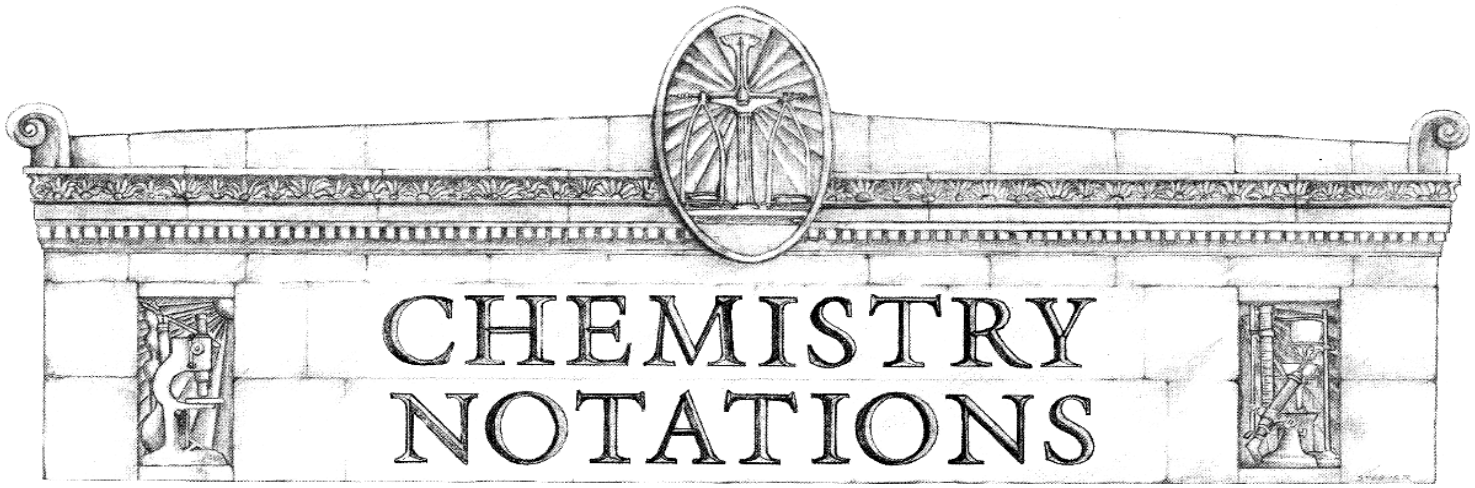
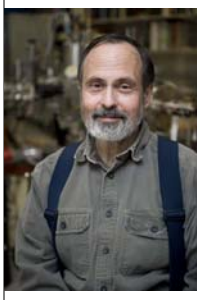


A publication of the Chemistry Department at Washington State University

2013

A Message from the Chair



It is hard for me to believe that this is the fifth edition of our reborn yearly news letter! Over the last five years we have seen many changes in the department. Many of these changes were good, but some were sad. Of the sad ones, the loss of Jim Schenck is at the top of my list. Jim was a terrific departmental citizen and I miss his voice at faculty meetings and many of us miss his contributions to our research. Another sad one was the loss of Roger Ray. While it has been many years since he retired from the Chemistry faculty and the College Deanship, he was always a presence in person and in his policies. Professor Roger Willett lost his wife Thelma during this period. I am also sad about Jim Satterlee's illness, but hopeful that he will heal and be back teaching next January. Now, on to the good...

We have been blessed with an active, dedicated, and highly talented faculty. Almost all of our faculty is well funded and have active productive research groups that train undergraduates, graduates, and postdoctoral fellows. Our new additions during the last five years include Nathalie Wall (Radio-Environmental), Pete Reilly (Analytical), Jonel Saludes (Bio-Organic), Brian Clowers (Analytical), and Zach Heiden (Inorganic). We are in the process of searching for both Physical and Analytical faculty members to join us in 2014. Almost all of these are assistant professors. This is a major change in a department that was mostly full professors, and it bodes well for the health of our program for many years to come.

