

Badger Chemist

The Newsletter of the Department of Chemistry
at the University of Wisconsin-Madison

Established 1953, No. 57, 2014



DEPARTMENT OF
Chemistry

UNIVERSITY OF WISCONSIN-MADISON

Ten People, Ten Stories

Ever since joining the faculty at the University of Wisconsin-Madison 25 years ago, one of the things that has most impressed me is the astounding variety of science, classes, and other activities that happen in our department each day. If you were to explore the Chemistry Building and talk to 10 people, each one might easily tell you a different story about an exciting new research project, a meaningful class experience, a poster or publication in progress, or a new program for students or the community.



CONTENTS

New Badger Chemists	2
Alumni News	4
Chemistry News	5
Awards and Honors	11
Features	15
Shakhashiri ACS Presidency Reflections	19
New Faculty Profile	20
ICE	21
WISL	23
In Memoriam	25
Professor Hans Reich Retirement	29

Badger Chemist is an annual publication for alumni and friends of the Department of Chemistry at the University of Wisconsin-Madison.

Executive Editor
Matt Sanders, msanders@chem.wisc.edu

Managing Editor
Libby Dowdall, ldowdall@chem.wisc.edu

Contributing Writers
Grace Pham, hpham@chem.wisc.edu
Rachel Schulze, rmschulze@chem.wisc.edu

To update your contact information, visit
ls.wisc.edu/update.html.

Please send items for *Badger Chemist* to
badgerchemist@chem.wisc.edu.

1101 University Ave., Madison, WI 53706
608.262.1483

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DEPARTMENT OF
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With this issue of the *Badger Chemist*, we aim to give you a taste of this great diversity of teaching, research, and outreach. Whether you have fond memories of learning the ins and outs of the department's chemical instruments (page 15), you want to find out the latest update on the Chemistry Building Project (page 6), you're curious what chemistry majors are learning in the lab these days (page 17), or you want to meet our newest professor (page 20) or professor emeritus (page 29), we hope these pages will help keep you informed and engaged with your many fellow *Badger Chemists*.

Finally, if we haven't seen you in a while, we'd love to catch up with you. Join us for a department reception at one of the ACS National Meetings, stop by for a visit next time you're in Madison, or attend a special event like the upcoming Reich Celebration Symposium (see page 30 for details).

With very best regards,

Robert J. McMahon
Helfaer Professor and Chair
chair@chem.wisc.edu

PS: Visit go.wisc.edu/stories to meet a few of the many unique students who help make the Department of Chemistry a great place.

New Badger Chemists

Ph.D.

DECEMBER 2012

Lisa Johnson (Gellman)

Development of Alpha/beta Peptides as Fusion Inhibitors of HIV and Agonists of Glucagon-Like Peptide-1 Receptor (GLP-1R)

Aaron Almeida (Gellman)

Insight into Protein Structure Using Parallel Beta-Sheet Model Peptides

Alexander Clemens (Burke)

Synthesis of Garner's Aldehyde and Efforts Toward the Synthesis of Tapentadol via an Asymmetric Hydroformylation/Reductive Amination Sequence

Robert Cunningham (Li)

Mass Spectrometry Applications for Comparative Proteomics and Peptidomic Discovery

Tianing Diao (Stahl)

Palladium-Catalyzed Aerobic Alpha,beta-Dehydrogenation of Carbonyl Compounds: Method Development and Mechanistic Study

Robert Sturm (Li)

Mass Spectrometry Method Development for Targeted and Discovery Neuroproteomics and Peptidomics

Craig Tainter (Skinner)

Three-Body Interactions, Structure and OH-Stretch Spectroscopy of the Water Hexamer and Amorphous Solid Water

Gene Wong (Landis)

Rhodium-Catalyzed Asymmetric Hydroformylation of Alkenes Using Diazaphospholane Ligands and Application With Wittig Olefination

MAY 2013

Michelle Benson (Hamers)

Synthesis of Stable Interfaces on SnO₂ Surfaces for Charge-Transfer Applications

Anthony Breitbach (Blackwell)

Novel Chemical- and Materials-



Based Approaches for the Control of Bacterial Biofilms

Daria Fedjukina (Cavagnero)

Role of Long-Range Interactions and Ribosomal Electrostatics In Protein Folding

Katherine Paulsen (Burstyn)

Investigating the Diverse Role of Metals in Protein Structure and Function

Emily Guinn (Record)

Developing Solutes as Quantitative Probes of Protein and Nucleic Acid Processes

Craig Gutman (Brunold)

Exploring the Mechanisms of Redox Potential Tuning and Substrate/active-Site Interactions in Iron- and Manganese-Bound Superoxide Dismutases and Synthetic Analogues

Samuel Henry (Keutsch)

A Novel Detection Method of Glyoxal and Application of Glyoxal Measurements to Studies of Photochemically Driven Atmospheric Oxidation

Samira Musah (Kiessling)

Synthetic Substrata to Instruct Human Pluripotent Stem Cell Fate: From Novel Ligands to Functional Biomaterials

Amelia Peterson (Coon)

Application of the Orbitrap Mass Analyzer to Targeted Proteomics and Gas Chromatography/Mass Spectrometry of Small Molecules

Roberto Risi (Burke)

Development and Applications of Asymmetric Hydroformylation Tandem Reactions: The Total Syntheses of (+)-Patulolide C, (-)-Pyrenophorol, (+)-Decaerectricine L and (+)-Prelog-Djerassi Lactone

Danielle Stacy (Blackwell)

Design, Synthesis, and Biological Evaluation of Small Molecule and Peptide Quorum Sensing Modulators

Kevin Williamson (Yoon)

Regio- and Stereoselective Oxyamination of Olefins with N-Sulfonyl Oxaziridines

AUGUST 2013

Adam Dunkelberger (Crim)

Photoisomerization Dynamics of Candidate Molecules for Vibrational Control Experiments

Emily Dunkelberger (Zanni)

Using Two-Dimensional Infrared Spectroscopy as a Tool for Studying Amyloid and Membrane Proteins

Puja Goyal (Cui)

The Proton Pumping Mechanism of

Cytochrome c Oxidase: Insights from QM/MM Simulations

Kristy Kounovsky-Shafer (Schwartz)
Development of Nanoconfinement Systems for Genomic Analysis

Dongxu Shu (Tang)
Rhodium and Platinum Catalyzed Cycloadditions from Propargylic Esters and Ethers

Nicole Woodards (Li)
Mass Spectral Analysis of Crustacean Signaling Peptides Using a Multi-Dimensional Strategy

Justin Wiens (Nathanson)
The Chemistry of Solvated Electrons at the Vacuum–Glycerol Interface

Joseph Yeager (Hammers)
Surface Chemistry of Silicon Anodes for Next-Generation Lithium and Lithium-Ion Batteries

Kuang Yu (Schmidt)
First Principles Studies of Gas Adsorption in Metal Organic Frameworks

B.S. and B.A.

