Introduction to Pharmaceutical Drug Development: Fail Fast and Fail Often
### Tarquinus (Tark) Bunch, Senior Research Scientist
### Gilead Sciences, Inc.

**Saturday, April 28, 2017**

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A Joint Publication of the
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Volume LXXIII April 2018 Number 3

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SCALACS (ISSN) 0044-7595 is published monthly March through May, September and October; and Bi-monthly January/February and November/December along with a special ballot issue once a year. Published by the Southern California Section of the American Chemical Society at 14934 South Figueroa Street, Gardena CA 90248. Subscription price is $12.00/year. Make checks payable to Southern California Section, ACS. Second Class postage paid at Gardena, CA 90247, email: office@scalacs.org.

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CONTRIBUTORS: Send all copy to Editor, SCALACS, 14934 South Figueroa Street, Gardena, CA 90248, email: editor@scalacs.org.

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## Chair's Message

## Chemistry For Life!

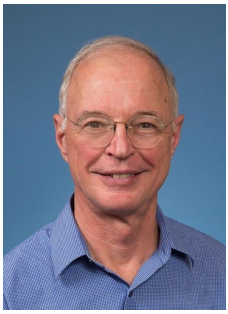
ACS is world-renowned for disseminating reliable information and is constantly finding new and innovative ways to do it. ACS continues to thrive because its members are *authoritative*. **Jeffrey Zink,** an inorganic chemist from the University of California, Los Angeles is the 2017 Tolman Award winner. Professor Zink is a Distinguished Professor of Chemistry and a member of the California Nanosystems Institute. He has been an invited guest professor at the University of Paris VI and at the University of Amsterdam, and serves as an ACS tour speaker. He is an authority on triboluminescence, photochemistry and photophysics of metal-containing molecules, and on nanomachines, and has published almost 400 articles. Many thanks to Professor Frank Gomez for leading a very capable Tolman Award committee. We look forward to celebrating with Professor Zink at UCLA on May 1st.

ACS members are *dynamic*; they go beyond what is required to advance the broader chemistry enterprise and its practitioners for the benefit of Earth and its people. Our local section members such as Henry Abrash are encouraging the next generation to take ownership of chemistry. Henry has planned Chemists Celebrate Earth Day (it becomes a Week in 2018) events at the California Science Center since 2003! The 2018 theme for CCEW is *Dive into Marine Chemistry*.

ACS members are *collaborative*. Professor Phil Hampton (CSU Channel Islands) of the California Los Padres Section (CALPACS) is collaborating with SCALACS to plan a "nano" Western Regional Meeting with the 2018 National Chemistry Week Theme *Chemistry is Out of This World*. The nWRM is planned for Oct 27, 2018 and will be held at Caltech. More details will be available soon. We have several wonderful activities planned. Please take a moment to check out the calendar and feel welcome to join us.

Thanks!

Robert de Groot, Chair
rdegroot@oxy.edu



## Richard C. Tolman Award Dinner Meeting

## Tuesday, May 1, 2018

## "Multifunctional Mesoporous Silica Nanoparticles Controlled by Nanomachines for Biomedical Targeting, Imaging and Drug Delivery"

**Professor Jeffrey Zink**
**UCLA Department of Chemistry and Biochemistry**

**UCLA Faculty Center**
480 Charles E. Young Drive, East
Los Angeles, CA 90095

6:00 p.m. Check-in and Hosted Social Hour
7:00 p.m. Dinner
8:00 p.m. Presentation

**The Award:** The Richard C. Tolman Medal is awarded each year by the Southern California Section of the American Chemical Society in recognition of outstanding contributions to chemistry in Southern California. The Tolman Medal recognizes broad accomplishments in chemistry rather than a single fundamental discovery. These contributions may be of several kinds, including seminal research of widely regarded influence, achievements of broad impact in chemical technology, significant contributions to chemical education, and outstanding leadership in science on a national level. To be eligible for the Medal, the recipient must have accomplished a major portion of his or her work while a resident of Southern California.

