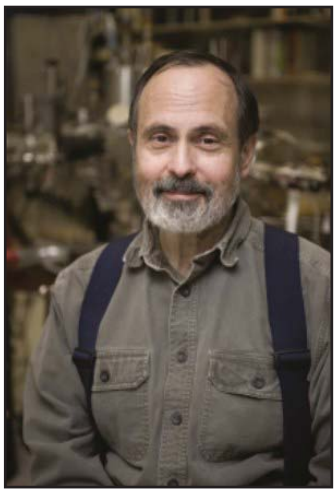
CHEMISTRY NOTATIONS

A publication of the Chemistry Department at Washington State University
2016

A MESSAGE FROM THE CHAIR

Greetings, ChemCougs! The 2015-16 academic year is over, and a new one is soon to start. We continue to add new faculty and to replace and add new staff. Reading through the pages of this newsletter will introduce you to Dr. Qiang Zhang (Assistant Professor of inorganic chemistry), Dr. Krista Nishida (Clinical Assistant Professor in general chemistry), Naomi Hyner (main stockroom), Yoshi Kodama (IT Manager), Josefina Galvan (reception), and Jennica Stiff (main office). They are all excellent additions who will make this department better.



Unfortunately, we must also say goodbye. Jane Crosby, a 40+ year staff member in the department, and wife of Professor Glenn Crosby, passed away in May of this year. I am especially saddened because Glenn was my PhD mentor and Jane was a very important part of my graduate life. More about her will be found inside.

Our search for a professor of nuclear chemistry continues. Despite our best efforts, we have not yet found the right person for the job, but the search goes on. We are hoping to be allowed also to search for a physical chemist in 2016-2017.

As you look through the pages of this newsletter, you will see that the department has been very busy and very successful at all levels. Awards for undergraduates, graduates, faculty, and staff abound. The large number of new grants only scratches the surface because there are even more three and five-year continuing grants not listed. Our efforts to bring new technology into teaching are requiring extra effort from both the faculty and staff, and I really appreciate the work that Scot Wherland, Paul Buckley, Greg Crouch, and Krista Nishida are doing to make this happen.

The Troy Hall remodel is well under way with only a few changes from our plan described last year. We will have two full floors of synthetic lab space (one for organic and one for inorganic), but to save money, the advanced lab planned for the basement has evolved into a classroom. Occupancy is now planned for May of 2017.

I took on this chairman's job in January of 2008 as an interim replacement for Sue Clark. I was then appointed by Dean Griswold to a two-year term (some in the department were worried I would do bad things), then another two-year term, and finally a full four-year term. That four-year term ends in August and I will be turning the department over to the capable hands of Professor Kirk Peterson. So this is my farewell message as Chairman. But I am not saying goodbye to the department. Over the last nine years, I have managed to keep my research program going and I look forward (as do my students) to spending more time in research. I will also be teaching a full load of graduate physical chemistry classes next year and I am eager to revisit the beauty of mathematical physical chemistry. I must admit though, it's going to be a little hard to walk away from a job I have been doing for nine years.

Best wishes,
KW Hipps, Distinguished Professor and Chair

At the Frontiers of Nanotechnology: Energy for the Future

By Dr. Ursula Mazur

How do you imagine the future of energy? Maybe you envision more nuclear power plants, only electric cars and busses traveling on roads and highways, or solar panels decorating roofs of homes and businesses. How about stacks of nanostructures built from molecules? When you consider the recent breakthroughs in nanotechnology, what once was just speculation is now becoming a reality.

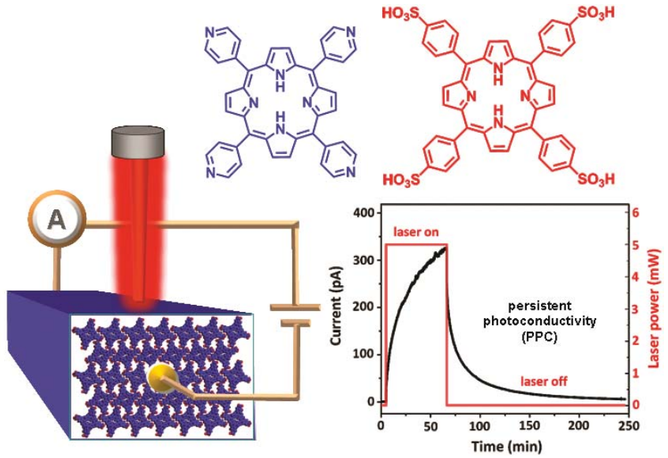


Figure 1. *Ionic porphyrins form highly ordered crystalline assemblies that are nanometer to micrometer in size. These supermolecular structures are insulating in the dark but become photoconductive when exposed to laser light.*

Here in our department, Professors K.W. Hipps and Ursula Mazur are conducting new fundamental experimental and computational studies at the nanometer, and molecular scale. These studies probe the fundamental chemical, physical, electronic, and structural properties of porphyrin multidimensional nanostructured self-assemblies fabricated from charged organic molecules. These assemblies are a novel class of porphyrin based semiconducting materials that may serve as efficient light-harvesting components for dye-sensitized solar cells and organic photovoltaics. For one member of the broad family of these structures, we have identified the molecular ordering, growth mechanism, mechanical, and photophysical properties. Our focus is on developing general structure–property relationships in order to rationally design and building high performance, stable, and durable porphyrin based devices.

Fabrication of the porphyrin supermolecular structures is relatively straightforward. In a process called ionic self-assembly, ***ISA***, ionic monomers are mixed together at a proper pH and in a matter of a few hours one obtains brightly colored highly water insoluble crystals. To control the crystal structure and the morphology in a precise and reproducible manner we have developed a very successful predictive nucleation and growth model that allows us to analytically manipulate the temperature, concentration, and the solubility of the porphyrin crystals in the solution. The resulting supermolecular assemblies possess no intermolecular covalent bonds and are held together strictly by strong electrostatic attraction, p-p interaction, and hydrogen bonding. In the crystalline solid, the porphyrin macrocycles are stacked face to face and form highly coherent columns along the long axis of the crystal (see Figure 1). Remarkably, the elastic modulus of these porphyrinic structures is comparable to that reported for covalently bonded flexible polymeric systems making them excellent candidates for flexible molecular optoelectronics.