Another blessing is our staff. We have a small but very dedicated office and stockroom staff. Some recent hires include Marlene Ibsen (reception and travel), Molly Spain (finance assistant), and John Sullivan (head stockroom person and chair of the safety committee). These join our excellent "old timers" to create a well balanced cohesive group that makes life better for all of us.

We have about as many undergraduates as last year, and more graduate students than ever before (about 115). While graduation numbers reflect the recruitment from several years ago, they are still the highest in history with ten Ph.D.s and three master's degrees last year. All the data indicates that we are not only increasing the numbers of graduate students, we are increasing their quality as well. On the undergraduate side, the big increases in freshman enrollment from previous years are showing up in our upper division classes. We have 90 students (so far) in first semester P Chem and about 450 in first semester Organic. As you might imagine, these numbers are highly challenging. However, Scot Wherland, Greg Crouch, Jeremy Lessmann, Louis Scudiero, and Mike Finnegan are working overtime to make sure the students get a quality experience.

The last five years have probably been both good and sad for most of you. I hope the good parts outweigh the sad and that the next five years are all good for each of you.

Best wishes,

K.W. Hipps, Professor and Chair

Chemistry Welcomes New Assistant Professors

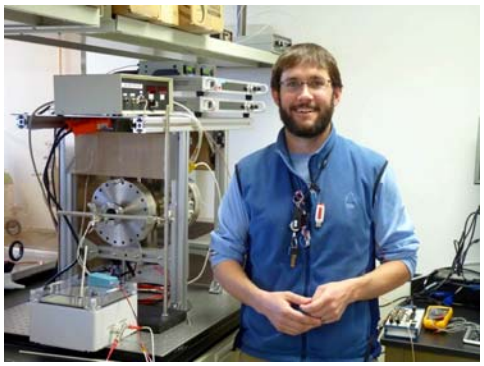
Zachariah (Zach) Heiden

Dr. Heiden joins our faculty in the Inorganic Division. Zach earned his B.S. in Chemistry and Chemical Engineering at the University of Wisconsin – Madison and his Ph.D. in Chemistry at the University of Illinois at Urbana/Champaign. At UIUC, under the supervision of Prof. Thomas Rauchfuss*, Zach developed proton and redox induced Lewis acidic catalysts for hydrogen and oxygen activation. During his graduate research, he was able to demonstrate how the concept of proton induced Lewis acidity could be used in the development of a homogeneous fuel cell and also promote catalytic aerobic oxidations. Upon completion of his Ph.D., he moved to the University of Toronto to join the laboratory of Prof. Douglas Stephan. At U of T, he focused on the development of metal free hydrogenation catalysts, with a focus on asymmetric hydrogenations. He was able to show that through the use of main group Lewis acids, primarily boron-based, asymmetric hydrogenations with moderate selectivity could be achieved. He continued his training as a Postdoctoral Fellow at Pacific Northwest National Laboratory, under R. Morris Bullock, focusing on the development of an iron based electrocatalyst for the reduction of dinitrogen to ammonia.

Here at WSU, Zach's research program is focused on using main group elements in combination with transition metals to promote difficult catalytic transformations for energy and biological applications. These efforts are focused on the development of cheaper catalysts with higher activities and greater selectivity. Projects in the lab include: (a) the design and synthesis of main group based ligands to promote reversible atom and hydride transfer between the metal center and substrates of interest to promote unusual organic transformations, (b) the development and synthesis of fluorescent boron based ligands for photo and redox switchable catalysis aimed towards biological applications, and (c) the design and synthesis of catalysts to promote the breakage of carbon-carbon bonds, with the ultimate goal of converting waste plastics into fuels. In Zach's spare time, he likes to hike, woodwork, and make wine.