DECEMBER 2012

Hinrichs, Gergana I.
Izhar, Izarin Izmir Bin
Meinig, Arthur Joshua
Sesing, Nicholas R.
Shin, Sanghun
Steinhoff, Nicholas Charles
Weis, Matthew Anthony

MAY 2013

Alexander III, Robert Charles
Bean, Jero M.
Burchardt, Kaitlyn Henrietta
Cai, Wenting
Chew, Kit Shawn
Chow, Clara Chiting
Cleland, Spencer Carl
Conway, Caitlin Ann
DeBoth, Gwendolyn Annette
DeCloux, Kyle Steven
Degregorio, Zachary Patrick
Derus, Tyler Stephen
Drake, Ryan James
Frankiewicz, Amanda Rae
He, Shushan
Heitkamp, Claire Olivia
Hetue, Robert Gregory

Hynes, Kieran Andrew
Jones, Amy Elizabeth
Kammerer, Bradley William
Kerlin, Kelly Jean
Kim, Yuyong
Kotecki, Shawn Thomas
Kwiatkowski, Anthony Carl
Lauder, Travis Beck
Leskinen, Heather Lee
Mehan, Alexandra Christina
Melcher, August Michael
Moua, James
Niemeyer, Zachary Louis
Plant, Isaac Nathan
Ristow, Jacob Jeffrey
Russell, Damian Simon
Sauter, Mark S.
Schellenberg, Jonathan Tomsic
Snyder, Gretchen Ann
Syed, Anoushka Nadeem
Urbain, Lucas T.
Veldre, Kiley Marie
Walters, Megan Marie
Wiensch, Eric Michael
Wood, Emily Rose
Yang, Tzuhsiung

AUGUST 2013

Karraker, Sara Nicole
Menden, Patrick Robert
Porubsky, Nicholas James

Stay in Touch with Your Fellow Badger Chemists

Find out news about the department and upcoming alumni events by signing up for Chemistry Alumni E-News. Visit go.wisc.edu/alumnieneews to sign up today!

Connect with fellow alumni by joining our Department of Chemistry Alumni group on LinkedIn by visiting go.wisc.edu/chemalumni.

Find us on Facebook: facebook.com/UWMadisonChem
Follow us on Twitter: twitter.com/UWMadisonChem



Alumni News



Reich Group Reunites at ACS Meeting to Honor Reich's 70th Birthday

Professor **Hans Reich** and past Reich group members met for dinner at a recent ACS National Meeting to celebrate the occasion of Reich's 70th birthday. In attendance were (from left to right in photo above) Marty Cohen (Ph.D. '79), Nathan Haese (Ph.D. '80, Woods), Ieva Reich, Martha Kelly (Ph.D. '83), Robert Dykstra (Ph.D. '93), Sue Wollowitz (Ph.D. '80), Steve Peake (Ph.D. '79), Amanda Jones (Ph.D. '07), and Hans Reich.

ACS Honors Djerassi at National Meeting

A special event at the 246th National Meeting of the American Chemical Society (ACS) honored alumnus **Carl Djerassi** (Ph.D. '45, Wilds). Titled "The Last 25 Years of Carl Djerassi – Beyond Chemistry: Drama, Fiction, Poetry, Short Story, and Autobiography," the celebration honored Djerassi on the occasion of his 90th birthday. In 1951, Djerassi and his colleagues synthesized a steroid hormone that was the basis for the first oral contraceptive pill. He later served as a professor of chemistry at Stanford University and was named professor emeritus in 2002. In 2012, he received a Distinguished Alumni Award from the Wisconsin Alumni Association.

Robert Bergman (Ph.D. '66, Berson) received a University of California, Berkeley Distinguished Graduate Student Mentoring Award for Senior Faculty in 2013. The Distinguished Graduate Student Mentoring Awards recognize Berkeley faculty for their vital roles in mentoring graduate students and training future faculty. Bergman has guided approximately 270 graduate students and postdoctoral fellows through the rigors of their academic programs and provides advice and support throughout their careers.

Michelle Buchanan (Ph.D. '78, Taylor) and **A.C. Buchanan III** (Ph.D. '78, West) returned to Madison in the fall to attend a thesis defense for their daughter, **Lauren**



Buchanan (Ph.D. '13, Zanni), a second-generation UW-Madison chemistry graduate student (see photo above).

Leslie Klevay (B.S. '56) has received the Medical Alumni Citation Award from the UW-Madison School of Medicine and Public Health in recognition of his distinguished achievements in medical practice, academics, and research. Klevay is published widely on the health benefits of dietary copper.

In the fall, **Michael Konopka** (Ph.D. '06, Weisshaar) became an assistant professor of chemistry at the University of Akron. He previously served as a postdoc in Professor Mary Lidstrom's lab at the University of Washington.

In 2013, **Timothy Lodge** (Ph.D. '80, Schrag) was named a Regents Professor by the University of Minnesota Board of Regents. This designation is the highest level of recognition given to faculty members at the university. He is a professor in the College of Science & Engineering's Department of Chemistry and the Department of Chemical Engineering and Materials Science. Lodge is a polymer scientist who has taught at the University of Minnesota for three decades.

In the fall, **Kevin Metz** (Ph.D. '07, Hamers) was awarded tenure and promoted to associate professor at Albion College.

In 1993, **Frank Silver** (Ph.D. '70, Whitlock) retired from managing R&D at Monsanto; he then retired as president of Silver Consultants International in 2004. In 2013, he began his third career as vice chair of the board with startup company Prometheon Pharma, which is working to gain FDA approval for an insulin patch.

Jack Simons (Ph.D. '70, Harriman) of the University of Utah received the 2013-14 Hirschfelder Prize in Theoretical Chemistry. Simons is an expert on the electronic structure of negative ions. As the Hirschfelder lecturer, he visited Madison and gave three insightful talks on negative ions, damage and repair of DNA, and mass spectrometry of proteins.

Chemistry News



Genomic Scientists Host NIH Conferences at UW-Madison

UW-Madison's National Human Genome Research Institute, which supports the research of several faculty members in the Department of Chemistry, hosted two conferences on the Madison campus in October. The first was a general meeting of National Institutes of Health (NIH) Diversity Action Plan (DAP) participants and T32 (Training Grant) trainees. Professor **David Schwartz** gave the welcome address, and faculty, students, and staff from UW-Madison and other institutions presented talks. Members of NIH's Centers of Excellence in Genomic Science (CEGS) attended the second portion of the conference, and Professor **Lloyd Smith** gave the welcome remarks (see photo above). Although NIH staff members were unable to attend both meetings due to the timing of the federal government shutdown, NIH played a key role in coordinating the events. The CEGS conference drew more than 65 participants.

Professor Bert Meijer Gives 2013 Ferry Lectures

In November, the department welcomed Professor E.W. "Bert" Meijer to campus as the 2013 Ferry Lecturer. Meijer is a professor of organic chemistry and molecular sciences at the Eindhoven University of Technology (Netherlands) and scientific director of the Institute for Complex Molecular Systems. The John D. Ferry Lectures in Macromolecular Science were established in honor of Ferry through generous gifts from his former students and associates. Ferry was a professor at UW-Madison from 1946 to 1982; his research dealt with the mechanical properties of polymers. To watch a video of Meijer's first lecture, "From Macromolecules to Supramolecular Polymers," visit go.wisc.edu/macromolecules; to watch his second lecture, "Mastering Complexity: Non-covalent Synthesis of Functional Supramolecular Systems," visit go.wisc.edu/complexity.



Photo courtesy of Center for Sustainable Nanotechnology

Sustainable Nano Blog Makes Nanotechnology Fun and Accessible

The Sustainable Nano blog, created by Professors **Robert Hamers** and **Joel Pedersen** as part of the Center for Sustainable Nanotechnology, provides a venue for UW-Madison scientists and their collaborators to communicate directly with the public about science. Hamers serves as lead investigator for the multi-institution center, which is funded by the National Science Foundation. Professors, graduate students, and postdoctoral fellows affiliated with the center regularly contribute posts to the blog. The scientists are experts in the fields of nanomaterial synthesis, characterization, toxicology, environmental chemistry, and spectroscopy. As public excitement and concern about the potential of nanomaterials grows, so too does the need to accurately portray the status of the science. What is possible? What do we know? How do we know it? The Sustainable Nano blog provides accurate and approachable answers to these questions. It also allows the next generation of scientists to gain experience communicating with a lay audience. Visit sustainablenano.wordpress.com to read the latest posts.

