Newsletter

March 2015

Silicon Valley Chemist

Santa Clara Valley Section — American Chemical Society

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MARCH 2015 NEWSLETTER TOPICS

Novel Optical Properties of Plasmonic Metal Nanomaterials for Chemical Sensing and Cancer Therapy

A Case Study of Hollow Gold Nanospheres

Dr. Jin Z. Zhang

Abstract

Nanomaterials are of strong interest for both fundamental and technological purposes. At the fundamental level, nanomaterials possess novel physical and chemical properties that differ from those of bulk matter due to quantum confinement effect and exceedingly large surface-to-volume ratio. These novel properties are highly promising for applications in emerging technologies. Our lab has been actively engaged in the study of optical and dynamic properties of nanomaterials of both semiconductor and metal for solar energy conversion, solid state lighting, chemical sensing, and biomedical applications. As a

specific example, we have been actively involved in the design and characterization of metal nanostructures for surface enhanced Raman scattering (SERS) and cancer imaging/therapy applications. We combine SERS with various optical fibers to generate a convenient platform for sensing with molecular specificity and high sensitivity. In particular, we have developed a novel hollow gold nanosphere (HGN)

continued on next page

Chair's Message

Ashley Piekarski

Last month we hosted two dinner meetings, and it was wonderful to see everyone there! In my last message I talked about networking, and there was definitely a lot of networking going on at these meetings. More students are attending our dinner meetings, and it's always amazing to see them interact with the Bay area science professionals. I invite my students out to every dinner meeting, and afterwards they always tell me about the connections they have made. They especially get all excited about receiving business cards, and I tell them to stay connected by emailing their new contacts or finding them on LinkedIn.

I believe we hear all the time to "network!" I imagine by now we are all very good at networking or at least are aware that is what we should be doing when we attend conferences and dinner meetings. Just as networking is vital to the growth of our careers, staying connected is absolutely important. A colleague of mine once told me that choosing your Ph.D. advisor is as critical as choosing the partner you marry or stick with for life! I did not realize how true that statement was until I went through graduate school and started searching for jobs. It's quite funny because I met my Ph.D. advisor at a National ACS Meeting. I already knew I wanted to work for Professor Craig Hawker at UC Santa Barbara, and I also knew it was competitive to get into his

continued on next page

March Dinner Meeting

Date: Thursday, March 19, 2015
Time: 6:00 Social Hour
7:00 Dinner
8:00 Presentation
Speaker: Dr. Jin Zhang
University of California
at Santa Cruz
Gold Nanospheres
Location: Biltmore Hotel & Suites
2151 Laurelwood Boulevard
Santa Clara, CA
Cost: $26.00
Pork Loin or Eggplant Parmesan
Reservations: ***www.scvacs.org***
Sally Peters
650-854-4614

Reservations should be made by March 16th stating your name, address, company/school affiliation, number of people in party. Watch the web site for more information. If you are unable to honor your reservation, please cancel by Tuesday, March 17th.

Novel Optical, continued from front page
system that has demonstrated outstanding photophysical properties for SERS sensing as well as for photothermal ablation therapy of cancer both in vitro and in vivo, due to their unique structural and optical characteristics. I will describe recent progress in the reproducible synthesis of HGNs, which has been a challenging issue for years, and in our latest understanding the HGN growth mechanism.

Biography

Jin Z. Zhang received his B.Sc. degree in Chemistry from Fudan University, Shanghai, China, in 1983 and his Ph.D. in physical chemistry from University of Washington, Seattle in 1989. He was a postdoctoral research fellow at University of California Berkeley from 1989 to 1992. In 1992, he joined the faculty at UC Santa Cruz, where he is currently full professor of chemistry and biochemistry. Zhang's recent research interests focus on design, synthesis, characterization, and exploration of applications of advanced materials including semiconductor, metal, and metal oxide nanomaterials, particularly in the areas of solar energy conversion, solid state lighting, sensing, and biomedical detection/therapy. He has authored over 260 publications and three books. Zhang has been serving as a senior editor for JPC published by ACS since 2004. He is a Fellow of AAAS, APS, and ACS. He is the recipient of the 2014 Richard A. Glenn Award of the ACS Energy and Fuel Division.

