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SCALACS

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

Southern California Section

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Chair's Message

Dear SCALACS members,

We hope you are all healthy and safe during this trying time. I'm sure you all receive many emails from various organizations about their response to the corona virus. This one will be shorter; our response has mostly been to cancel or postpone events, as you are no doubt aware. I was scheduled to be in Philadelphia for the ACS National Meeting, and preparing for our Council meeting. Instead my committee meeting was held online, and the Council meeting was cancelled. I know there have been other virtual meet-ups so some people at least have been able to present their research to their peers. A full list of canceled or postponed events is elsewhere in this newsletter.

I did see one helpful video from ACS Reactions on "Can Soap REALLY "Kill" the Coronavirus?" The answer is in chemistry, and the video is entertaining. You can find it at https://www.youtube.com/watch?v=K2pMVimI2bw.

I hope to bring you more news of exciting chemistry events in our next SCALACS newsletter.

Until then, wash your hands, and stay healthy and safe.

Brian Brady,
Chair

Announcing the 2019 Richard C. Tolman Award Recipient: Professor A. S. Borovik University of California, Irvine

Due to the on-going COVID-19 virus, the dinner will take place in September at UCI

Tolman Address: Molecular Complexity and Inorganic Chemistry: Utilizing Non-Covalent Interactions to Control Function

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: Location matters…no compound operates in isolation without interacting with its local environment. Metalloproteins are example systems whose active sites contain intricate structures that aid the performance of specific functions with high selectivities and efficiencies. The complexity of these systems complicates the study of their function and the understanding of the properties that give rise to their reactivity. One approach that has contributed to the current level of knowledge is the study of synthetic constructs that mimic one or more aspects of the native metalloproteins. These systems allow for analysis of individual components of structure and how they affect function. We are thus able to establish structure-function correlations that are necessary for evaluating mechanisms. Using key architectural features from active sites of metalloproteins as inspiration, my group has developed design approaches to prepare systems that regulate local environments around a metal center. These systems are used to study the activation of small molecules (e.g., O_2 and H_2O) that are essential in maintenance of human health. This presentation will highlight our molecular designs from small synthetic complexes to the use of larger, more diverse protein hosts.

Congratulations to the 2019 Recipient of the Richard C. Tolman Medal
Professor A. S. Borovik
University of California, Irvine

A. S. Borovik was raised in Chicago and received his B.S. degree in Chemistry with Honors from Humboldt State University. As an undergraduate student he did research at Oregon State University as an NSF Summer Fellow and at Woods Hole Oceanographic Institution as a WHOI Fellow. Both research experiences involved using nuclear chemistry to trace metal ions in the environment. He obtained his Ph.D. in Chemistry at the University of North Carolina -Chapel Hill under Tom Sorrell where he developed photophysical models for the active site of copper proteins. As an NIH postdoctoral fellow with Larry Que at the University of Minnesota, he designed synthetic complexes that replicated the properties of dinuclear iron centers in proteins. Upon completion of his postdoctoral fellowship, Professor Borovik joined the faculty at Ithaca College where he taught chemistry and mentored 6 undergraduate research students for two years. He then moved to the University of California-Berkeley as a postdoctoral associate with Ken Raymond, working on stereonostic coordination chemistry. From there, he joined the Chemistry Department at Kansas State University where he began a broad program on the effects of the secondary coordination sphere on metal ions. After 3 years, he moved his research group to the University of Kansas, continuing research on the development of metal complexes and hybrid materials with unique structural and functional properties. In 2006, Professor Borovik and his research group moved to the University of California-Irvine, expanding his approach to now include designing artificial metalloproteins. Professor Borovik has won several teaching and research awards that include a 2017 MERIT Award from the NIH and the 2018 National Cotton Award in Synthetic Inorganic Chemistry from the American Chemical Society. He is currently a UCI Distinguished Professor.

Events Cancelled due to the COVID-19 Virus:

The Southern California Undergraduate Research Conference
Scheduled for April 4, 2020 at Occidental College—cancelled

*****

The 2020 Expanding Your Horizons Los Angeles
Scheduled for Saturday, April 25, 2020 at Mount Saint Mary's University Chalon Campus—cancelled

*****

The High School Chemistry Olympiad
Due to the Covid-19 virus outbreak, the situation with the High School Olympiad is still evolving. We are hoping to continue with National testing by May 2nd; however, school closures may be extended. We will provide information to participants as we receive it.

This Month in Chemical History

Harold Goldwhite, California State University, Los Angeles
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For my final look back at the science of a century ago through the pages of The Chemical Society Annual Reports for 1920 I go to the section on radioactivity reported by F. Soddy, a collaborator of Rutherford, deviser of the term isotope, and Nobel Laureate in chemistry for 1921. A section on the nuclear constitution of atoms recapitulates the historic demonstration of the nuclear theory of Rutherford and associates and suggests that because the mass of an electric charge is proportional to the square of the charge and inversely proportional to its diameter, "the diameter of the uranium atom would be … $1/50^{th}$ of the diameter of a single negative electron, if [the nucleus] consisted of pure positive electricity. That the nucleus is not a pure positive charge, but contains negative electrons …is shown by the emission of beta-rays from the radio-elements and by the mode of formation of isotopes in radioactive changes. Hence the view is not free from inconsistencies."

A section on isotopes reports the mass spectrometric work of Aston, initially a student of J. J. Thomson. Aston and Thomson observed isotopes of neon as early as 1913. By 1920 Aston had examined nineteen elements and ten, including H, He, C, N, O, F, P, S, As and I were found to be homogeneous. (Later investigations using more sensitive detection methods have shown the presence of isotopes for several of these elements). Isotopes were confirmed, and their masses measured, for B, Ne, Si, Cl, A, Br, Kr, Xe, and Hg. "In every case, except hydrogen, the atomic mass of each homogeneous component proves to be an exact integer, in terms of that of oxygen as 16, within the error of measurement… For hydrogen, however, the chemical value, 1.008, is exactly confirmed and its homogeneity proved."