Fall Semester Brings Professor Christian Hackenberger as Latest Goering Visiting Professor

During the fall semester, Professor Christian Hackenberger of Freie Universität Berlin visited Madison as the Harlan and Margaret Goering Visiting Professor of Organic Chemistry. For more than 50 years, the department has had a tradition of hosting rising young European scholars, often from Germany. During his or her semester in residence, the visiting professor usually teaches one of the large undergraduate organic chemistry courses. Professor Harlan Goering was a long-time faculty member at UW-Madison who died in 1997, and the Goerings endowed this visiting professorship. To see a full list of past Goering visiting professors, visit go.wisc.edu/goering.

Chemistry Building Project Moves Toward Design Phase

In March 2013, the State of Wisconsin Building Commission voted to recommend that UW-Madison move forward with the design phase of the chemistry instructional building project. Although this recommendation does not include a formal commitment to fund the \$103.5 million project, it does reflect the expectation that the Commission will fund the project in the next biennial budget (for 2015-17). The Department of Chemistry is currently working with UW-Madison Facilities Planning & Management to submit a request to hire a design consultant. Once the selection process is completed, design of the building will begin in earnest. The design phase will take 18 to 24 months.

Staff Additions and Moves

We have welcomed several new employees to the department recently: **Jan Anderson**, administrative assistant for ICE; **Nick Jaeger**, director of development

(UW Foundation); **Sara Kobilka**, outreach specialist for ICE; **Steve Myers**, Instrument Shop supervisor; **Avelino Pontes**, accounts payable; **Kristine Turkow**, Kiessling group administrative specialist; **Heather Turner**, undergraduate chemistry specialist; **Mary Weidner**, post-award grants specialist; **Jim Zernicke**, research stockroom manager; **Lingchao Zhu**, Chemistry Instrument Center instrumentation technologist. We are also pleased to announce that **Rachel Bain** has transitioned from her previous role as faculty assistant to a new role as instructional technology specialist.

Staff Retirement

Sharon Mulvey, who served as head of the Chemistry Library for the last 23 years, retired in early 2014.

Faculty Promotions

The faculty promoted **Song Jin** and **Tehshik Yoon** from associate professor to full professor this year. Research in the

News from the Molecular Structure Laboratory

Dr. **Iliia Guzei** was selected as a 2013 U.S. IUPAC Young Observer for the IUPAC General Assembly and Congress in Istanbul, Turkey, which took place in August. He used this opportunity to learn more about the organization, make new connections, and participate in the World Chemistry Leadership Meeting. In September, Guzei organized the biennial crystallographic meeting of the Bruker users in Madison. In addition to students and faculty from Departments of Chemistry, Biochemistry, and Bacteriology, the meeting attracted researchers from six countries and 16 states.

This year has been declared the International Year of Crystallography by the General Assembly of the United Nations. This marks the centennial of X-ray diffraction, which made detailed studies of crystalline materials possible. It is also the 400th anniversary of Kepler's observation in 1611 of the symmetrical form of ice crystals, which resulted in the growth of appreciation of symmetry in matter. Over the last century crystallography has become the core structural science that has enabled scientists to study the atomic structure of compounds and the

chemical bond, establish the structure of DNA, show how proteins are created in cells, and design new materials and pharmaceuticals. It is now at the center of advances in many fields of science. The American Crystallographic Association hopes scientists and the public will become excited about crystallography this year. A description of international activities is available at iycr2014.org.

To celebrate the International Year of Crystallography, the Molecular Structure Laboratory has launched the first crystal-growing competition among Wisconsin high school students, homeschool students, and science teachers. This is an exciting scientific competition as well as a fun, hands-on experience for science classes. More information is available at xray.chem.wisc.edu/WICGC.html.



Jin group focuses on solar energy and nanoscience, while the Yoon group investigates organic synthesis and photocatalysis.

Faculty News

Professor **Mark Ediger** was on sabbatical last spring and spent two months at the School of Chemistry at the University of Sydney (Australia). He also gave invited talks at conferences in France, Spain, Germany, and Canada, in addition to serving as chair of the Liquids Gordon Conference. Ediger sends his thanks to his former students who supported graduate student participation at the conference.

Professor **Pupa Gilbert** won the first prize and People's Choice awards in the photography category of the 2012 NSF International Science and Engineering Visualization Challenge. To see her prize-winning image "Biomineral Single Crystals," visit go.wisc.edu/biomineral. The Gilbert group also solved the structure of vaterite, which had long been a mystery. Learn more about their findings at go.wisc.edu/vaterite.

For Professor **Robert McMahon**, the highlight of the year was an invitation to present the inaugural Chapman Lecture at the University of California, Los Angeles. McMahon also spoke during the Zimmerman Memorial Session of the Inter-American Photochemical Society Meeting in Sarasota, Fla., where he visited with many department alumni. He traveled to conferences and meetings in Hawaii, Colorado, the Netherlands, Germany, Denmark, and Finland. McMahon continues to serve as associate editor of the *Journal of Organic Chemistry*, and he spoke at the recent JOC Editor's Symposium. He is a member of the International Organizing Committee, Symposia on Matrix Isolation Spectroscopy and Low-Temperature Chemistry, and a member of the governing board of the International Symposia on Reactive Intermediates.

In October, Professor **John Moore** delivered the 14th annual Kolb Lecture at Bradley University, a singular honor given the presence of several Nobel laureates among the lecturers. With able assistance from Elizabeth Moore, he managed a complete revision (not the usual three-year update) of his general chemistry textbook, "Chemistry: The Molecular Science." This year, he will develop many new multimedia learning tools to accompany this new edition. Moore also gave an invited lecture at the ACS Symposium honoring his co-author, Conrad Stanitski, on the occasion of Stanitski's receiving the ACS George C. Pimentel Award in Chemical Education.

In September, Professor **Hans Reich** attended the International Conference on Carbanion Chemistry in Kyoto, Japan; he hosted this conference in Madison in 2007.

Professor **Robert Hamers** has given invited talks this year in Singapore, Japan, and Switzerland. Silatronix, a company he



co-founded with Professor Emeritus Robert West, now has 15 full-time employees and is making inroads in the international community. His battery research also continues to expand, and Hamers is working with Professor Mahesh Mahanthappa and others on a five-year project sponsored by Dow Chemical Company to help develop next-generation cathode materials.

For 10 years, Professor Emeritus **Edwin Vedejs** has been traveling to Riga, Latvia to teach. This year, Martha Casey and Professor Emeritus **Charles Casey** met Vedejs in Riga; the photo above shows the professors emeriti in front of a sculpture of the mirror images of bromo succinic acid that commemorates Latvian chemist Paul Walden's discovery of inversion of configuration in substitution reactions.

In 2012, Professor Emeritus **Robert West** attended the Asian Silicon Symposium in Tsukuba, Japan, where he gave a plenary lecture and a brief talk at the banquet. Also that year, West and his postdoctoral associate, Kerim Samedov, carried samples from Germany, Israel, and the U.S. for muon spin resonance research at the TRIUMF cyclotron in Vancouver, Canada. West gave a lecture at the North American Silicon Symposium in Lubbock, Texas in May then lectured on muon spin resonance at the International Ge-Sn-Pb Conference in Nova Scotia, Canada in July. In September he returned to Vancouver to run samples in the cyclotron for 10 days on his way to Yonsei University in South Korea, where he is a distinguished visiting professor. While at Yonsei he worked with doctoral students, taught a class, gave lectures, and delivered a paper at the Korean Silicon Symposium in Seoul. In November, West went to Israel to complete another three-year contract between the Israeli and U.S. governments.

Professor Emeritus **Lawrence Dahl** continues to be active in teaching and research. Last spring, he again taught chemical crystallography with Dr. Ilia Guzei. With Dr. Evgueni Mednikov, he is active in research, primarily in the preparation and physical/chemical characterization of new nanosized homo/hetero-metallic CO/PR₃-ligated palladium clusters. His last student, Jeremiah Erickson, finished his doctorate last summer.