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Chair's Message, continued from front page
research group because many students wanted to work with him. At that ACS meeting, I introduced myself to Craig and his post-docs and graduate students. I have a feeling that networking at that conference as an undergraduate helped me land a position in his laboratory as a graduate student. As I was applying for jobs in academia, Craig helped give me recommendations to all the schools I was applying for. Throughout graduate school, Craig gave me numerous opportunities to mentor students in research because he knew I wanted to be an educator after grad school. I couldn't have asked for a better advisor! Staying connected with the mentors and colleagues you have made is essential. At the Mosher award dinner, a special moment really stood out to me that illustrates the true meaning of "staying connected." Dr. Scott Denmark's first post-doc and graduate students came to the dinner. Professor Denmark still teaches at University of Illinois Urbana-Champaign and however, several of his post-docs and students are now employed in the Bay area. It was really special when all of them reunited at the dinner meeting. It's all about staying connected!

So with the upcoming National ACS Meeting in Denver, CO, who are you going to reconnect with? Are there people you have been meaning to reach out from your past who played a critical role in the development of your career? I hope you are all staying connected using LinkedIn and emailing one another. Are there new connections you want to make? Ask to join our LinkedIn page: just search "Santa Clara Valley American Chemical Society Section" and add us to your LinkedIn group! Many of the Counselors from our section will be at the meeting. Please feel free to use our LinkedIn page to organize some meet-ups prior to attending the conference. We all know how busy these National meetings can be, so, better to organize your connections ahead of time! I hope you all have a fun, productive, and enriching meeting in Denver!

Fading Reds in Van Gogh's Paintings

In the current issue of Chemistry World from the RSC, Matthew Gunther describes how researchers may have identified the chemical explanation why the red colors in one of Vincent van Gogh's paintings are turning white over time. The vibrant red leaves on the pond in Wheat stack under a cloudy sky are slowly transforming into the color of the clouds above.

Red Led, or minium (Pb_3O_4), thought to be one of the earliest synthetically produced pigments in antiquity, was used extensively by Van Gogh in his paintings. Scientists have known that minium 'whitens' under light but have not been able to determine why. To understand this process, Koen Janssens and his colleagues at the University of Antwerp examined a minute white globule taken from the surface of the pond in Van Gogh's 1889 piece. The researchers employed x-ray powder diffraction tomography. By firing a focused beam of x-rays at the sample from different positions, they were able to gather information on the chemical species present.

"[It is] an enclosed little world," explains Janssens. "The minium is changing and the products [are] captured below the surface of the paint." He goes on to add that the red lead is at the grain's center and, over the years, it has become coated with degradation products. In addition to minium, they found plumbonacrite ($3PbCO_3 \bullet Pb(OH)_2 \bullet PbO$), which is a very exotic mineral of lead. Towards the outer parts of this sample they found the more commonly known carbonates, hydrocerussites ($2PbCO_3 \bullet Pb(OH)_2$) and cerussites ($PbCO_3$). The cerussites are a family of compounds that form the white outer shell around the minium. The researchers think that when red lead is exposed to light it is converted into plumbonacrite, which reacts with carbon dioxide to form hydrocerussite and cerussite.

During his most prolific period, Van Gogh produced 2000 paintings over a decade and was known for his use of intense colors, which, some say, reflected his complex personality. However, many of the painter's most celebrated works have been degrading due to exposure to light.

The SPLASH Program Returns to Stanford

Saturday, April 11 – Sunday, April 12

The SPLASH education program is returning to Stanford. This is a weekend education program for middle and high school students on the beautiful Stanford campus in Palo Alto. Current 7th -12th graders sample many of the 1- or 2-hour fun and informative courses available. The classes are taught in the historic Quad classrooms by volunteer Stanford graduate students, undergraduates, and local professional community members. In addition to a variety of great classes, lunch is included for participants as part of the program. Registration opens Friday, March 20th. The cost for the whole weekend is $40. See ***www.stanfordesp.org*** for registration details or contact Dr. Howard Peters for more information at peters4pa@sbcglobal.net.