**Some of you may recognize Tom Rauchfuss as a WSU Ph.D. from the '70s.*

Brian Clowers



Building upon the fundamentals of analytical chemistry, Dr. Clowers's research has focused on the development of transformational analytical and instrumental methods that find application in areas ranging from fundamental biology to vapor phase threat detection. Notable highlights from Brian's graduate career under the direction of Prof. Herbert Hill include the design and construction of two distinct instrumental platforms designed to capture the gas-phase ion characteristics of isomeric species. After graduating from WSU Brian received an NIH Postdoctoral Fellowship and joined the research group of Prof. Carlito Lebrilla at the University of California, Davis to further explore the behavior of gas-phase carbohydrate isomers using high resolution mass spectrometry techniques. At UC-Davis Brian developed a clever laboratory technique capable of determining sites of protein glycosylation that preserves the underlying chemical information which directly informs carbohydrate composition. Following Brian's work with Dr. Lebrilla, he was invited to join the proteomics technology development group at Pacific Northwest National Laboratory under the direction of Dr. Richard Smith. His contributions to the development of a next generation proteomics analysis platform were based upon his seminal publication demonstrating the use of Hadamard Transform mathematics to ion mobility measurements. The patent issued for this work at PNNL serves as the foundation for the first commer-

cially available low-pressure ion mobility-mass spectrometer offered by Agilent Technologies. In 2008, Brian transferred to the Chemical and Biological Signature Sciences group at PNNL and applied his broad skill set to topics of interest within the national security domain with specific emphasis on the forensic characterization of select biological agents using mass spectrometry.

Here at WSU, Brian's research focuses on new mechanisms for gas phase ion characterization using ion mobility spectrometry (IMS), mass spectrometry (MS) and optical fragmentation techniques to probe complex chemical systems. These hybrid methods address a range of chemical problems spanning from the fundamental to the applied. A few of these research topics include carbohydrate structure determination, intelligent stereochemical ligand development, gas-phase clustering equilibria, and selective ion chemistry for threat detection. As a product of the Sierra Nevada Range, Brian occupies his free time in the mountains and patiently awaits the day when his son can join in the adventures.

In Memoriam

Dr. James O. Schenk

The WSU Chemistry Department lost one of its own this past year when Professor James O. Schenk passed away in January after a short battle with cancer.

As a Professor of Chemistry, Pharmacy, Biochemistry and Biophysics, he completed his undergraduate work at Wofford College in Spartanburg, South Carolina, studied clinical chemistry at Georgia State University and received his Ph.D. in analytical chemistry and neuroscience at the University of Kansas. He subsequently spent one year as a National Institutes of Health postdoctoral research training fellow and two years as a National Institute of Mental Health postdoctoral research fellow in the Neuropsychopharmacology Research Unit at Yale University School of Medicine. He remained at Yale for an additional year as a Postdoctoral Associate before joining the Washington State University faculty in the summer of 1986.

During his 26 years at WSU, he taught courses ranging from freshman chemistry to graduate classes in the kinetics and thermodynamics of environmental chemistry. As a mentor and advisor, Schenk trained more than 20 Ph.D. students in analytical chemistry and related fields.

He authored or co-authored more than 50 peer-reviewed papers over the course of his career, including two in 2012 on serotonin chemical signals and the bioelectrical effects of drugs of abuse, such as methamphetamine or cocaine, on the brain.

"He had the curiosity that marks all good scientists," said Jeff Jones, WSU professor of chemistry and one of Schenk's many collaborators. "The major application of our research together is a better understanding of how to rapidly design drugs to combat diseases and decrease the cost of drug development."

Schenk was honored with WSU's Meyer Distinguished Professorship of Life Sciences in 1997 and served as a Faculty Senate representative for many years.

"He was very interested in both the quality of the courses offered to the students and the research happening in the labs," said KW Hipps, chair of the WSU Department of Chemistry.

Schenk loved to cook, brewed his own beer and was an avid photographer. He enjoyed developing his photos on paper using metal halide chemistry and embellished them by hand painting to create unique artwork.