News from the Demo Lab

This year, the Demo Lab set up and performed more than 3,000 lecture experiments and continues to be involved in introducing new learning techniques into the chemistry curriculum. For example, more than 3,000 students used iClicker interactive classroom technology this fall, for everything from attendance to concept tests to group activities. The Demo Lab also supported a host of demos for the public, like the Wisconsin Science Festival, College for Kids, and Professor Bassam Shkhashiri's annual Fourth of July fireworks show and holiday demo show.



Lecture Demonstrator Jim Maynard gives a demo at the UW-Madison All-Campus Party in April.

Additionally, Lecture Demonstrator **Jim Maynard** has been awarded a UW-Madison Educational Innovation grant that will allow the department to experiment with blended learning techniques such as video lectures. Professors Helen Blackwell and Steven Burke are currently engaged in this venture, although additional faculty will most certainly be involved in order to help complete the work included in the proposal.

News from the Glass Shop

At this year's American Scientific Glassblowers Symposium, **Tracy Drier**, master scientific glassblower, presented a poster titled "Handle with Care: 19th Century Invertebrate Models in the 21st Century," a collaboration with Dr. Ilia Guzei, director of the Molecular Structure Laboratory, and Laura Halverson Monahan, curator of UW-Madison's Zoological Museum.

Last spring, Drier exhibited a complete Wisconsin Schlenk line in the Vital Skills exhibition at the Overture Center for the Arts' James Watrous Gallery. He also gave demonstrations at the Madison Children's Museum, the Neon and Light Exhibition, and the Wisconsin Science Festival, and also at various local schools.



Graduate students Wes Brogden (Berry) and Veronica Berns (Fredrickson) work on pieces for the department's annual Partners in Giving auction.

Each year, the department hosts a silent auction to benefit the statewide Partners in Giving campaign. The Glass Shop hosted two after-hours glassblowing sessions to allow graduate students who have taken the glassblowing class time to create glass pieces for the auction.

In March, Drier will again partner with Guzei and Monahan to participate in a spring Round Table Lunch Series presentation on the glass invertebrate models of Leopold and Rudolph Blaschka; the models will also be evaluated by a conservator from the Corning Museum of Glass this year. With this evaluation they will have a better understanding of the models' current condition and what it might cost to conserve or restore the models. Monahan will give a public lecture on the Blaschkas and this evaluation on April 10 at the Chazen Museum of Art.

Wright Symposium at SciX Conference

In honor of Professor John Wright's 70th birthday, Wei Zhao, a former Wright group postdoc, and Junrong Zheng organized a special symposium on Coherent Multidimensional Spectroscopy (CMDS) at the 2013 SciX conference in Milwaukee, Wis. They also compiled a special Professor John C. Wright *Festschrift* issue of the *Journal of Physical Chemistry A* (Vol. 117) in which more than 50 research groups from around the world contributed papers devoted to the CMDS field Wright initiated. All of

Wright's current graduate students, 11 of his former graduate students, and 12 of his CMDS colleagues from around the world participated in the symposium. Speakers included Professor John Asbury, Professor Alex Benderskii, Professor Mark Berg, Professor David Blank, Professor Peter Chen, Professor Minh Cho, Professor Greg Engel, Professor Nien Hui Ge, Professor David Jonas, Tom McDonough, Professor Igor Rubtsov, Professor Martin Zanni, and Junrong Zheng.

The SciX festivities included a reception before the symposium, the symposium itself, and a birthday dinner at Safe House, a spy-themed restaurant in Milwaukee. Wright says the reception was especially meaningful in that it allowed him to reconnect with his former graduate students. "What started as a foreboding year ended as one of the most memorable," he says.

Most symposium participants are featured in the photo above. From left to right: Professor Lei Geng (postdoc, '94-95); Professor David Thompson (Ph.D. '98); Rob Lascola (Ph.D. '98); Eric Hagee (current graduate student); Nathan Neff-Mallon (current graduate student); Kyle Czech (current graduate student); Professor Peter Chen (Ph.D. '92); Erin Boyle (current graduate student); Blaise Thompson (current graduate student); Dr. Andrei Pakoulev (assistant scientist); Professor John Wright; Dawna Wright; Eve Garty; Dr. Dinh Nguyen (Ph.D. '84); Michael Riebe (Ph.D. '87); Brad Price (Ph.D. '90); Forest Garty; Kate Kornau (Ph.D. '09); Carol Wright; Matthew Rowley (current graduate student); Daniel Kohler (current graduate student); Professor Wei Zhao (postdoc, '97-99); Kathy Cirillo-Penn (Ph.D. '89); Professor James Hamilton (Ph.D. '94); Junrong Zheng; John Wietfeldt (Ph.D. '85); Professor Alex Benderskii.



Dahl Marks 60 Years with Triiron Dodecacarbonyl

Professor Emeritus Lawrence Dahl recently co-authored "Sixty-Year Saga (1952–2013) of the Solid-State Structure of Triiron Dodecacarbonyl" with Chuck Campana (Bruker AXS), Dr. Ilia Guzei, and Dr. Evgenii Mednikov. The paper was published in the 2014 Silver Anniversary issue of the *Journal of Cluster Science*. In addition to presenting recent results of a low-temperature (100 K) crystallographic analysis of $\text{Fe}_3(\text{CO})_{12}$ to examine its temperature-dependent structural variations, the paper reflects upon Dahl's early research career, beginning in the BCD days (before computers/diffractometers) as a graduate student (1951–56) under the late R. E. Rundle at Iowa State, and then as a young faculty member at UW–Madison. From other experimental measurements and theoretical analyses, an informative

perspective of facts, speculations, and controversies concerning the dynamic/fluxional geometrical behavior of $\text{Fe}_3(\text{CO})_{12}$ and closely related analogues in the solid state and in solution is given. The article includes a painting of $\text{Fe}_3(\text{CO})_{12}$ by chemist Dr. Grant D. Venerable II, presented to Dahl by Venerable during the Chicago ACS meeting in 1967, that depicts the solid-state structure of $\text{Fe}_3(\text{CO})_{12}$ at room temperature reported by Wei and Dahl in 1966 from an X-ray film diffraction study. The observed six-prong Star of David illustrates the centrosymmetric crystal disorder giving rise to a hexagon of half-iron atoms.



Zanni and Collaborators Re-examine Amylin Proteins

Without insulin, hungry cells can't tap sugar in the bloodstream for energy, and high blood sugar levels cause type 2 diabetes and its complications — stroke, nerve damage, and kidney disease among them. Animal species that don't get type 2 diabetes find a way to keep plaque from forming in their pancreas and disrupting insulin production. Describing how their amylin proteins differ may provide a target for new treatments for diabetes and other plaque-involved disease such as Alzheimer's and Parkinson's. A study published by Zanni and collaborators paints that target on small clumps of mis-folding proteins in the middle of the plaque formation process. Using a technique called two-dimensional infrared spectroscopy developed in Zanni's lab, the new study provides the first picture containing specific details of what the intermediate clumps look like. – *Chris Barncard, University Communications*

>> [READ MORE at go.wisc.edu/amylin](http://go.wisc.edu/amylin)

Computations Help Berry Group Create a Stable Intermediate

Rhodium is a powerful catalyst but also one of the rarest and most expensive. Chemists' efforts to study the inner workings of dirhodium metal complex reactions have been hindered by their extreme efficiency and speed. Now, a team of scientists led by Professor John Berry reports an advance that freezes one step of the process long enough to offer researchers a glimpse into the finer mechanism. Chemical reactions pass through a series of steps from starting material to end product, with intermediate chemical structures formed at each step. Intermediates can tell chemists a great deal about the processes and their efficiency; however, intermediates normally exist for a second or less, making them extremely difficult to study. In a recent paper, Berry and collaborators describe the isolation and characterization of an intermediate that is stable for hours at 0 degrees Celsius. – *Jill Sakai, University Communications, and Grace Pham*

>> [READ MORE at go.wisc.edu/intermediate](http://go.wisc.edu/intermediate)

Keutsch Group Participates in Atmospheric Science Field Campaigns in Europe and U.S.