The ISA structures we investigated thus far are n-type semiconductors and have band gaps of about 2 eV. While almost insulating in the dark the same porphyrin nanomaterials exhibit photoconductivity when exposed to light, such as the system composed of *meso*-tetra(4-pyridyl)porphyrin (TPyP) and *meso*- tetra(4-sulfonatophenyl)porphyrin (TSPP) shown in Figure 1. Theoretical calculations on the TPyP:TSPP support a conduction mechanism in which electron transport is facilitated via the π-π stacking axis of the porphyrin crystal. It turns out that by changing the intermolecular porphyrin spacing in the crystalline columns by modifying sizes and charges of the functional groups at the periphery of the porphyrin tectons we can effectively control the efficiency of carrier migration.

Some porphyrin nanostructures we studied also display persistent photoconductivity, PPC, just as the TPyP:TSPP example. PPC is a photoinduced increase in the electrical conductivity that persists after the illumination is switched off, often with very long time constants. PPC may be important for memory and sensing applications. In the TPyP:TSPP the PPC is attributed to the formation of photo-induced metastable defects. (*continued on next page*)

(*continued from previous page*) In addition to the rod-like TPyP:TSPP nanostructure, we have synthesized and are studying different ISA porphyrin crystalline assemblies shaped like rods, tubes, fibers, and even sheaves. Our research provides new insights into the fundamental understanding of the structure-morphology-mechanics-function relationships that will enable a rational design of nanostructures for a particular energy related application.■

WELCOME NEW STAFF MEMBERS

Josefina Galvan: *Office Assistant*

I recently joined the Chemistry staff in March as the new Office Assistant. My position is to coordinate departmental seminars. Although this position has grown arms and legs, I'm here at the forefront of the main office to support the students, faculty and staff. I graduated from the University of Idaho in 2007 and have lived in Moscow for 14 years. I am a former WSU employee where I had the pleasure of working under The Division of Student Affairs and The Office of Student Financial Services. I am a business owner of a local construction company alongside my husband. I enjoy traveling and spending time with my 7-year old son, my husband, our 12-year old border collie mix, and 9-month old yorkie.

Naomi Hyner: *Stockroom Attendant*

Hello Cougs. My name is Naomi Hyner, your friendly neighborhood Stockroom Attendant in the basement storeroom @ the Fulmer Bldg. I am a military brat born in Germany, raised in the US, Germany & Italy. I am tri-lingual (German, Spanish [though a little bit rusty] & Italian). Before relocating here from Nashville, TN to be closer to family, I studied and received a degree in International Marketing from MTSU/Nashville Tech & worked in the music industry as a Royalty Analyst & Income Tracker for artists (such as Madonna, Enigma, KISS, Motley Crue, Massive Attack, Red Hot Chili Peppers, etc) & songwriters under contract Sony/ATV Music Publishing. I enjoy listening to Music, practicing Muay Thai, Yoga & traveling.

Jennica Stiff: *Fiscal Technician*

As a newbie to WSU, I joined the Chemistry Department at the beginning of May and have since enjoyed getting to know the university, the department, the people, and the never-ending complexity of my new position. Aside from personnel/payroll duties, I have been granted the task of putting together the yearly newsletter, and will soon be in charge of updating the department website as well. I come equipped with a degree in Graphic Arts and a desire to never stop "growing". My ever-expanding list of interests includes a passion for animals, plants, photography, and outdoor fun. Through it all, I wouldn't be anywhere without my parents, sane without a few select friends, nor content without my #1 (Ben). In my downtime, I enjoy snuggles from my tortoiseshell-tabby (Mara) and boxer-beagle (Scout).

Yoshi Kodama: *IT Manager*

Last August, I happily joined the Department of Chemistry as the head of Information Technology. I've been an IT/IS professional for over 16 years, with experience on both WSU and UW campuses, as well as several years in the private sector.

My mission is to organize the way Chemistry handles all things IT/IS related, provide technical support and advisement for all students, researchers, and their projects, and to create increased efficiency and improve performance anywhere I can. The smiles that result from my efforts are one of my favorite metrics of success.

It's a 24/7 type of job so I don't have a lot of downtime, but when I do, I try to spend it with my loving wife, Ana (a lead teacher @ the WSU Children's Center) and my perpetually smiling three-year-old daughter, Amaiya.

Other hobbies include modifying & restoring cars, graphic design, singing/playing rhythm guitar (was in a gigging band until a few years ago), and what kind of IT person could I really be if I didn't like video games?

WELCOME NEW FACULTY

Qiang Zhang

I started my research lab in the summer of 2016. I have been working on transition metal cluster complexes for my graduate study and Metal-Organic Frameworks for my postdoc research. My research interests will focus on the integration of porous materials, mainly Metal-Organic Frameworks and Metal-Organic Polyhedra, with molecular compounds, metal cluster complexes, and nano-materials or polymers to construct novel and multifunctional hybrid materials. These materials will be extensively studied in biomimetic catalysis, photocatalysis, dye-sensitized solar cells, hydrogen production, and sensing etc. In my free time, I enjoy hiking, fishing, and playing basketball.

IN LOVING MEMORY

Dear Friends and Colleagues,

It is with great sadness that we announce the passing of Mrs. Jane Crosby, a beloved member of our chemistry community. Jane passed away in the arms of her one true love and husband of 70 years, Professor Glenn Crosby, on May 19, 2016. We offer our deepest condolences to Glenn, their daughter, Karen, son, Alan, grandchildren, and remember her late son, Brian.

Jane Crosby worked tirelessly behind the scenes as a full partner with Professor Crosby, never seeking the spotlight. Her daughter describes it best when she says, "it was always Doc and Jane". As students in the Crosby laboratory, we remember Jane as being fiercely dedicated to Science and Education. She was one-half of the Crosby team and the one that kept the entire operation running. If Doc was the Chief Science Officer, then Jane was the Chief Executive and Chief Financial Officer. She had a gift for details and she understood their importance. She could proof-read your paper from across the room and fill out your schedule a year in advance. She was a powerful force in the Crosby laboratory at WSU and someone we respected, admired, and loved.