As a native of South Carolina, Schenk's soft drawl, deep sense of humor and penchant for colorful details enhanced nearly every conversation.

"If it could be said in five words, Jim would use 10 and you would love every single one," said Jim Brozik,

Schenk's friend and WSU chemistry department colleague.

Schenk is survived by his wife, Carrie Giovannini, a graduate coordinator for the department, two sons, a daughter, and two stepsons.

Memorial gifts to support chemistry students may be made in Schenk's name. Please contact the College of Arts and Sciences development office at supportcas@wsu.edu for details.

Faculty Highlights

New Funding—Award Totals

Cliff Berkman & Jeff Jones, NIH, "Development of a Malarial Kinase-on-Phage Screening Platform", $190,778.

Aurora Clark, DOE, "The Center for a Nanoporous Materials Genome", $140,500.

Phil Garner, NSF, "Aziridine Mediated Peptide Ligation", $160,000.

Xing Zhang & Herb Hill, WSU Office of Resaerch/ ADA, "The Analysis of Neuronal Metabolomes from Cocaine Abused Rats by ESI-IM-TOFMS", $12,227.

Herb Hill, DOD, "Reducing False Alarms in Ion Mobility Spectrometry Detectors - Determination of Accurate and Precise Ion Mobility Spectrometry Constants", $346,754.

K.W. Hipps & Ursula Mazur, NSF**, "**Investigation of Structure and Electron Transport in Porphyrin and Phthalocyanine Aggregates", $470,000.

Jeff Jones, NSF, "SEP: Consortium for Nature-Inspired Lignocellulosic Biomass Processing", $27,446.

Jeff Jones, NIH, "Understanding the Metabolic Impact of Aldehyde Oxidase on New Drug Design", $258,683.

Chul-Hee Kang, , NSF, **"**SEP: Consortium for Nature-Inspired Lignocellulosic Biomass Processing", $48,219.

Alex Li, NSF, "Developing New Photoswitchable Chromophores for Frequency-Domain Imaging: Signal Amplification, Interference Suppression and Sensitive Detection", $430,000.

Alex Li, NSF, "Folded, Yet Stretchable Polymers as Molecular Yardsticks and Force Sensors: New Molecular Tools", $200,000.

Jeanne McHale, NSF, "Controlling the Hierarchal Structure of Light-Harvesting Chromophore Aggregates", $463,142.

Ken Nash, DOE, "Upgrading Lanthanide and Actinide Spectroscopy Capabilities at Washington State University", $84,299.

Ken Nash, DOE, "NEUP Advanced Characterization of Molecular Interactions in TALSPEAK-like Separations Systems", $674,500.

Ken Nash, DOE, "Studies on Minor Actinide Separations", $170,000.

Kirk Peterson, DOE, "Accurate ab Initio Thermochemistry and Spectroscopy of Molecules Containing f -block Elements", $395,000.

Nathalie Wall & Pete Reilly, DOD, "Fast Ultra-Trace Detection of Fission Product Relative Isotopic Abundances", $1,067,607.

Nathalie Wall, DOE, "Coupling of Nuclear Waste Form Corrosion and Radionuclide Transport in Presence of Relevant Repository Sediments", $695,250.

Ming Xian, ACS, "Explore New Molecular Entities for Hydrogen Sulfide Research", $270,000.

Ming Xian, Burroughs Welcome, "Collaborative Research to Develop New Chemical Tools for Signaling Molecules," $7,000.

Awards and Achievements

Sue Clark was named to the Washington State Academy of Sciences. Dr. Clark has developed ways to quickly identify radioactive materials in environmental samples.

Dr. Clark also won the College of Arts and Sciences "Professional and Institutional Service Award" recog-

nizing her distinguished service at both the national and international level.

Ken Nash was awarded the College of Arts and Sciences "Mentoring" award for his excellence in training graduate students and preparing them for the professional lives.