Last summer, several members of the Keutsch Group conducted field research across Central and Northern Europe and the Southeastern U.S. They collaborated with the Pan-European Gas-Aerosol-Climate Interaction Study (PEGASOS) and the Southeast Atmosphere Study (SAS). The Keutsch group spent three months continuing their participation as the only U.S.-based group invited to participate in the Zeppelin component of PEGASOS, this time exploring the chemistry of pollution formation from Southern Germany all the way to rural Finland. Group members and instruments also participated in one of the largest U.S. field campaigns aimed at dissecting anthropogenic influence on pollution formation and the coupling of these processes with climate. Keutsch Group students conducted measurements both on the ground in rural Alabama and on a P-3 "Hurricane Hunter" aircraft owned by the National Oceanic and Atmospheric Administration (NOAA).

>> [READ MORE at go.wisc.edu/keutsch](http://go.wisc.edu/keutsch)

Jin and Colleagues Work Toward Hydrogen Fuel

Theoretically, hydrogen is the ultimate non-carbon, non-polluting fuel for storing intermittent energy from the wind or sun. When burned for energy, hydrogen produces water but not carbon dioxide. Practically speaking, producing hydrogen from water, and then storing and using the gas, have proven difficult. In a recent paper, Professor Song Jin and colleagues introduce a new catalyst structure that can facilitate the use of electricity to produce hydrogen gas from water. Significantly, the catalyst avoids the rare, expensive metal platinum that is normally required for this reaction. The material under study, molybdenum disulfide, contains two common elements. "Most people have tried to reduce the cost of the catalyst by making small particles that use less platinum, but here we got rid of the platinum altogether and still got reasonably high performance," says Mark Lukowski, a doctoral student in the Jin group. – *David Tenenbaum, University Communications*

>> [READ MORE at go.wisc.edu/hydrogen](http://go.wisc.edu/hydrogen)

Awards and Honors



New ACS fellow Ieva Reich with Professor Bassam Shkhashiri



Professor Mark Ediger receives the Hildebrand Award

FACULTY AND STAFF

Professor **Tehshik Yoon** was among the 338 individuals who were elected fellows of the American Association for the Advancement of Science (AAAS). Yoon was recognized “for the discovery of novel, useful, and fundamentally interesting methods to mediate chemical transformations.”

In July, **Ieva Reich**, lecturer emerita, was named a fellow of the American Chemical Society. Other new fellows with ties to the department include alumni **A.C. Buchanan III** (Ph.D. '78, West), **Peter Dorhout** (Ph.D. '89, Ellis), and **Mary Jane Shultz** (B.S. '70). Reich is shown above with Professor Bassam Shkhashiri, past president of the ACS.

At the 247th ACS National Meeting in Dallas, Professors **Samuel Gellman** and **Laura Kiessling** will each receive an ACS award recognizing contributions they have made to their respective fields. Gellman will receive the Ronald Breslow Award for Achievement in Biomimetic Chemistry. Kiessling will receive the Alfred Bader Award in Bioinorganic or Bioorganic Chemistry.

In April, at the ACS meeting in New Orleans, Professor **Mark Ediger** received the Joel Henry Hildebrand Award in the Experimental and Theoretical Chemistry of Liquids. He is shown receiving the award in the photo above.

Professor **Bassam Shkhashiri** received the 2013 Carl Sagan Award for Public Understanding of Science. He also was named a “Friend of Education” by the Wisconsin Department of Public Instruction.

The ACS Division of Polymer Chemistry has awarded Professor **David Lynn** the 2013 Biomacromolecules/Macromolecules Young Investigator Award.

Professor **Laura Kiessling** presented at the 8th annual Dorothy Crowfoot Hodgkin Symposium. At the event, Kiessling was awarded the Hofmann medal in recognition of her outstanding career.

At the 23rd American Peptide Symposium, the Makineni Lectureship was awarded to Professor **Samuel Gellman**. The award recognizes an individual who has made a “recent contribution of unusual merit to research in the field of peptide science.”

The Royal Society of Chemistry awarded Professor **Ronald Raines** the 2013 Jeremy Knowles Award. The award recognizes and promotes the “importance of inter- and multi-disciplinary research between chemistry and the life sciences.”

Last spring, Professor **James Skinner** delivered the E. U. Condon Lecture at the University of Colorado-Boulder, the Priestley Lecture at Pennsylvania State University, the Vasser Wooley Distinguished Lecture at Georgia Institute of Technology, and the Ralph and Lucy Hirschmann Lectures at the University of Pennsylvania.

Professor **Jennifer Schomaker** received a 2013 Alfred P. Sloan Research Foundation Fellowship. She also received a five-year Faculty Early Career Development (CAREER) Award from NSF and a Rising Star Award from the ACS Women Chemists Committee (WCC); she will present her research at the WCC symposium at the ACS National Meeting in Dallas.

Professor **Randall Goldsmith** received a five-year CAREER Award from the NSF Division of Chemistry. In addition, the Greater Milwaukee Foundation named Goldsmith a Shaw Scientist.

The U.S. Department of Energy (DOE) recently selected Professor **Etienne Garand** for an Office of Science Early Career Research Award. Through a peer review process, Garand's proposal, "Probing Chromophore Energetics and Couplings for Singlet Fission in Solar Cell Applications," was one of 61 selected for funding from among 770 projects.

Professor **Trisha Andrew** received a 2013 3M Non-Tenured Faculty Award, which recognizes outstanding new faculty for the quality and pertinence of their research. 3M selected Andrew for the award in recognition of her research on developing open-shell organic semiconductors for lightweight, low-cost, high-efficiency solar cells.

Martha Casey and Professor Emeritus **Charles Casey** were joint recipients of the 2012 Harry and Carol Mosher Award given by the Santa Clara Valley section of the ACS. Their joint address to the section was titled "Case(y) Study of Traditional and Non-Traditional Career Paths in Chemistry."



Caseys receive Mosher Award from Santa Clara Valley ACS section chair Paul Rusch

Professors **Ned Sibert** and **Tehshik Yoon** won 2013 UW-Madison Faculty Distinguished Teaching Awards. Yoon was awarded the William H. Kiekhofer Distinguished Teaching Award, and Sibert was awarded the Chancellor's Distinguished Teaching Award.

In October, Professor **Helen Blackwell**, former graduate student Danielle Stacy, and postdoc Dr. Yftah Tal-Gan received a Wisconsin Alumni Research Foundation Innovation Award. Their research focused on the quorum-sensing ability of bacteria — the signaling process bacteria use when enough are present to begin multiplying, forming toxic biofilms and producing tissue degrading enzymes — and the development of compounds capable of disrupting serious bacterial infections.

Professors **Song Jin** and **Frank Keutsch** have received notable UW-Madison research awards: Jin received the

WARF Romnes Faculty Fellowship and Keutsch received the Vilas Associates Award.

In 2013, the College of Letters & Science awarded **Matt Sanders**, executive director, the Judith Craig Distinguished Service Award for his 28 years of service to the department and college. The college also recognized **Betty Harwood**, human resources assistant, with a 2012-13 Classified Staff Award and Dr. **Chad Wilkinson**, general and inorganic lab director, with an Early Career Award.

Dr. **Iliia Guzei**, director of the Molecular Structure Laboratory, was awarded the 2013 Chancellor's Award for Excellence in Research: Critical Research Support, a UW-Madison Academic Staff Excellence Award. Each year, Guzei's lab analyzes more than 300 samples from research groups within the department and from outside collaborators.