Jane Crosby was also a gifted scientist in her own right. She graduated Magna Cum Laude as a double major in both Chemistry and Mathematics from Waynesburg University in 1950 and received the Waynesburg University distinguished alumni award in 2011. She worked as a research technician for Professor Edwin Krebs on a project, describing how reversible phosphorylation works as a switch to activate proteins. This work eventually won Dr. Krebs the Nobel Prize in Medicine. Her dedication to Chemical Education and Public Service has been recognized numerous times by the American Chemical Society (ACS), including the Prestigious ACS Parsons Award, which she received with Professor Crosby. The Crosbys have also been generous benefactors for many students seeking degrees in Science and Mathematics from WSU, Waynesburg University, and Concordia University-Irvine.

Jane Crosby will always be remembered for her honesty, loyalty, and endearing kindness. Jane was one-of-a-kind and we will deeply miss and never forget her.

J. A. Brozik (Crosby Alum, 1996)
and K. W. Hipps (Crosby Alum, 1977)
June 14, 2016

STAFF AWARDS

Debbie Arrasmith
CAS AP Outstanding Career Achievement

Debbie provides budget reconciliation and forecasting for both the department and for an extensive portfolio of pre- and post-award grant budgets. Altogether, she oversees accounting for approximately $14 million annually. She is well versed in both WSU and external agency policies, and readily guides researchers through complex reporting requirements while promptly and accurately responding to financial questions and concerns. As the unit's personnel officer, she is responsible for completing appointments for 150 faculty, staff, and graduate students, as well as numerous time slip workers. Her commitment to excellence and efficiency greatly enhances overall operations for the department and the college.

Molly Spain
CAS Civil Service Early Career Achievement

Molly is known for her outstanding customer-service focus and keen eye for detail. She is responsible for nearly 3,000 purchasing transactions annually, budget reconciliation for dozens of researchers involving more than 275 accounts, and she serves a secondary role in personnel management for approximately 200 employees. She has streamlined processes to make day-to-day ordering as easy as possible for researchers and graduate students alike. Her solution-oriented approach to finding lost packages, navigating shipping regulations, and resolving inevitable complications is highly prized by the department and central purchasing. She is a role model for productivity and we look forward to her continued success.

FACULTY AWARDS & HIGHLIGHTS

Cliff Berkman's startup company (Cancer Targeted Technology) held clinical trials in December for prostate cancer imaging. This was made possible by a $2.3 million contract from NIH. They will be evaluating and selecting one of our tumor-targeted radiotherapeutic agents over the next two years.

James Brozik was honored with the *Matteson Professor of Chemistry* award

Aurora Clark has been promoted from *Associate Professor* to *Full Professor,* effective August 16, 2016.

Greg Crouch has been promoted from *Clinical Associate Professor* to *Clinical Professor,* effective August 16, 2016

KW Hipps became a *Fellow of the American Vacuum Society (AVS)* "For pioneering work in the application of electron tunneling to the understanding of physisorbed transition metal complexes, and for the extension of these studies to quantitative kinetic and thermodynamic measurements".

KW Hipps was also honored with the *Westinghouse Distinguished Professorship in Materials Science and Engineering*

Jeffrey Jones was honored with the *Ralph G. Young Distinguished Professorship in Sciences*

Rock Mancini became the recipient of a *2016 AAI Early Career Faculty Travel Grant*

Ken Nash became an *Industrial & Engineering Fellow* by the *Industrial and Engineering Chemistry Division* of the *American Chemical Society (ACS)*

Krista Nishida has been promoted from *Instructor* to *Clinical Assistant Professor,* effective August 16, 2016

Kirk Peterson became a *Fellow of the American Physical Society (APS), Fellow of the American Chemical Society (ACS),* and *Fellow of the American Association for the Advancement of Science (AAAS)*

Nathalie Wall, in collaboration with **Don Wall,** Director of the Dodgen Nuclear Radiation Center, did such a terrific job with the Nuclear summer school in 2015 that they have been invited to host for two more years!

Kirk Peterson *CAS Excellence in Graduate Teaching*

Kirk is a gifted teacher and the department's highest rated instructor. Every year, he routinely teaches half of the graduate courses in physical chemistry, as well as several undergraduate courses. He provides critical training in fundamental concepts for a wide variety of chemists, engineers, and scientists while also maintaining an internationally recognized research program. His unique blend of energy, enthusiasm, and expert knowledge enhances student learning in the classroom and the laboratory. From thermodynamics, to quantum mechanics, to computational chemistry, students praise his engaging style, his willingness to answer questions outside of class, and his skill in presenting abstract concepts with "good ol' fashioned chalk talks."

Scot Wherland *CAS Excellence in Institutional Service*

For nearly 20 years, Scot has invested his time and his talent to advance the integrity of the University. Scot's knowledgeable faculty voice and leadership on the WSU Catalog Subcommittee has helped maintain high academic standards for new and modified courses and degrees across the institution. His extensive record includes multiple years of service on the Grade Review Board, the Faculty Hearing Panel, the University Classrooms Committee, chairman of the Academic Affairs Committee, and eight years on the University Advisory Committee on Computing and Telecommunications. Within the college and the Chemistry department, his contributions and leadership encompass committees on curriculum review, assessment, advising, faculty searches, and more.

FACULTY NEW FUNDING: AWARD TOTALS FOR CALENDAR YEAR 2015

Paul Benny: "Measuring Technetium Affinity with Magnetic Nanomaterial" $30,000

Paul Benny: "Multivalent targeted theranostic liposomes for chemo-resistant aggressive CaP" $113,250

Cliff Berkman: "Inactivating Inhibitors of Mycobacterium tuberculosis beta-lactamase BlaC" $226,500

Cliff Berkman: "MMP-14 Chimeric Ligands for Targeted Imaging of Metastatic Tumors" $164,213

Cliff Berkman: "Tunable pH – Sensitive Linker for Targeted Drug Delivery" $45,000

Jim Brozik: "Guide Star Imaging: Shedding Light On Ligand Gated Ion Channels" $175,062

Aurora Clark: "Development of Approaches to Model Excited State Charge and Energy Transfer in Solution" $105,370

Aurora Clark: "The Center for a Nanoporous Materials Genome" $87,850

Sue Clark: "Joint Appointment Agreement with PNNL and WSU" $60,000

Sue Clark: "Modern Integrated Radchem Techniques (MIRT) (HEAPA): PL13-Modern-Radchem_sepns-NDD04" $45,000

Sue Clark: "Rapid, Ligand-assisted Capillary Electrophoresis Methods for Actinide Determinations by Mass Spectrometry" $191,198

Sue Clark: "Electroanalytical Method Development to Support Post-Detonation Debris Analysis" $175,862