Dr. Nash also gave the Distinguished Faculty Address with a talk titled, *How Will We Power the Future?* Dr. Nash is internationally known for his fundamental and applied research in actinide separations focusing on clean and efficient nuclear fuel cycles. He is committed to educating a new generation of nuclear/radiochemists and separation scientists.

K.W. Hipps earned the Sahlin Faculty Excellence Award for Research, Scholarship and Arts. Working at the interface between physics and chemistry, he is regarded as a pioneer in the field of physical chemistry. He is best known for his seminal work in scanning tunneling microscopy. His STM images have graced the covers of six editions of prestigious journals, including the Journal of Physical Chemistry, Langmuir and the Journal of the American Chemical Society.

Dr. Hipps was also elected to the Washington State Academy of Sciences, joining Sue Clark in representing chemical sciences at the state level.

Ming Xian was honored as the outstanding mid career faculty member in the College of Arts and Sciences this year.

Dr. Hipps receives the Sahlin Award from Daryll DeWald, Dean of the College of Arts and Sciences, and Provost Warwick Bayly

Graduate Program News

Cougars Released Into the Wild

The University awarded doctoral degrees in Chemistry to the following students this year.

Derek Brigham, Ph.D.
Committee Chair: **Ken Nash**

Dr. Brigham has accepted a postdoctoral research position with *Gregory R. Choppin Professor* Thomas Albrecht-Schmitt at Florida State University in Tallahassee setting up laboratory facilities to do research in actinide solution chemistry at FSU.

Cindy Choy, Ph.D.
Committee Chair: **Cliff Berkman**

Dr. Choy is a postdoctoral research associate with Professor Berkman and has co-written a grant with Dr. Berkman that was funded by NIH aimed at developing a high-throughput screening platform for anti-malaria agents.

Jessica Drader, Ph.D.
Committee Chair: **Sue Clark**

Dr. Drader is a postdoctoral research associate with Professor Jenifer Braley (a WSU graduate formerly in Dr. Nash's group) at the Colorado School of Mines in Golden helping with the setup of new radiochemistry research labs at CSM and the U.S. Geological Survey at the Denver Federal Center. Dr. Drader will also be doing research on actinide separations.

Jane Holly House, Ph.D.
Committee Chair: **Sue Clark**

Dr. House is working as a postdoctoral research associate with *Gregory R. Choppin* Professor Albrecht-Schmitt at Florida State University studying the synthesis, structure elucidation, spectroscopy, and structure-property correlations of f-element materials.

Hongli Li, Ph.D.
Committee Chair: **Herb Hill**

Dr. Li is a postdoctoral research fellow at the US Food and Drug Administration in the Washington D.C. area helping to develop high throughput ambient ionization mass spectrometry techniques to detect contaminants in drugs and medical devices.

Elsa Silva Lopez, Ph.D.
Committee Chair: **Jim Brozik**

Dr. Lopez is been working as an editor for Norton and Co. for a General Chemistry text book by Gilbert, Kirss, Foster, and Davies. She has also taken a position as a General Chemistry Instructor at Wake Forest Technical Community College. She is actively seeking a research postdoc at Wake Forest University where her husband (Nelmi Devarie, Xian Lab) has a postdoctoral position.

Luther McDonald IV, Ph.D.
Committee Chair: **Sue Clark**

Dr. McDonald is a postdoctoral research associate at Pacific Northwest National Labs in the National Security Directorate.

Chris Rich, Ph.D.
Committee Chair: **Jeanne McHale**

Dr. Rich has accepted a postdoctoral research position at Colorado State University with Professor Amber Krummel.

Kristyn Roscioli, Ph.D.
Committee Chair: **Herb Hill**

Dr. Roscioli is working as a postdoctoral research associate at the Environmental Molecular Sciences Laboratory at Pacific Northwest National Lab working for Drs. Ljiljana Pasa-Tolic and Robby Robinson helping with Bruker-funded instrument development and with imaging mass spectrometry projects using MALDI ionization looking at biofilms and bacterias.