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 seminar 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 seminar 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 for February

Amelia Adams
Spencer Alford
Steven Bradford Barney
Deepak Behera
Jean Conrad
Kathleen Desevin
William P. Gallagher
Anna Goc
Akil Hamsath
Zachary Harvey
Dr. Kenneth Henry
Arvind Kannan
Dr. Saswata Karmakar
Alison R. Lee
Dr. Debora Winnie Lin
Zhenxin Lin
Dr. Xiao-Dong Liu
Professor Sanjay V. Malhotra
Jan Marik
Kunal Nagpal
Divya Reddy Parapati
Shawn Pugh
Courtney Reichhardt
Sophia D. Steffens
Deborah Stoliker
Xianghong Wang
Alicia White
Tashica T. Williams
Dong Wu

Last Chance to Judge at Local Science Fairs in 2015

by Susan Oldham-Fritts

This month is your last chance to judge at one of this year's regional science fairs. While all of these fairs need category judges, we especially need members for our SCV-ACS special awards team to judge the 100-plus chemistry projects at the Synopsys Championship. Please contact me at sofritts@garlic.com if you can join our team on March 11, 10am - 4pm, at the McEnery Convention Center, San Jose.

Category judges in chemistry, botany, biology, biochemistry, chemistry, microbiology, and the behavioral/social sciences are needed at the following fairs. (So ask professionals you know in these fields to join us and judge, too.)

Santa Cruz Science Fair *March 7*
Santa Cruz County Fairgrounds, Santa Cruz
www.science.santacruz.k12.ca.us

Synopsys Championship *March 11*
San Jose Convention Center, San Jose
www.outreach-foundation.org/judges.html

Monterey County Science and Engineering Fair *March 14*
California State University, Monterey Bay – University Center, Building 2 ***www.montereycountysciencefair.com/***

San Francisco Bay Area Science Fair *March 25*
San Francisco County Fair Building - Golden Gate Park
www.sfbasf.org/

The interaction between the students and judges is the heart of each and every science fair. The encouragement, critiquing, and interest we as judges share with the students benefit all of the participants. So, no matter which fair includes your home town, now is your last chance to volunteer!

The American Association of Chemistry Teachers (AACT)

After about four years of feedback from the chemical education community, a national organization dedicated solely to supporting K–12 teachers of chemistry came alive in September 2013 at the ACS national meeting in Indianapolis. Over the past year, an advisory board comprising secondary chemistry teachers, professors, industry experts, and ACS leaders has worked together with ACS staff and resources to shape the programming and direction of what is known as AACT. AACT is founded on the principle that we are creating a community by and for teachers of chemistry. The AACT website is a professional home through which the K-12 chemistry teaching community has access to customized resources and support – from staff and most importantly, from colleagues and peers.

As the landscape of chemical education changes and new challenges arise, AACT will help teachers navigate their path to success by offering new curriculum to implement in the classroom, vetting chemistry teaching resources, and providing professional development opportunities that address current topics. AACT membership is open to educators and anyone with an interest in K–12 chemistry education. Benefits include an annual subscription to ChemMatters and Chemistry Solutions; classroom resources such as lesson plans and multimedia; professional development opportunities; and platforms to connect with other educators.

For more information, please visit the website ***www.teachchemistry.org***.