Brian Clowers: "Brian Clowers WSU & PNNL Joint Appointment" $26,000

Brian Clowers: "Kinetics of High Pressure Ionization Mechanisms to Enable Real-Time Ultra-Trace Detection of Organics from Environmental Matrices" $150,000

Brian Clowers: "Curriculum and Faculty Development in Technical Nuclear Forensics at Washington State University" $100,000

Brian Clowers: "Collaborative Research: RUI: Ion Mobility Spectrometry Radiative Ion-Ion Neutralization for Gas-Phase Ion Spectroscopy" $284,440

Ursula Fittschen: "On-line elemental detection in liquid-based separation techniques using X-ray fluorescence" $13,000

KW Hipps: "Acquisition of Essential Surface Analysis Instrumentation—X-ray and UV Photoelectron Spectrometers" $522,000

Herb Hill: "Correlation of Drug Recognition Expert (DRE) Evaluation with Chemical Field Analysis: The Timely Enhancement of Enforcement Capacity to Deal with Drugged Driving" $22,500

Herb Hill: "Development of a Breathalyzer for Drugged Driving" $200,000

Jeff Jones: "Understanding the Metabolic Impact of Aldehyde Oxidase on New Drug Design" $231,236

Jeff Jones: "Drug Interactions and Low-Spin Drugs" $113,000

ChulHee Kang: "Roles of calsequestrin in the control of calcium signals in health and disease" $121,891

Ken Nash: "Controlling Hexavalent Americium – A Centerpiece to a Compact Nuclear Fuel Cycle" $212,630

Ken Nash: "Automated Chromatography System for purification of new reagents for An/Ln extraction and separation" $32,925

Pete Reilly: "IBDR: Development of a Digital Ion Trap Mass Spectrometer for Resolved Mass Analysis of Intact Singly-Charged Proteins, Complexes, RNA, DNA and Viruses" $178,078

Nathalie Wall: "Technetium Management, Task 3:54042 Technetium Redox Speciation, Treatment, and Removal from LAW" $33,999

Nathalie Wall: "Determination of Thermodynamic and Kinetic Parameters for Complexation of Tc(IV) with F-, Cl -, Br-, I-, SO42- and PO43-, acetate, citrate and EDTA" $250,000

Nathalie Wall: "Nuclear Forensics Undergraduate Summer School 2015" $200,000

Nathalie Wall/Brian Clowers: "Field detection and quantification of inorganic species from surfaces" $525,000

Nathalie Wall/Ursula Fittschen: "Literature and test plan for effect of microenvironment, Ag, and Sb on radiation fields" $25,001

Nathalie Wall/Ken Nash: "Managing Zirconium Chemistry and Phase Compatibility in Combined Process Separations for Minor Actinide Partitioning" $189,583

Nathalie Wall/Pete Reilly: "Fast Ultra-Trace Detection of Fission Product Relative Isotopic Abundances" $349,444

Ming Xian: "Novel sulfide releasing agents for ischemic injury 1R01HL116571-01A1" $434,899

Choong-Shik Yoo: "High-Energy-Density Monolithic Organometallic Solids" $74,948

Choong-Shik Yoo: "Novel Low Z Extended Solids: A New Class of Energetic Materials" $454,504

Choong-Shik Yoo: "Awareness & Localization of Explosives-Related Threats ALERT, a Northeastern University & University of Rhode Island DHS Center of Excellence" $75,000

Choong-Shik Yoo: "Extreme Physics and Chemistry of Carbon: Forms, Transformations and Movements in Planetary Interiors" $44,800

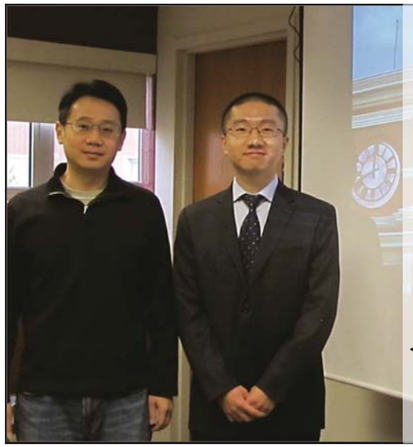
NORTHWEST CRYSTALLOGRAPHY WORKSHOP

This summer, during June 17-19, the WSU chemistry department, led by Dr. ChulHee Kang—and with considerable assistance from Office Assistant/Event Coordinator, Josefina Galvan, and the department's Assistant Director, Trent Amonett—hosted the latest edition of the Northwest Crystallography Workshop (NWCW) at Washington State University (https://chem.wsu.edu/2016-northwest-crystallography-workshop/). The NWCW has been an important gathering of the macromolecular crystallographic community in the Pacific Northwest for over twenty years, and it has a reputation as a delightfully casual opportunity for crystallographers to network.

The scientists and students—from Washington State University, University of Washington, Gonzaga University, Montana State University, University of Montana, University of British Columbia, University of California-Davis, Utah State University, Oregon State University, University of Oregon, Oregon Health Center, Fred-Hutchinson Cancer Center, and Pacific Northwest National Laboratory—participated and shared expertise on their advances as well as the challenges they have overcome or are facing.

Keynote speaker, Keith Dunker

2015-2016 GRADUATES



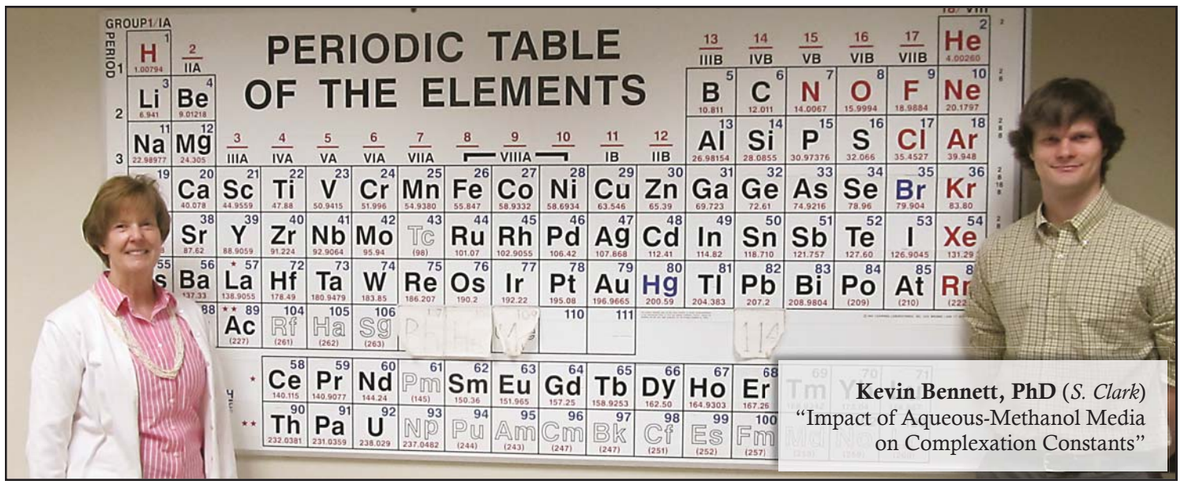
Gregory Brabeck, PhD (*Reilly*) "Precision Digital Waveform Technology in Next-generation Quadrupole Mass Spectrometers"