**Abstract:** The subjects of this talk are multifunctional nanoparticles controlled by nanomachines for targeting, imaging and drug delivery in cells and *in vivo*. The nanoparticles are designed to 1) trap therapeutic molecules inside of nanocarriers, 2) carry therapeutics to the site of the disease with no leakage, 3) release a high local concentration of drugs, 4) release only on autonomous or external command, and 5) kill the cancer or
*(Continued on Page 4)*

**Tolman Award Dinner Abstract (Continued from Page 3)**

infectious organism. The most important functionality is the ability to trap molecules in the pores and release them in response to desired specific stimuli. Two types of external stimuli will be discussed: light and oscillating magnetic fields. Activation by internal biological stimuli such as pH changes, redox potential changes and enzymes will also be presented. Molecular machines based on molecules that undergo large- amplitude motion when attached to mesoporous silica - impellers, snap-tops and valves – will be described. Derivatized azobenzene molecules, attached to the interior pore walls function as impellers that can move other molecules through the pores. Nanoparticles containing anticancer drugs in the mesopores are taken up by cancer cells, and optical stimulation of the impellers drives out the toxic molecules and kills the cells. Snap-tops with cleavable stoppers release cargo molecules when the stopper is removed from the pore entrance. Nanovalves consisting of rotaxanes and pseudorotaxanes placed at pore entrances can trap and release molecules from the pores in response to stimuli. Activation of these nanodevices by the five types of stimuli in solution, in living cells, and in animal models will be discussed. Applications to treatments of cancers (including pancreatic and breast) and of intracellular infectious diseases (including tuberculosis and tularemia) will be presented.

**Cost:** There is a choice of dinner entrees of Marinated Grilled Rib-Eye Steak with veal demi glaze, potatoes and asparagus ($44) or Pan Roasted Salmon with herbs and grilled asparagus ($48) or Moroccan Spiced Vegetable Tagine—Saffron couscous, squash, celery root, garbanzo beans and tomatoes ($38). All options include a hosted social hour, salad, dessert, wine with dinner and tax and tip, payable at the door with cash or check. **Please RSVP to Nancy in the Section Office at office@scalacs.org by Monday, April 16, 2018**.

**Directions:** For directions to the campus, use this link: http://www.ucla.edu/maps-directions-parking/. Parking is $12 for guest parking in Parking Lot 2 (just south of the Faculty Center).

## Congratulations to the 2017 Recipient of the Richard C. Tolman Medal
## Prof. Jeffrey I. Zink

Jeffrey I. Zink received his Bachelor's Degree in Chemistry from the University of Wisconsin, Madison, his Ph.D. in Chemistry from the University of Illinois Urbana-Champaign, and is currently Distinguished Professor of Chemistry at the University of California Los Angeles. He is a recipient of the Camille and Henry Dreyfus Teacher-Scholar Award, the Glenn T. Seaborg Award, the Herbert Newby McCoy Award, the Dow-Hanson Distinguished Teacher Award, the DOE Sustained Outstanding Research Award, the DOE Outstanding Scientific Accomplishment in Metals and Ceramic Sciences Award, and both an Alexander von Humboldt and a John Simon Guggenheim Fellowship. He was a Visiting Professor at the University College London, University of Paris VI, France, and the University of Amsterdam, Netherlands, and a Visiting Lecturer for the National Science Council Taiwan. He participated in ten of the ACS Speaker Tour programs in the late 1990's. His research interests include excited state properties of large molecules, laser assisted chemical vapor deposition of nanoparticles and structures, multifunctional nanostructured materials, and nanomachines. He has over 550 publications in peer-reviewed journals and is a Thomson-Reuters Highly Cited Author.

## A Novel Biosensor for Monitoring Glucose Levels in Tears and Sweat

A group of researchers from USC and UCLA have recently reported in the journal ACS Nano on a wearable Indium Oxide Nanoribbon Transistor Biosensor with integrated on-chip gate for continuous monitoring of glucose in body fluids such as saliva, sweat and tears. They point out that this device can be incorporated into watches and artificial eyeballs or arms and does not require finger piercing to draw blood to measure glucose levels. The use of this device can be extended to monitor pathogens in body fluids that can warn of an impending disease onset. By extension, the device can potentially be fitted into contact lenses.