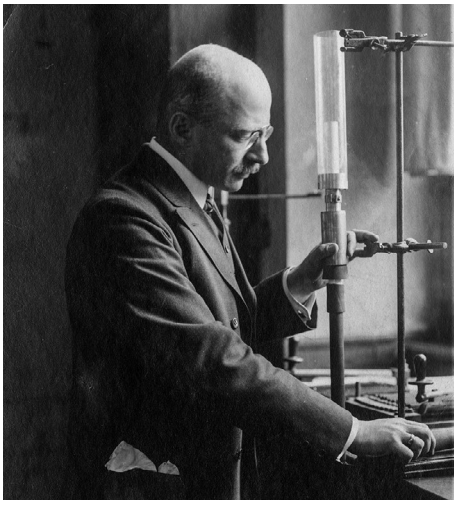
100-Year History of Chemical Weapons

Chemical and Engineering News has produced a series of articles on the 100-year history of Chemical Weapons. Available at ***http://chemicalweapons.cenmag.org/***, the series begins with the first chlorine gas attack on April 22, 1915. By the end of World War I, scientists working for both sides had evaluated some 3,000 different chemicals for use as possible weapons. Chlorine gas was chosen for a few reasons. It was widely used in the German dye industry and thus widely available. The gas was also inexpensive to produce and did not divert any resources from the production of conventional weapons needed for the war. From a practicality standpoint, chlorine gas was heavier than air and could sink into the trenches instead of disappearing up into the sky. Finally, the gas was a powerful irritant to eyes, noses, lungs, and throats. At high enough concentrations, exposed victims would die of asphyxiation.

One of the first frontline workers to realize the gas was chlorine was Lt. Col. George Nasmith, a sanitation expert from Toronto. He spread the word that the poison gas was chlorine the evening of the attack, as did ambulance doctor, Capt. Francis Scrimger. He told his staff to urinate on their handkerchiefs and use them as a face cover when they went into affected areas to rescue the wounded. Scrimger knew that the ammonia in urine, a base, could help neutralize chlorine gas, which transformed into a strong acid in body tissue.

The second part of the series focuses on the role of Fritz Haber.The Nobel Laureate is widely known for his work on nitrogen fixation, which enabled the Haber-Bosch process for making fertilizer as well as nitrogen-based explosives. The series explores the complex scientific and personal life of Haber who was

Both German soldiers and military dogs were issued protective gas masks. (2015 © Chemical & Engineering News)



Fritz Haber in his lab. (2015 © Chemical & Engineering News)

alternately regarded as a war criminal, devoted father, gifted scientist, and callous murderer.

The series continues with first-hand accounts from the diaries of soldiers who experienced chemical warfare. The timeline of chemical weapons then and now illustrates the historical underpinnings of chemicals in warfare. A more general look at how chemistry changed warfare during world war I concludes the series.

The purpose of the ACS Fellows Program, one component of the broader ACS Awards Program, is to recognize and honor members of the American Chemical Society for their outstanding achievements in and contributions to the science and the profession and for their equally exemplary service to the Society.

Although the "Fellow" designation has been adopted by many professional societies, the criteria for awarding this designation vary significantly from society to society. For some, such as the Royal Society of Chemistry, the Fellow designation indicates a senior membership level, signifying that the individual has attained a particular status within the profession. For others, such as the American Physical Society, the designation indicates that the individual has been recognized by his or her peers for significant contributions to the science. The ACS Fellows Program, however, uniquely recognizes a different standard of achievement and service. Specifically, the Fellow of the American Chemical Society (ACSF) designation is awarded to a member who, in some capacity, has made exceptional contributions to the science or profession and has provided excellent volunteer service to the ACS community.

Information about the program and the nomination process can be found on the ACS webpage: ***http://www.acs.org/content/acs/en/funding-and-awards/fellows.html***

2014 Harry and Carol Mosher Award

Left to right, David Parker, Natalie McClure, Ashley Piekarski, Professor Scott Denmark (winner of the award), Lois Durham and Howard Peters.

CHEMPLOYMENT ABSTRACTS MARCH 2015

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

CHEMPLOYMENT ABSTRACT 3973

Position Title: Environmental Compliance Manager

Job Description: Reporting to the Director of Environmental Health and Safety, the Environmental Compliance Manager will serve as the principal subject matter expert for all campus environmental regulatory compliance matters, ensuring all appropriate environmental permits necessary for campus operations are in place, current, and in compliance with conditions of the permitted operations.

QUALIFICATIONS DESIRED:

Education: Bachelor's degree in in Environmental Health and Safety, or related field such as industrial hygiene, or equivalent knowledge, certificaitons and experience; higher level degree in relevant field of study preferred.

Experience: Applicant must have at least 7 years of experience in progressively responsible positions in environmental health and safety or related field, including demonstrated effective management of safety employees.

LOCATION, SALARY, EMPLOYER:

Job Location: San Francisco, CA

Employer Description: The employer is the Department of Environmental Health and Safety at San Francisco State University.

Application Instructions: See ***http://www.Click2Apply.net/t5c554n***. Submit an online application, resume, and cover letter outlining experience. Please include the names, addresses (including emails), and telephone numbers for at least three professional references.