David Bross, PhD (*Peterson*) "Accurate Ab Initio Thermochemistry and Spectroscopy of Molecules Containing Transition Metals and Heavy Elements"

< **Bo Peng, PhD** (*Xian*) "Novel Chemistry and Chemical Tools for Hydrogen Sulfide Research"

Shalina Bottorff, PhD (*Benny*) "Ligand and Material Design for the Recovery of Transition Metals (Rh, Re and Tc) from Aqueous Solutions"

Desiree Mendes, PhD (*Berkman*) "Development of phosphoramidate inhibitors for cell surface proteases in metastatic cancers"



Kevin Bennett, PhD (*S. Clark*) "Impact of Aqueous-Methanol Media on Complexation Constants"

CONGRATULATIONS!

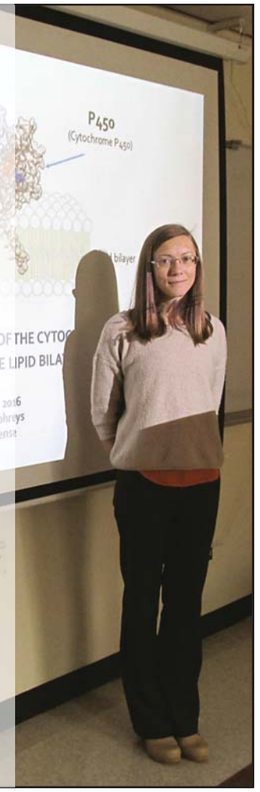
Adam Burn, PhD (*Nash*) "Fundamental studies of actinyl cation-cation interactions in mixed-solvent media"

Jonathan Geruntho, PhD (*Berkman*) Imaging and Isolation of Prostate Cancer Circulating Tumor Cells"

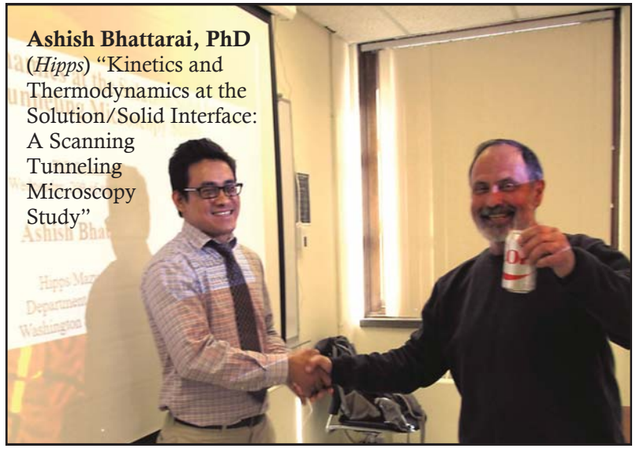
< **Brian Hauck, PhD** (*Hill*) "High Accuracy Ion Mobility Spectrometry to Reduce False Alarm Rates in National Security Technology"

Thomas Hayes, PhD (*Benny*) "Technetium-99M carbonyl complexes and new ligand development for targeted radiopharmaceuticals"

Sara Humphreys, PhD > (*Jones*) "Deconvoluting the Dance of the Cytochrome P450 Metabolon at the Lipid Bilayer"



Ashish Bhattarai, PhD (*Hipps*) "Kinetics and Thermodynamics at the Solution/Solid Interface: A Scanning Tunneling Microscopy Study"



Jessica Tufariello, PhD (*Hill*) "Development of a Breathalyzer-Ion Mobility Spectrometer for the Detection of Cannabis from Human Breath"

Ryan Joseph, PhD (*Garner*) "New Methods for the Convergent Glycoligation of Peptides"

Kevin Lewis II, PhD (*Kang*) "Calsequestrin"

Amanda Lines, PhD > (*S. Clark*) "Sensor Development for the Nuclear Fuel Cycle: Electrochemistry, Spectroelectrochemistry, Spectroscopy, and Chemometric Analysis"

Samuel Morrison, PhD (*S. Clark*) "Activation product analysis in the presence of fission products"

Mirissa Smith, MS (*Benny*)

Chelsie Beck, MS-TC (*S. Clark*)

Benjamin Rinne, MS (*Heiden*)

Stephanie Conn, MS (*Jones*)

Steven Luksic, MS-TC (*N. Wall*)

Nathaniel Murray, MS (*N. Wall*)

Riane Stene, MS (*N. Wall*)

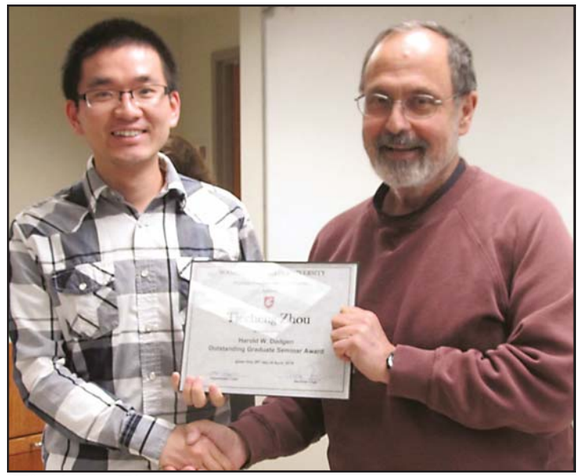
Paige Lathem, MS

Charles Murray, MS

Rocio Rodriguez, MS

STUDENT AWARDS, SCHOLARSHIPS &

Sakun Duwal (*Yoo*) was honored with the *Glenn A. Crosby Outstanding Graduate Seminar Award, Chow Endowed Fellowship, NASA Space Grant Fellowship,* and *Golding Fellowship*