The principle of this device is similar to the electrochemistry based blood glucose monitoring gadgets known to date. It utilizes the oxidation of glucose by the enzyme glucose oxidase into gluconic acid with simultaneous liberation of hydrogen peroxide. The hydrogen peroxide generates oxygen and protons and electrons and the proton concentration is directly proportional to the glucose level. The change in the local field effect transistor conductance and current levels consequent to the liberation of these protons correlates with the blood or other body fluid glucose level. The difference is that the nano device reported in the presently reported work is wearable in its miniaturized form, unlike earlier published devices which use bulky electrodes and cannot be incorporated into watches etc. This new sensor can monitor glucose levels in the 10 nanomoles to 1 millimole range, which is typical of normal body fluid concentrations. While normal blood glucose levels are between 3.9 –7.8 mM, the levels in tears are 0.1-0.6 mM, in saliva between 28.3 micromoles to 0.129 mM and in sweat between 0.277-1.11 mM. For full details, refer to ACS Nano, 2018, Vol. 12, pp. 1170-1178 and the web site www.acs.org and the journal Medical Design Briefs March 2018 issue, page 38.


## Outreach

We have lots of exciting activities coming up! Chemists Celebrate Earth Week is April 22-28, 2018 and the theme is "Dive Into Marine Chemistry!". Check out our website at www.scalacs.org in the coming weeks for more events. Here are some of our upcoming activities:

**Saturday, April 7, 2018—Expanding Your Horizons** Conference for Girls in grades 5-8 at Mount Saint Mary's University Chalon Campus, 12001 Chalon Road, Los Angeles, CA 90049. To register online, go to: **www.expandingyourhorizonsla.org.** Since this is a conference for girls, women volunteers to help out for the day are very welcome. **If you would like to volunteer, please contact Dr. Eleanor Siebert at esiebert@msmu.edu.**

**Sunday, April 8th, 10am-4pm.** The Alpha Chi Sigma Chapter is holding a **Chemistry Merit Badge** event at Occidental College. Space is limited for attendance, but interested scouts should contact Crystal Liang liangc@oxy.edu directly to see if any additional spots are open.

Volunteer help from chemistry professionals are needed to talk to the scouts about opportunities for chemists, as well as help in grading worksheets. They can also use the help of additional Chemistry Merit Badge Counselors to sign off on the blue cards. Lunch is included. If you are interested in helping out, please contact Crystal Liang at liangc@oxy.edu.

**Saturday, April 21, 2018—National High School Chemistry Olympiad at California State University Dominguez Hills.**

Dates TBD—**Chemists Celebrate Earth Week at the California Science Center**. If you would like to volunteer to help with events, please email Dr. Henry Abrash at abrash8@aol.com.

# This Month in Chemical History

Harold Goldwhite, California State University, Los Angeles
hgoldwh@calstatela.edu

I continue my look back of a century through reviewing the Annual Reports of the Chemical Society on the Progress of Chemistry. This month's column will examine further aspects of the chemistry of 1918 through such a review. The 1918 report is a slim volume covering the final year of World War I, the Great War as it was known, when academic research in chemistry had to yield to the demands of wartime research.

It is important to recall that 1918 was less than a decade after Bohr proposed his revolutionary quantized interpretation of the structure of the hydrogen atom. The spectral calculations from the Bohr model agreed exactly with observations of the Rydberg series of lines in the hydrogen atom spectrum. Not surprisingly speculation about the electronic structures and other features of heavier atoms was widely pursued by scientists of the period. The Section on General and Physical Chemistry covers this material.

"There [has been] some reluctance in the acceptance of the view that the fundamental parameter [underlying the periodic system] is the atomic number". The article goes on to indicate that using a relationship between the atomic number and "the characteristic atomic frequency" (not defined, but I take this to refer to characteristic X-ray frequencies) the choice between the views of Rydberg, who assigns atomic number 5 to lithium, and Moseley, who assigns lithium atomic number 3, is found to be in favor of Moseley (who by this time had died in the assault on Gallipolli).

In examining high frequency spectra of atoms heavier than hydrogen "frequent attempts have been made to interpret these spectra in terms of the Rutherford model atom and the Bohr theory of emission". According to Debye (!) and Vegard the K-series of X-ray lines is probably due to an inner ring of three or possibly four

*(Continued on Page 9)*

## This Month in Chemical History

*(Continued from Page 8)*

electrons. Vegard further proposes that the L, l, and M series may result from two quanta being needed for the removal of constituent electrons, and that the L series derives from a ring of seven electrons, while the l and M series are attributed to eight- and nine-membered rings.