April Leslie, physical-theoretical path coordinator, received a 2013-14 College of Letters & Science Classified Staff Excellence Award.

At the American Scientific Glassblowers Symposium, **Tracy Drier**, master glassblower, received the annual Wale Award for the most outstanding technical poster presented by a member at the 2012 symposium.

The 2013 James W. Taylor Excellence in Teaching Symposium, held in December, recognized Dr. **Tony Jacob** for his service to the Chemistry Learning Center. The Symposium featured presentations by Jacob and 2012 Taylor Award recipient Dr. Jeanne Hamers, undergraduate chemistry coordinator. Awards for exceptional Teaching Assistants were also presented to 2013 award recipients Sarah Decato (Mecozzi), Matt Faber (Jin), Ben Haenni (McMahon), Wyatt Merrill (Crim/Keutsch), Josh Ricci (Ediger), Mike Shaloski (Nathanson), William Tucker (Mecozzi), and Amy Tatarsky, a faculty assistant.

For the Fall 2013 semester, 22 instructors from the Department of Chemistry were named University Housing Honored Instructors. Teaching assistants who were nominated for the award are Dan Araki (Strieter); Arya Baghkhani (Mahanthappa); Morgan Baima (Andrew); Scott McCann (Stahl); Ankit Gujral (Ediger); Adam Birdsall (Keutsch); Wen Chyan (Raines); and Beth Blaesi, Stephanie Dillon, and Christopher Jordan from the Brunold group. University Housing residents also nominated Dr. Teri Larson, an assistant faculty associate from the Chemistry Learning Center; Dr. Matt Bowman, lecturer; Lab Directors Dr. Stephen Block and Dr. Brian Esselman; and Professors John Berry, Thomas Brunold, Samuel Gellman, Randall Goldsmith, John Moore, Gilbert Nathanson, J.R. Schmidt, and Tehshik Yoon.

Shipping and Receiving Manager **Mike Bradley**, who has worked for UW-Madison for 30 years, was recently elected to UW-Madison's first-ever Classified Staff Executive Committee.

Dr. **Steven Girard**, a postdoctoral fellow in the Jin group, received an NSF SEES postdoctoral fellowship and will begin a faculty appointment at UW-Whitewater in summer 2014.

In November, **Andrew Fuchs**, an associate research specialist with the Cavagnero group, was awarded a research fellowship from CONACYT to present his research at the 3rd U.S.-Mexico workshop of protein folding and dynamics in Mexico.

STUDENTS

Several chemistry graduate students and a postdoc were among the 620 participants selected to attend the Lindau Nobel Laureate Meeting in Germany last summer: **Shakeel Dalal** (Ediger), **Jennifer Faust** (Nathanson), **Brett VanVeller** (Raines, postdoc), **Alison Wendlandt** (Stahl).

Jung Ho Lee, a graduate student in the Cavagnero group, published a cover article in the Journal of Physical Chemistry B on a novel enzyme system to achieve unprecedented sensitivity and enable long-term data collection in laser-driven NMR via photochemically induced dynamic nuclear polarization (photo-CIDNP) in solution.

Audrey Forticaux, a graduate student in the Jin group, won the 2013 UW-Madison Cool Science Image contest. See her winning image at go.wisc.edu/flowers.

Yusuke Okuno, a graduate student in the Cavagnero group, won a travel award to present his research at the ENC NMR conference in California.

Twelve graduate students received 2013 NSF fellowships: Larry Anderson (Strieter), Phillip Calabretta (Kiessling), Erin Gemperline (Li), Mimi Hang (Hamers), Britta Johnson (Sibert), Michelle Killian (Brunold), Chris Lietz (Li), Tom McDonough (Zanni), Leith Samad (Jin), Mitchell Thayer (Keutsch), Mary Van Vleet (Schmidt), and Angela Varela (Cavagnero)

The Barry M. Goldwater Scholarship program recognizes students who demonstrate significant promise in the sciences or in engineering. For 2013, junior chemistry majors **Brian Cornille** (Skinner) and **Joshua Shutter** (McMahon/Woods) were among the recipients.

As recipients of 2013 Hildale Undergraduate/Faculty Research Fellowships, 10 undergraduate chemistry majors collaborated with faculty advisers on intensive summer

research projects. Fellowship-winners included Andrew Daniel (Jin), Rafal Dziejcz (Jin), Laura Linde (Remucal), Sarah Nordeen (Yoon), Prashanth Prabakaran (Strieter), Kevin Walters (Raines), Si Wang (Record), Tong Wang (Gellman), Clara Ye (Cox), and Lucas Zarling (Kiessling).

DEPARTMENTAL AWARDS

2013 Summer Undergraduate Research Awards

- Ackerman Scholarship / Don Brouse Scholarship: Andrew Bartling
- Ackerman Scholarship / Edwin & Kathryn Larsen Scholarship: David Schuman
- Eugene & Patricia Kreger Herscher Scholarship: Kyle Desrochers, Samantha Fix
- Walter & Young-Ja Toy Scholarship: Yicong Ge
- Undergraduate Student Support in Chemistry Scholarship: Seth Berger, Scott Burlingham, Joshua Shutter

2013 Undergraduate Awards

- Ackerman Scholarship: Carl Buttke, Abner Jacobson
- Margaret McLean Bender Scholarship: Kaitlyn Mayer
- Andrew Dorsey Memorial Scholarship: Prashanth Prabakaran
- Henry & Eleanor Firminhac Scholarship: Kimberly Dinh, Si Wang
- Richard Fischer Scholarship: Anders Knight
- Eugene & Patricia Kreger Herscher Scholarship: Haley Albright, Hannah Grossberg
- Wayland Noland Undergraduate Research Fellowship: Tong Wang
- Lindsay Theresa Plank Memorial Scholarship: Paul Vang
- Mabel Duthey Reiner Scholarship: Yurun Zhang
- Robert Franklin Taylor Scholarship: Brian Cornille
- Undergraduate Student Support in Chemistry Scholarship: Joshua Shutter, Matthew Sternke, Ethan Zager
- Martha Gunhild Week Scholarship: Dongyu Zhang
- George & Arleen Ziarnik Scholarship: Nicholas Sánchez

Other Undergraduate Awards

- ACS Undergraduate Award in Organic Chemistry: Eric Wiensch
- Alpha Chi Sigma Alumni Scholarship: Andrew Cockerham
- ACS Awards (Wisconsin Section): Kyle Gustafson,

Carl Buttke, Tong Wang, Michael Freidberg, Anatoliy Nechyporenko, Anders Knight

- Berbee-Walsh Awards: Excellence in Analytical Chemistry: Ailin Mao; Excellence in Organic Chemistry: Ho On Alston Conrad Chiu, Sohil Shah; Excellence in Physical Chemistry: Brian Cornille
- Francis Craig Krauskopf Memorial Awards: Hatem Alhothali, Erin Drees, Michael Josephson, Alexander Retzlaff, Benjamin Van Domelen, Yui Chun Wan
- John & Elizabeth Moore Awards for Excellence: Helene Altmann, Lixue Cheng, Nathan Delvaux, Morgan Heller

2013 Graduate Awards

- Roger Carlson Award: Chris Rose (Coon)
- Harry & Helen Cohen Research Award: Elliot Farney (Yoon), John Lukesh (Raines), David Mortenson (Gellman)
- Eastman Summer Research Award: Joshua Fishman (Kiessling)
- Goering Organic Chemistry Award: Brent Amberger (McMahon), Adam Weinstein (Stahl), Alison Wendlandt (Stahl)
- Hirschfelder Prize Graduate Award: Kuang Yu (Schmidt)
- Hirschmann/Rich Graduate Award in Bioorganic Chemistry: J.P. Gerdt (Blackwell), Joe Grim (Kiessling), Mario Martinez Farias (Kiessling)
- Michael McCoy Memorial Award: Joe Yeager (Hamers)
- K.V. Reddy Award in Physical Chemistry: Somenath Bakshi (Weisshaar)
- Charles & Martha Casey Excellence in Research Awards: Analytical Chemistry: Gloria Sheynkman (Smith); Inorganic Chemistry: Kasia Kornecki (Berry); Materials Chemistry: Fei Meng (Jin); Organic Chemistry: Paul White (Stahl); Physical Chemistry: Jennifer Laaser (Zanni)
- Outstanding Chemistry TA Awards: Brent Amberger (McMahon), Jeremiah Erickson (Dahl), Judy Hines (Burstyn), Brandon Kilduff (Fredrickson), Sriteja Mantha (Yethiraj), Kaz Skubi (Yoon), Daniel Tabor (Sibert)

Other Graduate Awards

- GSFLC Mentor Awards: Fei Meng (Jin), Nicole Woodards (Li), Joe Yeager (Hamers)

2013 Student Awards Ceremony and Poster Session



Top: Professor James Weisshaar recognizes undergraduate award-winners at the 2013 Student Awards Ceremony.