Tiecheng Zhou (*A. Clark*) was awarded the *Harold W. Dodgen Outstanding Graduate Seminar Award*

Samuel Battey (*Peterson*)
- *Frank Fowler Fellowship*

Mitchell Friend (*N. Wall*)
- *Frank Fowler Fellowship*

Ashleigh Kimberlin (*Nash*)
- *Frank Fowler Fellowship*

Timothy Moural (*Kang*)
- *Frank Fowler Fellowship*

Paige Lathem
- *Frank Fowler Fellowship*
- *College of Sciences Scholarship for the Promotion of Diversity*

Carlo Barnaba (*Jones*)
- *Matteson Graduate Fellowship*

< **Bess Krahn** (*Nash*)
- *Matteson Graduate Fellowship*

Abbrey Monreal (*Berkman*)
- *Matteson Graduate Fellowship*

Brian Backer (*Berkman*)
- *Stacey Gardner Research Endowment*

Tyler Biggs (*Xian*)
- *Stacey Gardner Research Endowment*

Charlie Murray (*Garner*)
- *Stacey Gardner Research Endowment*

Erickson Paragas (*Jones*)
- *Stacey Gardner Research Endowment*

Bryan Borders (*Hipps*)
- *Crosby Graduate Scholars Endowment*

Rulin Feng (*Peterson*)
- *Harold W. Dodgen Outstanding Graduate Seminar Award (honorable mention)*

Sara Humphreys (*Jones*)
- *Ruck Graduate Fellowship*

Trevor Omoto (*N. Wall*)
- *Wagner Graduate Endowment*

Nicholas Treich (*Heiden*)
- *Frank Fowler Fellowship*

Brenda Kapingidza (*Mancini*)
- *Chemistry Abelson Fellowship*

Kelsey Morrison (*Clowers*)
- *Chemistry Abelson Fellowship*

Amanda Lines (*S. Clark*)
- *Best Research Presentation at the INMM Symposium at PNNL*

Alex McCue (*A. Clark*)
- *Glenn A. Crosby Outstanding Graduate Seminar Award (honorable mention)*

Desiree Mendes (*Berkman*)
- *William Shelton Scholarship*

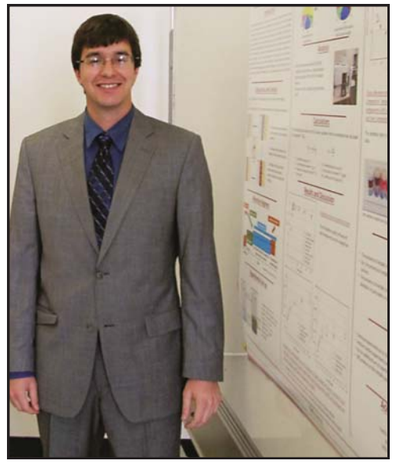
Morgan Kelley (*S. Clark/A. Clark*)
- *DOE Graduate Research Award*
- *Seaborg Summer Internship*

Amelia Silva
- *Ivan Legg Fellowship*

ACHIEVEMENTS

Brynden Riggan (N. Wall):
2016 CAS Outstanding Senior Award

Brynden Riggan and Chris Musa presented their research at the WSU Showcase for Undergraduate Research and Creative Activities (SURCA) on May 28.



Chris Musa, a senior undergrad in Nathalie Wall's group, was awarded an Honorable Mention in the Engineering and Physical Sciences category for his SURCA participation. He was recognized at the Office of Undergraduate Education Award Ceremony on April 18, 2016.

Slater Weinstock, Dr. Greg Crouch and Sophia Beyer pose for a celebratory selfie at graduation.

Graduate Chemical Society

Brian Hauck
GCS TA of the Year

"From the first day of the semester, he has attended every single lecture and taken care of the students for their various situations and needs; such as problems in login on Blackboard, learning disability, distributing handout materials, light switches on/off, screen adjustment and many others. This is not the duty of a regular TA, it just comes from his good heart."

Jessica Tufariello
GCS RA of the Year

"During the course of this work, she has been involved in the design of scientific instruments, resulting in a provisional patent. In addition, she has presented papers at international meetings in Spain and her work has been reported in the general press throughout the US. Overall, she has four publications and 13 oral and poster presentations at scientific meetings. Her best work, however, has not yet been published."

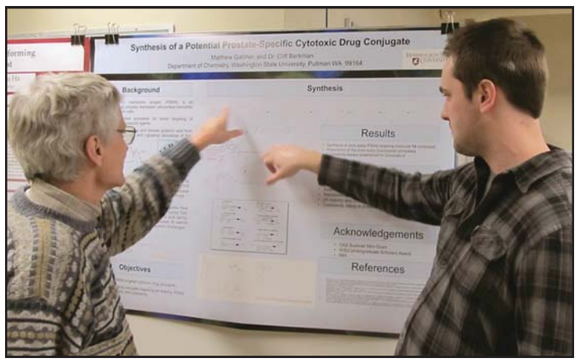
The Graduate Chemical Society (GCS)officers

2016—2017	**President:**	Kelsey Morrison (*Clowers*)
	Vice President:	Elise Held (*Peterson*)
	Treasurer:	Peyton Nosbusch (*Clowers*)
	Secretary:	Lelee Ounkham (*A. Clark*)
2015—2016	**President:**	Paige Lathem (*Heiden*)
	Vice President:	*Fall*: Chris Veldhuizen (*Wall*)
		Spring: Nicholas Treich (*Heiden*)
	Treasurer:	Kelsey Morrison (*Clowers*)
	Secretary:	Rocio Rodriguez (*Heiden*)

Departmental TA Awards

Presented by Paul Buckley for excellence in teaching in the General Chemistry Program: CHEM105, CHEM106, CHEM116

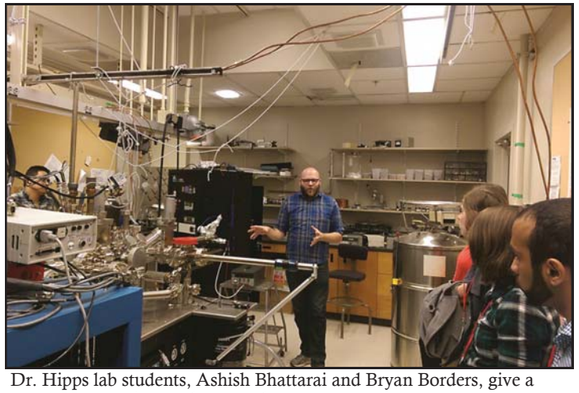
- Lyra Christianson
- Rolf Hermanson
- Nicholas Treich
- Emily Witthuhn



Dr. Scot Wherland and chemistry student, Matt Galliher, at the senior poster presentation.