CHEMPLOYMENT ABSTRACT 3974

Position Title: Academic and Research Safety Manager/Chemical Hygiene Officer

Job Description: Under the general direction of the EHS Director, the Academic and Reseerach Safety Manager/Chemical Hygienee Officer (ARSMCHO) is responsible for developing, implementing and administering occupational health and safety programs for San Francisco State University.

QUALIFICATIONS DESIRED:

Education: Bachelor's degree in in Environmental Health and Safety, or related field.

Experience: Applicant must have at least 7 years of experience in progressively responsible positions in environmental health and safety or related field, including demonstrated effective management of safety employees.

LOCATION, SALARY, EMPLOYER:

Job Location: San Francisco, CA

Employer Description: The employer is the Department of Environmental Health and Safety at San Francisco State University.

Application Instructions: See ***http://www.Click2Apply.net/rxyzbfj***. Submit an online application, resume, and cover letter outlining experience. Please include the names, addresses (including emails), and telephone numbers for at least three professional references.

CHEMPLOYMENT ABSTRACT 3975

Position Title: Fletcher Jones Chair in Chemistry Associate or Full Professor

Job Description: Plan and teach upper- and lower-division courses in chemistry & biochemistry and fulfill all responsibilities associated with assigned courses; maintain an externally-funded and productive research program in chemistry with undergraduates; contribute to departmental research and teaching objectives; and provide service and leadership in the department, the college and the university.

QUALIFICATIONS DESIRED:

Education: A Ph.D. in chemistry, biochemistry, or a closely allied field

Experience: Experiences in conducting research with students, a record of successful university-level teaching and in teaching a diverse student population are preferred. The successful candidate must have 1) a record of achievement sufficient to merit appointment at a minimum level of Associate Professor with tenure; 2) sufficient administrative experience to serve as Chair of the Chemistry & Biochemistry Department.

LOCATION, SALARY, EMPLOYER:

Job Location: Santa Clara, CA

Salary: Competitive salary and benefits package; housing assistance

Employer Description: Santa Clara University is a comprehensive Jesuit, Catholic university located in California's Silicon Valley. It is an Equal Opportunity/Affirmative Action employer, committed to excellence through diversity and inclusion, and it has an ACS-approved chemistry curriculum.

Application Instructions: For detailed instructions, visit ***www.scu.edu/hr/careers/***

Applications will be accepted until the position is filled, and review of applications will begin February 13, 2015.

Chemistry Quiz

The small molecule with the formula $C_8H_{16}O_2$ is in clinical use as an anticonvulsant and mood-stabilizer in the treatment of epilepsy, bipolar disorder, and prevention of migraine headaches. What is its name and chemical structure?

Last Month's Question:

Which element forms allotropes with hardness ranging from 10 to 1.5 on the Mohs scale?

Answer:

Carbon. Diamonds have Mohs hardness of 10. Graphite has a Mohs hardness of 1.5.

SANTA CLARA VALLEY SECTION
AMERICAN CHEMICAL SOCIETY
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http://www.scvacs.org

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http://www.scvacs.org/newsletter/

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FUTURE MEETINGS

Mar 14 Pi Day - Free Admission to the Exploratorium
San Francisco Exploratorium
www.exploratorium.edu/visit/calendar/pi-day-free-day-2015

Mar 19 Dr. Jin Zhang , UCSC
Gold Nanospheres for Photodynamic Therapy
Biltmore Hotel, Santa Clara, CA

Mar 22-26 Spring 2015 National Meeting
Chemistry of Natural Resources
Denver, CO

Apr 2 Silicon Valley Leaders Symposium
Sara Kenkare-Mitra, VP Genentech Research and Early Development
San Jose State University
http://engineering.sjsu.edu/our-college/events/silicon-valley-leaders-symposium

Apr 18 Hayward Fault Walking Tour
http://msnucleus.org/haywardfault/hayward.html

Apr 23 Dr. David Sopchak, San Jose State University
Fuel Cells
Biltmore Hotel, Santa Clara, CA

May 23 Joint Meeting with CA and Sacramento Sections
UC Davis