Bottom: Professor Samuel Gellman talks with undergraduate Jonathan Lang, a student researcher in the Cavagnero group.

These scholarships and awards would not be possible without the support of our generous alumni and friends. To encourage future chemists, make a gift in support of student scholarships at go.wisc.edu/SupportChemistry.



Graduate students Ryan Pakula and Amanda Corcos, both members of the Berry group, work with an X-ray diffractometer in the Molecular Structure Laboratory while Brian Dolinar selects a crystal at the microscope. Photo by Iliia Guzei.

Bender's Legacy

Chemistry Instrument Center provides state-of-the-art research support and student training

Upon arriving at the UW-Madison Department of Chemistry in 2008, Paul White (Ph.D. '13, Stahl) soon realized just how exceptional his level of access to all types of chemistry instruments was. Through the department's Paul Bender Chemistry Instrument Center, graduate students, faculty, and other campus researchers receive open access to world-class NMR, ESR, mass spectrometry, and X-ray crystallography instruments, services, and instruction.

During his first semester, White enrolled in the introductory NMR class; he then continued his training the following summer in the advanced NMR class. It was at that point that he started to see the full scope of what he could learn from NMR – a true wealth of information. He soon began using NMR in his own research to measure the rate of cyclization reactions.

“When people stop enjoying science, it's because they hit hurdles,” White says. “If you have instruments that can bust through those hurdles – sensitivity, crystal size, how much sample you can make – it makes science much more enjoyable.”

More recently, as White worked to finish his doctorate, he became involved in another project, this time using both the NMR and X-ray crystallography facilities to characterize ligated palladium complexes.

Through the center, “students can have as much practical hands-on experience as they wish, thereby expanding their knowledge of essential experimental techniques,” says Dr. Iliia Guzei, director of the center's X-ray crystallography facility. “The center employs six Ph.D.-prepared scientists and several TAs, which makes it a very strong facility.”

The department has long recognized the importance of maintaining a world-class center with open access to shared instrumentation. Established in the 1920s under the direction of Professor Villiers Meloche and with the support of Professor and Department Chair J. Howard Mathews, the once small center soon developed a reputation as a hub for chemical instrumentation. It served not only as a teaching facility, but also as a service facility for research within the department and across campus. Throughout the following decades, the technology behind the instruments began developing rapidly.

By the late 1950s, Professor Paul Bender, a physical chemist, had assumed leadership of the center and had begun working to further advance its three primary facilities. He may well have been the first chemist in academia to provide all chemists in the department open access to these sophisticated analytical instruments. Up until that time, such access had been limited to the few experts who investigated specialized aspects of

magnetic resonance, mass spectrometry, or X-ray diffraction. By the time other chemistry departments had begun realizing the importance of shared instrumentation, Bender had already established formal classes to teach students how to use the instruments for their own research.

“A Wisconsin hallmark, started by Professor Bender, is the philosophy that an integral part of a graduate student’s education requires providing hands-on access to the most advanced scientific equipment,” Professor Thomas Farrar writes in the 1994 Badger Chemist publication.

When Farrar assumed the role of director in 1979, Bender had successfully transformed the center into a cornerstone for departmental and campus-wide research efforts. By this time, large numbers of researchers were relying on the center for characterization, and most synthetic chemists were being trained to acquire and make use of the data provided by the instruments. Regular success in obtaining competitive instrumentation grants from the National Institutes of Health and the National Science Foundation kept the various instruments at near-state-of-the-art capabilities.

“The Chemistry Instrument Center isn’t a money-making operation, but it’s absolutely necessary to be competitive. In any field, you have to have access to good data,” says Dr. Martha Vestling, director of the center’s mass spectrometry facility.

In 1993, in recognition of Bender’s leadership in building a premiere center, the department named the center in his honor. He and his wife, Margaret McLean Bender, later made a bequest that would help make significant upgrades to the existing instruments.

The Benders’ gift “allowed the department not just to maintain the instruments but also to move forward significantly,” says Dr. Charles Fry, director of the center’s magnetic resonance facility. “Because of Bender’s legacy, we have always led in training, capabilities, and breadth of support for chemists.”

So far, the Benders’ gift has purchased a top-of-the-line powder diffractometer for the X-ray crystallography facility and spectrometers that advanced the magnetic resonance facility’s capabilities by orders of magnitude.

“Grad school isn’t easy, and having facilities that are so streamlined – and with engaging staff members who want to help you – makes life so much easier,” says White. “Having the types of instruments we have enables us to achieve chemistry and results that wouldn’t be obtained anywhere else.”

Upon graduating in September, White accepted a postdoctoral fellowship in the Hong lab at Iowa State University.

Paul Bender Chemical Instrument Center: Facilities and Instruments

Professor Samuel Gellman, director; Dr. Robert Shanks, senior instrumentation technologist; Dr. Lingchao Zhu, instrumentation technologist



Photo courtesy of UW-Madison Archives

Professor Paul Bender

Magnetic Resonance Facility

Dr. Charles Fry, director

- Bruker Avance III 400 Spectrometer: excels at very high sample throughput (2012)
- Bruker Avance III 500 Spectrometer: 13C capability (purchased with Bender gift funds) (2012)
- Bruker Avance III 500 Spectrometer: multinuclear and variable temperature capabilities (purchased with Bender gift funds) (2012)
- Bruker EleXsys E500: modern X-band ESR (2009)
- Varian MercuryPlus 300: routine NMR (2004)
- Varian INOVA 600: CIDNP and high-end characterization (scheduled for upgrade in 2014) (2000)
- Bruker AVANCE 360: in-situ reaction monitoring at high-pressure and temperature (purchased in part with Bender gift funds) (1999+2012)
- Bruker AC+ 300: walk-up routine NMR (1993)

Mass Spectrometry Facility

Dr. Martha Vestling, director

- Shimadzu GCMS-2010S: gas chromatography, electron impact, single quadrupole (2008)
- Shimadzu LCMS-2010A: high performance liquid chromatography/electrospray ionization/single quadrupole (2000)
- Bruker ULTRAFLEX III : Matrix-assisted laser desorption/ionization (MALDI) (2008)
- Bruker REFLEX II: Matrix-assisted laser desorption/ionization (MALDI) (1996)
- Waters (Micromass) LCT: electrospray ionization (2000)
- Waters (Micromass) AutoSpec: electron impact, magnetic sector, direct probe (1994)

X-Ray Crystallography Facility

Dr. Ilia Guzei, director

- Bruker D8 Advance: powder diffractometer (purchased with Bender gift funds) (2012)
- Bruker Quazar APEX2: diffractometer with Mo K α μ S radiation source (2009)
- Bruker SMART APEX2: with Cu K α conventional sealed X-ray tube (2007)
- Nikon SMZ-10A: (49x) microscope with polarizer

Simulations in the Classroom

Computational chemistry makes a lasting impression on undergraduate chemistry students

“Today, the computer is just as important a tool for chemists as a test tube,” the Royal Swedish Academy said when recognizing computational chemists Martin Karplus, Michael Levitt, and Arieh Warshel as the 2013 Nobel laureates in chemistry. Their collective contributions generated groundbreaking computational techniques that help scientists predict and explain chemical processes.