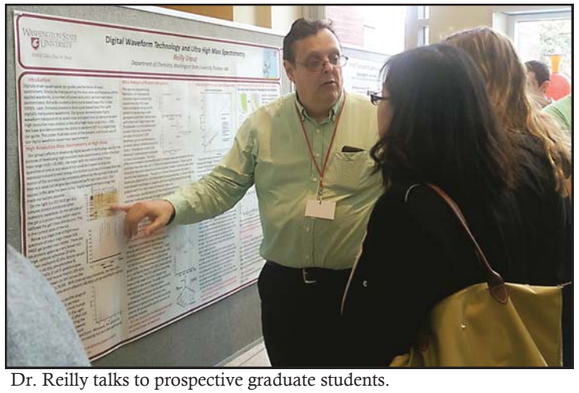
PROSPECTIVE GRADUATE STUDENT WEEKEND

Dr. Fittschen, Dr. Reilly and Dr. Clowers speak with prospective graduate students.

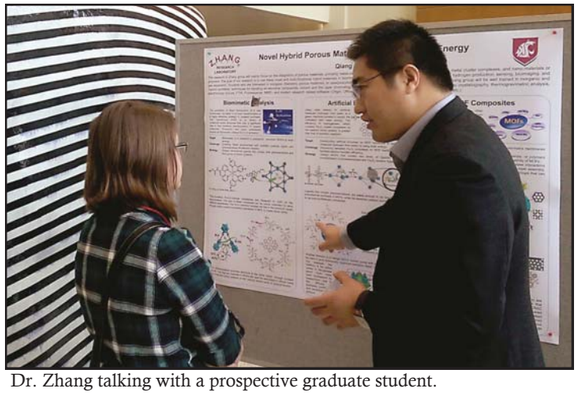


Dr. Hipps lab students, Ashish Bhattarai and Bryan Borders, give a tour to prospective graduate students.

Dr. Peterson talks to prospective graduate students.



Dr. Reilly talks to prospective graduate students.



Dr. Zhang talking with a prospective graduate student.

PHS CHEMISTRY STUDENTS VISIT WSU CHEMISTRY

Pullman High School Chemistry Honors Students Visit the Chemistry Department *by Dr. Ursula Fittschen*

In February, 40 students from Pullman High School (31 juniors, 7 sophomores and 2 seniors) came to visit the WSU Chemistry Department. Their teacher, Johanna Brown, has only been with PHS since August of 2015, but she is already highly engaged in activities like the Science Team, Knowledge Bowl Team and outreach to WSU Chemistry with her Chemistry Honors Class. From the WSU side, the outreach was initiated by Prof. Ursula Fittschen and organized substantially by Prof. Michael Finnegan and Prof. Zachary Heiden. To make the most out of the one-day visit, the day started with an experimental lecture by Prof. Finnegan and ChemClub members and was followed by a hands-on laboratory session in which students engaged in chemical experiments of their own. The day concluded with a tour of faculty laboratories where students learned about research in inorganic, organic, physical and analytical chemistry. A couple of students took the opportunity to apply for voluntary training in the summer, and we look forward to them joining us soon.

(above) Students had the opportunity to experiment on their own after a safety training session with Stockroom Manager, John Sullivan. This hands-on part of the day was supervised by WSU grad students Peyton Nosbusch, Paige Lathem, Nick Treich and Matthew Huber, with help from ChemClub students Wilson Tramel, Grirard Watson, Abi Bravo and Hannah Pulacastro.

Prof. Rock Mancini discusses a phenomenon known as the Leidenfrost Effect.

Everybody enjoyed Prof. Michael Finnegan's experimental lecture with explosions and fire.

Prof. Heiden explains inorganic synthesis.

Prof. Michael Finnegan

INS & OUTS

Getting the Lead Out *By Ryan Rice*

As of four years ago, three different experiments in the WSU General Chemistry teaching labs still used lead solutions and/or solid, elemental lead. However, starting with the Fall 2016 semester, all of our teaching labs will be lead-free. With its departure, student and staff exposure, as well as the occasional accidental release of lead down the drain, will all be eliminated.

Of the three experiments that formerly used lead, replacing it in two was easy. The first was in a relatively simple experiment that is designed to test the solubilities of various cations and anions. In this case, we replaced lead (II) nitrate with aluminum nitrate. The second experiment involves making voltaic cells (batteries) from solid metals and their associated nitrate salts. For this second experiment, solid lead and lead nitrate were replaced with iron and iron (III) nitrate respectively. Replacing lead in the second case has two other side benefits: the iron behaves more predictably than the lead did, and solid pieces of iron are much less likely to get mixed up with the other solid metals used in the experiment.

For the third experiment, a qualitative analysis of ions scheme, lead has simply been removed for now. However, we are investigating replacing it with calcium or perhaps zinc.

Dr. Michael Finnegan combines jack-o-lanterns and science during his Halloween chemistry demo.

POST GRADUATION

Mihindra Dunuwille

Mihindra Dunuwille, who was a part of Choong-Shik Yoo's group, graduated from WSU with her PhD in 2015. She recently started working as a postdoc at the University of Utah and has also been featured in an article at the ALERT (Awareness and Localization of Explosives-Related Threats) website. Mihindra's thesis at WSU, "Pressure-induced Physical and Chemical Changes of Non-conventional Energetic Materials: Nitrate, Perchlorate and Peroxide Chemistries at High Pressures and High Temperatures", involved research on explosives for ALERT with the hopes of developing new methods to lessen explosives-related threats.