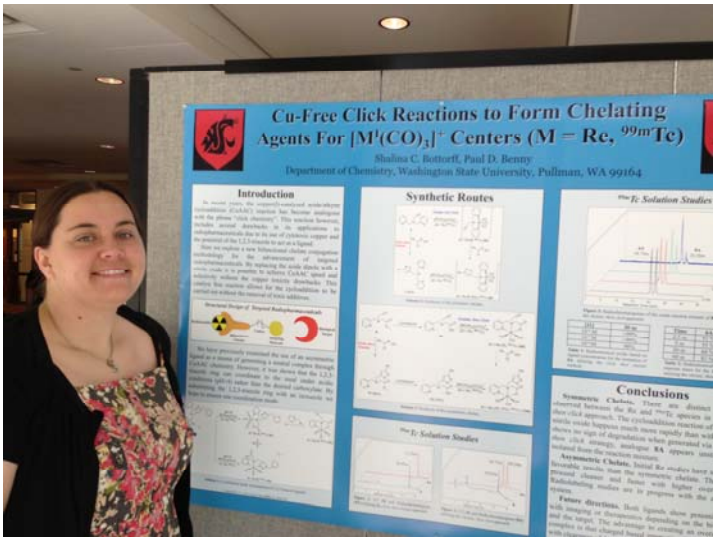
Thomas Wall, Ph.D.
Committee Chair: **Ken Nash**

Dr. Wall is a postdoc with Professor Heino Nitsche at the University of California, Berkeley and Lawrence Berkeley National Lab assisting in experiments designed to synthesize and characterize new elements and isotopes heavier than actinides.

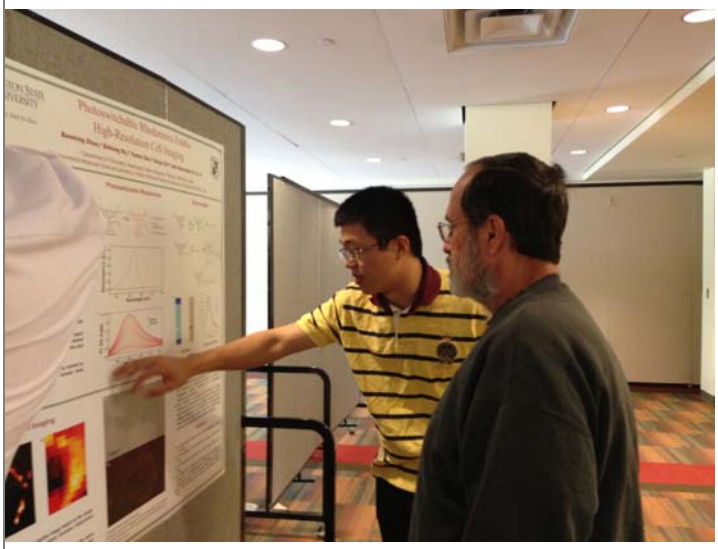
Chemistry 544 Poster Session

Our senior graduate students—those who have completely passed preliminary exams—presented posters of their work in July in the CUB.