The precise work of T. W. Richards (the first U.S. Nobel laureate in chemistry) and others on the atomic weight of lead from various sources is analyzed. From Norwegian thorite the value is 207.9, the highest yet found. Ceylonese thorianites gave values as low as 206.8. "Common" lead has an atomic weight of 207.1. These results show that there are different radioactive decay series that give rise to different mixtures of lead isotopes.

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This Month in Chemical History

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Although many attempts have been made it is doubtful whether any separation of a mixture of isotopes has yet been successful. Neon has been fractionated [by adsorption?] on cold charcoal to no effect. Similarly for fractional diffusion through porous pipe clay. Theoretical separation methods include centrifugal separation and thermal diffusion, both of which depend on differences of molecular mass. (These and related methods are, of course, central to the modern nuclear industries.)

There are reports on pioneering experiments on the use of isotopes as tracers in chemical operations. "When active lead nitrate and inactive lead chloride are dissolved in boiling pyridine, the lead in the lead chloride crystallizing out is half as active as the lead in the original lead nitrate, but when an active lead salt is so mixed with an organic compound of lead, such as lead tetraphenyl or diphenyl [lead] nitrate no interchange of lead occurs." Lead isotopes have also been used to measure the velocity of diffusion of lead atoms in molten lead.

Soddy reviews in detail the "fixed electron" model of atomic structure that is attributed to G. N. Lewis. He concludes that in contrast to the Bohr theory the Lewis model possesses a number of advantages particularly in accounting for the Periodic Law, ionized versus un-ionized compounds, and the arrangement of atoms in crystals as determined by X-ray methods. We are fortunate in 2020, in having the luxury of choosing our atomic models – Lewis or electron orbitals – depending on the problem at hand.

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Insights Into IP Law

Keith Orso*, Irell & Manella LLP
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The previous edition of this column began describing a case involving a drug company that developed an anticoagulant formulation and method of making it. The company paid another entity to manufacture three batches of the drug for commercial use, paying more than $100,000 per batch. An issue in the case was whether this activity, which took place more than one year before the company filed a patent application, created an "on-sale bar" that invalidated the resulting patent.

The on-sale bar is designed to prevent inventors from exploiting their inventions commercially for too long before filing corresponding patent applications. Specifically, selling or offering for sale an invention more than one year before filing a patent application generally creates a bar to patenting the invention.

In the case introduced in the previous edition of this column, the trial court ruled that there was no on-sale bar, and the party challenging the patent appealed. The court of appeal initially reversed, finding that there was no on-sale bar. But then the appellate court took a second look and affirmed (for reasons still to be addressed here). After the last installment of this column, one reader wrote expressing healthy skepticism and suspicion about the process. Was this skullduggery? Under what conditions, and with what pressure from the parties (pursuing their own agendas), did the court of appeal change its mind?

These are good questions. There are twelve active judges on the relevant court of appeal. The appeal from the case discussed in this article was, as always, initially heard by a panel of three of those judges. After the hearing, the judges issued their initial ruling reversing the trial court.

After an initial ruling, a losing party has the right to file a petition asking the panel of three judges to reconsider the case (a panel rehearing), or in the alternative, asking for the decision to be set aside and for all twelve judges to hear the case together and decide anew (a rehearing "en banc"). If there is any interest from the judges, then the non-petitioning party is given an opportunity to file a response to the petition. The judges may then initiate a poll to determine if rehearing will be granted. If so, the judges may request further briefing or another hearing. Requests for rehearing are often denied, but it is not uncommon for one to be granted, as was the case here. On rehearing, the full court affirmed for reasons that will be discussed next time.

* 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

Well a lot in the world has changed since the last message, hopefully most effects will be temporary with minimal impact to people's lives. It seems that anything I write here is pretty insignificant in comparison to these events, so this will be a short message.

It occurs to me that aside from the very important educational, government and industry jobs that many of our members are performing, perhaps the most important function is to use our knowledge of science and the scientific process to inform and find answers to questions that non-scientists in our families and communities have about the scientific aspects of the current situation and how to minimize risk. Knowledge can help to calm anxieties that others may be feeling. It's challenging to provide answers with the isolated conditions, but posting to social media, Skype'ing or Facetiming your grandkids, nieces, nephews, older parents, etc. are modern day options that just might make the world a little less scary for them.

The Section will reschedule both the Olympiad and the "Careers for Chemists" events that were postponed as soon as conditions permit. We appreciate the interest that was expressed in both these events and seek everyone's patience with the necessary delay.

A quick reminder that you can access the local section information on the websites shown below:

- ACS San Gorgonio Local Section website: http://www.sgacs.org
- ACS San Gorgonio Local Section Instagram: https://www.instagram.com/sangorgonioacs/

As always I welcome any suggestions, comments, etc. from members of the section or other interested parties. My email is: rm.riggin@yahoo.com. Feel free to contact me at any time.

Ralph Riggin, Chair

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Bi-Section Chemists' Calendar

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

April

4	SC Undergraduate Research Conference at Occidental College—**Cancelled**
19-25	Chemists Celebrate Earth Week - Theme: "Protecting the Planet Through Chemistry"
25	Expanding Your Horizons Conference—**Cancelled**

To find out which events have been cancelled or postponed, please see our websites:
www.scalacs.org
www.sangorgonio.sites.acs.org.