There is also speculation about the interpretation of chemical properties, in particular valence, in the light of the new views on electronic structure. Different models abound. In one a central negative core is present "in which beta-ray electrons travel in closed orbits. Positive electrons [!] move in orbits which closely surround the negative cpre, and outside these are the negative valency electrons which move in elongated, elliptical orbits comparable with those of comets in the solar system."

There is an interesting observation on the spectra of isotopes. Spectra of ordinary lead and lead from radium have been examined with great care, and the line at 4058 Angstroms shows a wavelength difference of 0.0043 Angstroms between the isotopes.

With our understanding of the electronic structures of atoms, gathered from a century of further work involving a number of missteps, it is easy to smile at the misunderstandings of scientists of 1918. It may be salutary to speculate on how many of our currently held views will withstand the scrutiny of another century of work.

# Insights Into IP Law

**Keith Orso*,** Irell & Manella LLP
KOrso@irell.com

In exploring what types of documents qualify as prior art "printed publications" that can render a potential invention unpatentable, earlier editions of this column have addressed posters displayed at scientific conferences, oral presentations (with or without preprints), and doctoral dissertations or theses processed by libraries in various ways. What about information found on the Internet?

"Printed publications" are generally documents (such as books, journal articles, periodicals) that have been disseminated or otherwise made publicly available to the extent that persons interested and ordinarily skilled in the subject matter of the art, exercising reasonable diligence, can locate them. The Internet is one way to make documents and other information widely available. But how informal can a printed publication be?

Can a newsgroup post count as a printed publication? Yes. In one case, a self-proclaimed "newbie" posted to a Usenet newsgroup (in 1995) a question that he described as one that "might seem ridiculous." A college student posted a response, which itself elicited six additional posts within a week. During subsequent patent litigation, the issue was whether the college student's response rendered asserted claims of a patent invalid.

The patentee argued that the Usenet newsgroup was populated mostly by beginners, as opposed to people having ordinary skill in the art. The court rejected that argument for two reasons. First, the court found that the level of ordinary skill in the art was low. There were no courses or books on the topic at the time, and the responding college student learned about the topic through self study. Second, there was evidence that those ordinarily skilled in the art actually were using such newsgroups, which were accessible at the time only by those with access to a university or corporate computer. The court also said that the question posted would only seem "ridiculous" if other subscribers had more skill than the "newbie."

The patentee additionally argued that the newsgroup post was not sufficiently publicly accessible because it was not indexed and was not searchable. The posts had titles, but could only be sorted by date. The court rejected that argument too because it found that the Usenet groups were organized in a hierarchical manner that allowed someone interested in the topic to easily locate a list of posts. The court also pointed out that a printed publication need not be easily searchable after publication if it was sufficiently disseminated at the time of its publication. The court deemed the post a printed publication and held the patent claims invalid.

* The author earned engineering and chemical engineering undergraduate and graduate degrees, and is a patent attorney and partner at the law firm of Irell & Manella LLP. This column does not constitute legal advice and does not necessarily reflect the views of the firm or its clients.

## Chair's Message

In February, we had another very successful Chemistry of Wine lecture by Professor Ernie Simpson. The Wine Auditorium at Cal Poly Pomona has a very nice setting, and the room was essentially full. Ernie not only clearly explained the chemistry of wine, but also guided us through several exercises that helped us appreciate the complexities of wine tasting. If you missed this remarkable event, you can take a peek at the enchanting photos on our section Facebook page.

Last week, I went to the open house at Diamond Bar High School and stepped into its AP Chemistry class. With questions on the big screen and students cheering, the room was full of energy and passion in chemistry. Some of them probably just took the first round Chemistry Olympiad in March. I wish them good luck in the exam and a successful career in chemistry if they choose this path.

In April, we will have a luncheon meeting on pharmaceutical drug development given by Tark Bunch, a Senior Research Scientist at Gilead Science. Please see the details in our announcement. I am sure it will be interesting to all chemists.

Recently, we received an invitation to talk at Chaffey College chemistry club. It will be very meaningful to have more interactions between young and senior chemists in our section.