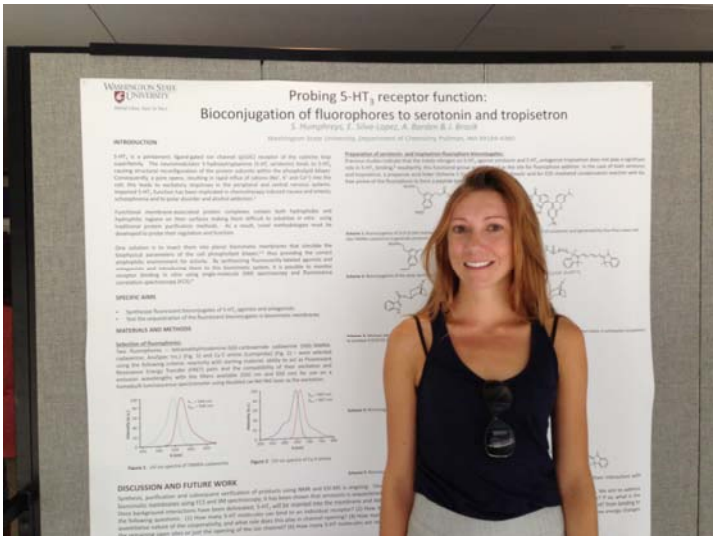
Jessica Tufariello and Mike Williams, Herb Hill Lab



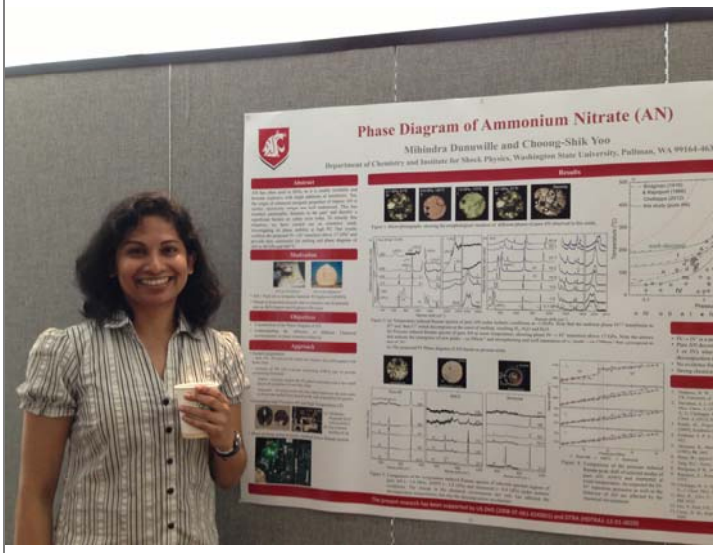
Shalina Bottorff, Paul Benny Lab



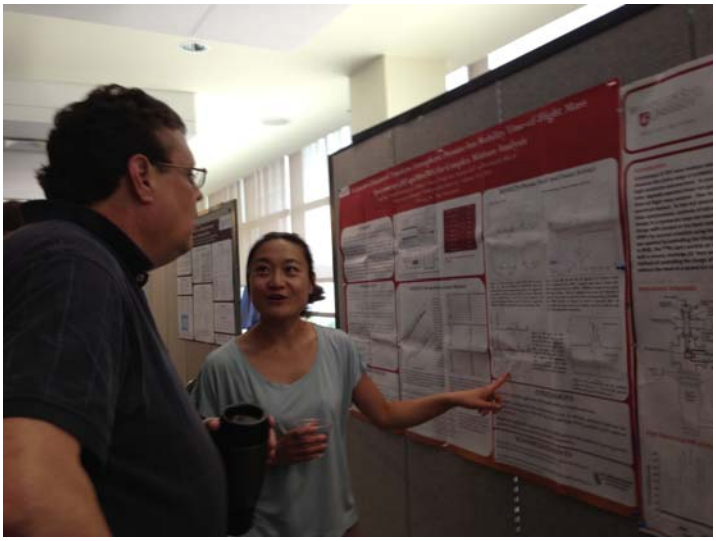
Paul Zhao, Alex Li Lab, explains his poster to Professor Hipps