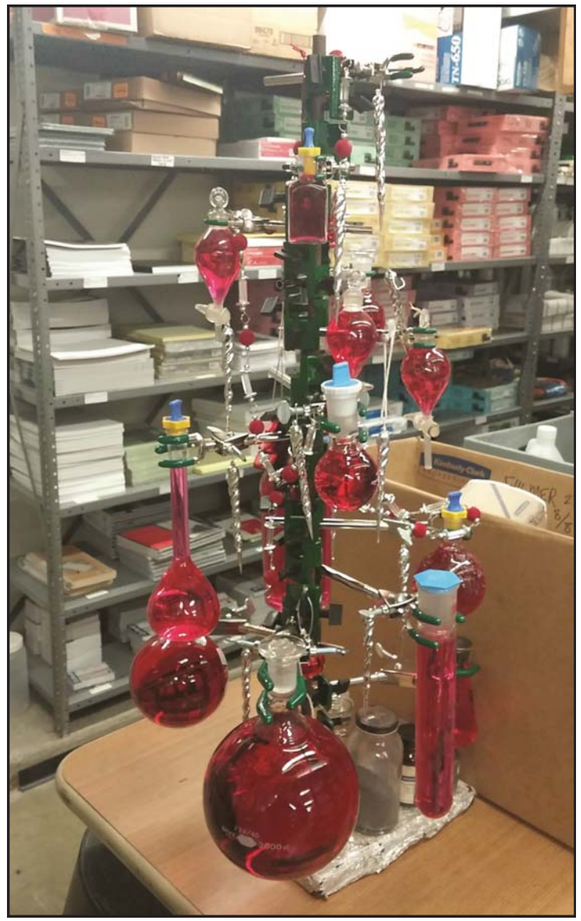
Amber Donley

Amber Donley, who was a part of Sue Clark's group and graduated with her PhD in 2014, has taken a job as a radiochemist at Exelon's Peach Bottom Power Plant in Delta, Pennsylvania. As a radiochemist, Amber is in charge of the plant's environmental and effluent monitor programs and the gamma spectroscopy/lsc instruments in the lab.

The Troy Hall renovation started in earnest in the winter of 2015, and completion is planned for April of 2017. Only the outer brick veneer is being kept, and the photo shows support structures being put in place to support the outer brick walls as inner-building infrastructure is demolished. Once complete, Troy Hall will house research labs for Drs. Ming Xian and Rock Mancini, both organic faculty, and research labs for Drs. Zach Heiden and Qiang Zhang, both inorganic faculty. The building will also support a chemistry teaching space, chemistry graduate student office space, and space for the School of the Environment.

AROUND THE DEPARTMENT (AND SUCH)

Stacie Olsen-Wilkes, Graduate Coordinator, and Lori Bruce, Principal Assistant, at the College of Arts and Sciences Awards Ceremony.



General Chemistry Instructional Lab Supervisor, Ryan Rice, and General Chemistry Instructional Coordinator, Nikki Clark.

DONOR RECOGNITION

The Department of Chemistry at WSU is proud to be among your philanthropic priorities, treasures your benevolence, and promises to steward that benevolence responsibly and gratefully. Your generosity has been instrumental as we strive to fulfill our goal to have every student leave our department with a diploma in one hand and a job offer in the other.

- Together, your gifts have allowed our students to attend national conferences, afford textbooks and supplies, and train under the top scientists in their field—nationally and internationally.
- Together, you continue to provide our students with top-notch faculty, facilities, classroom education, instrumentation, and leadership opportunities that prepare them for both personal and professional success.

Thank you so much for all that you have done.

Newsletter Note: We're planning to add an itemized donor section in future newsletters. If you'd rather not have your name mentioned, please let us know by calling 509-335-5585, or by emailing us at chemistry@wsu.edu.

Graduate and undergraduate alumni: We would love to hear from you! Please write to us at **PO Box 644630 • Pullman, WA • 99164-4630**, email us at **chemistry@wsu.edu**, and/or **Like us on Facebook** (Department of Chemistry at Washington State University) and tell us what you've been doing since graduation.

Happy (summer) Holidays from the Chemistry Department Stockroom! John Sullivan and his crew put this (left) together and aptly dubbed it the Chemist-Tree.

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INTRODUCING: CHAIRMAN KIRK PETERSON

I would like to thank Kerry for his extensive leadership and service during his tenure as Chairman over the last eight years. While Chair of Chemistry, KW was instrumental in hiring nine new tenure-track faculty members and has presided over a doubling of the graduate student population, most of this during very uncertain budgetary times. It is clear that Chemistry is one of the flagship departments at WSU in no small part due to Kerry's efforts as Chair. As I step into my new role in the department, I hope to also be an effective advocate for Chemistry. There is much to be optimistic about. For example, (i) we currently have six assistant professors at various stages of their progress towards tenure with an active search for an assistant professor in radiochemistry underway; (ii) the Troy Hall renovation is on track and will support three of our current faculty with new synthetic laboratory space; (iii) our faculty continue to be successful in winning federally-funded support for their research; and (iv) we continue to be able to recruit high-quality graduate students to maintain our current healthy population of 90-100 students. Considering the large numbers of undergraduates that also make their way through the department's classrooms each year, our faculty and staff are truly amazing. I'm looking forward to all the new successes and challenges the coming year will present.

Kirk Peterson, Professor and Chair (August 16, 2016—)

Kirk Peterson received his Ph.D. from the University of Wisconsin-Madison in 1990 where he carried out both computational and experimental spectroscopic studies of small molecular ions. He subsequently carried out postdoctoral research with Prof. Hans-Joachim Werner in Germany and then with Dr. Thom H. Dunning, Jr. at the Pacific Northwest National Laboratory. He joined the Chemistry department at WSU in 1994 as an assistant professor and was promoted to full professor in 2004. His research focuses on ab initio quantum chemistry calculations to accurately determine molecular thermodynamic and spectroscopic properties, particularly for heavy elements including lanthanides and actinides. Over the last 10 years, his group has led the development of the correlation consistent family of Gaussian basis sets. Kirk is an author and co-author of about 250 journal articles and book chapters and has been elected a Fellow of the AAAS, APS and the ACS. He received the College of Sciences Distinguished Faculty Award in 2011, was appointed as the Meyer Distinguished Professor (2011-2013) as well as the 2014 Gauss Professor by the Göttingen Academy of Sciences (Germany), and was awarded the Excellence in Graduate Teaching Award by the College of Arts and Sciences in 2016. Kirk has twice served as the Associate Chair for graduate studies in the Department of Chemistry, most recently from 2010 to 2016.