Below are the upcoming events:

- April 28, An Introduction to Pharmaceutical Drug Development: Fail Fast and Fail Often by Tarquinus (Tark) Bunch
- Annual high school student awards dinner in May
- Recognition luncheon for senior ACS members in September
- National Chemistry Week in October
- Annual meeting in November

To better communicate with our members, we have started using some new channels:

- Central email: sangorgonioacs@gmail.com
- Instagram: @sangorgonioacs
- LinkedIn Group: https://www.linkedin.com/groups/13509132
- Facebook Page: https://www.facebook.com/SGSACS/
- Facebook Group: https://www.facebook.com/groups/306580863196707/

Again, please feel to contact me (cell: 515-306-6855, email: bruce@acbscitech.com) if you have ideas or would like to volunteer.

-Bruce Liu, Chair

## April Luncheon Meeting

### An Introduction to Pharmaceutical Drug Development: Fail Fast and Fail Often

### Tarquinus (Tark) Bunch, Senior Research Scientist Gilead Sciences, Inc.

### Saturday, April 28, 2017

### Western University of Health Sciences

Health Professions Center( HPC) Building, Classroom 3
309 E 2nd Street, Pomona, CA

Social and Check-in: 11:15 am
Luncheon: 11:45 am
Program: 12:30 pm
WUHS Tour 1:30 pm

**Program Overview:** Prior to regulatory and marketing approval, pharmaceutical drugs must prove to be both safe and effective. Once the Chemistry and Biology's R&D work is complete, the truly expensive R&D work begins at the clinical side. This requires years of clinical effort with data acquired in a staged manner with increasing numbers of patients at each level and clinical data undergoing rigorous scientific evaluation to assure that the drug entity does provide for an unmet medical need. Understanding the life cycle of a drug from novel drug entity at the test tube to statistically significant efficacy in the patient is key to a chemist's success at raising their progeny to meaningful and successful members of the therapeutic medicinal landscape. With rising health care costs, a big-picture understanding will ideally empower the scientist to "fail fast and fail often" to more quickly discard bad candidates and arrive at success sooner.

**Speaker:** Tarquinus "Tark" Bunch graduated from Cal Poly Pomona in 1987 with a BS in Microbiology and a minor in Chemistry. He started a Master's in Biology at Cal Poly but then got drawn away by the allure of Industrial research working for Vestar Pharmaceuticals in neighboring San Dimas California in 1989. Since that time, Tark has worked in different roles including formulation development, product scale-up, separation science, assay development, product characterization, technical transfer, and industrial forensic research all at the same address while the name on the building changed from Vestar, to Nexstar, to Gilead.

**Luncheon, Cost and Reservations:** Luncheon buffet catered by Eddie's Italian Eatery featuring House Salad, Pasta Salad, Signature Sandwich Trays including vegetarian, Pasta Trays (Vodka Rigatoni and Penne pasta tray with meat sauce), Pizzas (including vegetarian), soda, and bottled water. The cost is $15 for ACS

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## April Luncheon (Continued from Pg. 12)

members, $20 for nonmembers, $10 for retirees, and for students, $5 for the first six students from a specific college or university and $10 for any additional student from that institution. Make your reservation no later than Monday, April 23rd by contacting David Srulevitch (srulev@charter.net or 909 455-6135). Please honor your reservation.

**Directions:** Via Interstate 10: Take Towne Ave. (Exit 46), go south on Towne to Third St., turn right and go to Palomares St. Via Highway 60: Take Garey Ave. (Exit 29A westbound, 29B eastbound), go north on Garey to Third St., turn right and go to Palomares St. Free parking in Lot 24 (southeast corner Palomares and First). The Health Professions Center (HPC) is located on the northeast corner of Palomares and Third. Signs will direct you to Classroom 3.


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Contains Dated Meeting Announcement

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## Bi-Section Chemists' Calendar

For more information on these events, please check our website at www.scalacs.org

**April**

| | |
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| 6 | SC Getty GCI Lab Tour (co-hosted with CALPACS) - see March issue |
| 7 | Expanding Your Horizons Conference—see page 7 |
| 21 | SC High School Olympiad National Exam—see page 7 |
| 21 | SG High School Olympiad National Exam—see March issue |
| 22-28 | Chemists Celebrate Earth Week—Theme: "Dive Into Marine Chemistry!" - see page 7 |
| 28 | SG April Luncheon Meeting with Tarquinus (Tark) Bunch, Gilead—see page 12 |

**May**

| | |
|---|---|
| 1 | SC Tolman Award Dinner at UCLA honoring Prof. Jeffrey Zink—see page 3 |
| 18 | SC Educational Awards Banquet at MSMU—see March issue |