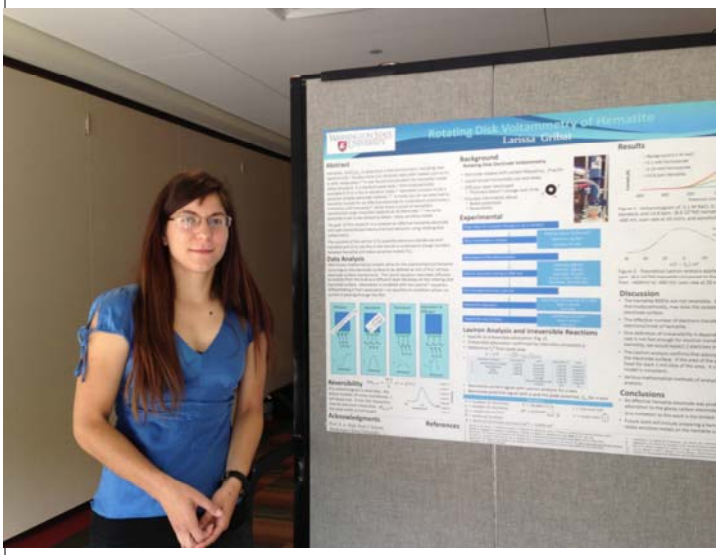
Sara Humphreys, Jim Brozik Lab



Mihindra Dunuwille, Chung-Shik Yoo Lab



Nancy Zhang, Herb Hill Lab, explains her poster to Professor Reilly



Larissa Gribat, Nathalie Wall Lab

Undergraduate Program News

The Undergraduate Chemistry Club

By Ross Overacker, Chemistry Club President

The Washington State University Chemistry Club serves to connect students interested in the field of chemistry. Members come from various educational backgrounds and degree tracks and all share a passion for learning about chemistry. The Chemistry Club strives to maintain a friendly presence on campus where students can collaborate on chemistry-related projects, share ideas, learn new concepts and interact with the science directly. One of the best features the

club boasts is the strong emphasis placed on the faculty-student relationship. We work closely with professors and advisors to create a strongly resourced network that allows us to engage in fun and complex applications of chemistry. Students attending meetings can often participate hands-on in demonstrations prepared by the officers and members that demonstrate concepts highly tied to class and research level science.

Perhaps the best-kept secret of the Chemistry department at WSU is the fun, laidback atmosphere the Chemistry Club provides to undergrads in the often-intense scene of higher education. Members can relax and enjoy the fun spirit of like-minded individuals in a community based setting over pizza every other week at our meetings. While being laidback, we also constantly offer demonstration and outreach opportunities. Demonstrations are essential to the Chemistry Club because we can learn hands-on and work as a team to share something that we collectively enjoy.

All year long, members have opportunities to participate in events such as the annual Dad's and Mom's Weekend demonstrations, events around the WSU campus or even community-hosted events. In the past, we have collaborated with the Physics Club and most recently have demonstrated a liquid nitrogen ice cream recipe at a College of Arts and Sciences fair. Some of our more colorful events involve children – Kids' Engineering Day, Boy Scout camps and the Palouse Discovery Center's Kids' Kitchen day – and teaching concepts through simple and fun activities that can be fun, messy and very rewarding.

Throughout the school year the Chemistry Club operates jointly as a student chapter of the American Chemical Society and receives awards based on our dedication to sharing some of the wonders of chemistry. This coming school year we have full schedule of activities and events to keep our growing number of members busy. Fun, interesting and constructive, the Chemistry Club is a great organization to spark creativity in even the most studious of dedicated chemistry-minded students.

Editor's note: Focusing exclusively on undergraduate education, Dr. Mike Finnegan is the Chemistry Club faculty advisor. Dr. Finnegan assists the Club with projects and demonstrations.

Photos from the Senior Poster Session

Senior chemistry majors present posters in Fulmer 318 prior to the close of the academic year.

Ross Overacker presents his poster to Professor Mazur

Megan Babcock presents her poster to Professor Wherland

Alumni

Dr. Robert Bianchini, Ph.D. 1985 (J. Ivan Legg mentor) is Vice President for consumer health care at Merck. He visited the department and talked to students about potential careers on August 26.

We want to hear from you! Please let us know what you're up to at chem.wsu.edu/alumnis/new.