Without a doubt, computational chemistry has emerged as a fundamental pillar of chemical research. It is also making an impact in the classroom, and at UW-Madison the Department of Chemistry is making a concerted effort to integrate computation into every level of the undergraduate curriculum.

“This should be the standard,” says Professor J.R. Schmidt. “We should have students consistently exposed to computational chemistry, not just in one class, but in small amounts from the beginning and all the way through.”

Computational chemistry is first taught in general chemistry labs and then continued in higher-level courses. Dr. Chad Wilkinson, general and inorganic chemistry laboratory director, has worked with Dr. Desiree Bates, computational

chemistry leader, and Dr. Cheri Barta, undergraduate research coordinator, to design and implement new general chemistry labs that include computational chemistry components. At this level, students use computer simulations to visualize molecules in 3D. They also learn to connect these models to key concepts of chemical structure and reactivity.

At the organic chemistry level, Dr. Nick Hill, organic chemistry laboratory director, and Dr. Brian Esselman, assistant organic chemistry laboratory director, challenge students to predict and analyze the results of their experiments using computational tools. Students perform calculations for two-thirds of the experiments carried out during the course. “They are experiencing how an actual researcher would use computational chemistry,” Esselman says. This effort was supported in part by the Madison Initiative for Undergraduates, which provided funding for Esselman and Hill to revamp the organic lab curriculum.

When students reach inorganic and physical chemistry classes, they begin to learn about the concepts behind computations and the equations used to generate chemical models. Dr. Mark Wendt, physical chemistry laboratory director, and



Beth Hartig, a senior, and John Harter, a sophomore, work with WebMO during an organic chemistry lab. Undergraduates at all levels of chemistry classes learn and apply computational approaches to chemistry. Photos by Grace Pham.

Professors John Berry, Judith Burstyn, and Clark Landis use computational chemistry to help students explore abstract concepts such as molecular orbital theory. This approach allows students to gain a more sophisticated and accurate understanding of molecular structures and bonding.

As they worked to apply the new curriculum changes, the faculty and staff involved identified a need for user-friendly software and enough computing power to accommodate the many undergraduate students who take chemistry classes each semester.

The user-friendly software was made possible by Schmidt, who created the WebMO graphical interface while an undergraduate at Hope College, where he worked with Professor Will Polik. Their goal was to help students learn and apply computational chemistry at the undergraduate level. The web-based interface is easy to use and provides access to the powerful calculations available through cutting-edge computational software such as Gaussian and MolPro.

Students can access WebMO from any computer, and they can submit multiple computing jobs at once. Learning to use computational tools and to evaluate simulated models, however, can present a significant learning curve. Many students find WebMO challenging at first but later recognize its value.

“It really started horribly,” says Mike Soukup, a junior who

conducts research in the Garand group. “However, after wrestling with WebMO for a while, it eventually became second nature. The amount of information you could derive from the calculations really helped my understanding of the molecules.”

The calculations are processed by the departmental research computing cluster, which is partially funded by the National Science Foundation. Bates and Paul McGuire, cluster system administrator, manage the cluster and have created a computation queue dedicated to running calculations for undergraduate classes.

For students who plan to pursue careers in chemistry, exposure to computations is especially beneficial as preparation for both industry work and graduate school. New guidelines from the American Chemical Society (ACS) require graduating seniors to be familiar with computational chemistry in order to receive an ACS-certified bachelor’s degree.

Primed with the necessary resources and innovative educators, UW-Madison is making computations an integral part of chemical education for undergraduates. In the future, Schmidt envisions expanding the curriculum to include molecular simulations, which would edge closer to the types of computations that garnered the this year’s Nobel Prize.

— *Grace Pham, communications project assistant*



Research computing cluster administrators (from left) Paul McGuire, Professor J.R. Schmidt, and Dr. Desiree Bates



Dr. Brian Esselman, assistant organic lab director, teaches students the ins and outs of WebMO as the spring semester begins.

Shakhashiri Reflects on ACS Presidency

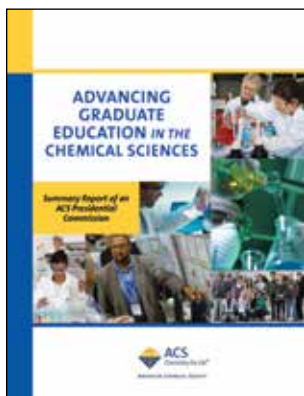


As 2012 ACS president, it was a great honor to represent the 164,000 members of the world's largest scientific organization and to speak on behalf of ACS everywhere. Of greater satisfaction was the opportunity to energize ACS to address daunting global challenges facing science and society. In my presidential essay, "Chemistry: A Key to Human Progress" (available at go.wisc.edu/presidentialessay), I call on chemists to help sustain earth and its people in the face of population growth, finite resources, malnutrition, disease, deadly violence, war, climate change, and the denial of basic human rights, especially the right to benefit from scientific and technological progress. Solutions to the world's problems demand radical innovation coupled with transformative changes in education. We must aim to effect change in our attitudes, in our behavior as scientists, and as responsible citizens. Communication of the critical role of science and technology in society can help alter attitudes of the general public and can also foster collaboration among people to work together to solve global challenges. During my presidency, I proposed several initiatives, including:

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Graduate Education in the Chemical Sciences

A commission was formed and charged with answering two questions: What are the purposes of graduate education in the chemical sciences, and what steps should be taken to ensure that graduate education addresses important societal issues as well as the needs and aspirations of graduate students? The major tasks in the charge were to consider fundamental, comprehensive, and systemic changes suitable for graduate education in the chemical sciences, and to suggest actionable approaches for enhancing the quality of graduate education at all institutions. The five major



audiences of the report are: academic institutions, funders, industry leaders, graduate students, postdocs, and the ACS. Implementation work will continue into 2014 and beyond. The report is available at acs.org/gradcommission.

Climate Science Initiative

It's essential for everyone to have a basic understanding of the atmospheric mechanism that maintains the climate. Because the mechanism is based on fundamental physics and chemistry, scientists — including chemists — bear a responsibility for understanding climate science themselves and helping others who are not scientists be attentive to the issues relevant to maintaining the climate.



Toward these ends, the Climate Science Working Group developed content for an ACS Climate Science Toolkit, which deals with the basic science of climate change. It is designed to equip you with the information and resources necessary for your discussions with others. The kit can be accessed at acs.org/climatescience.

The second and ongoing task is to articulate strategies for chemists and others to use the information from the Toolkit and possible further resources in disseminating climate science information to broader audiences. Read more about the subject in the Science editorial, "Climate Change Conversations," at go.wisc.edu/climatescience.

ACS Global Water Initiative

The grand challenge of water is the creation of new, sustainable water systems for the developed and developing world. Because the ACS can and should play a larger role in meeting this grand challenge, the ACS has launched a Global Water Initiative with a working group that includes experts from both academia and industry. The purpose is to prepare members for the challenges and opportunities that will accompany the coming revolution in water management. Read more in the C&EN editorial available at go.wisc.edu/globalwater.

I urge all Badger Chemists to participate in bringing these initiatives to fruition.

— Professor Bassam Shakhashiri, 2012 ACS president

Meet Professor Ive Hermans



In January, Associate Professor Ive Hermans and members of his research group made the 4,400-mile journey from Switzerland to Wisconsin to join the UW-Madison Department of Chemistry. Since 2008, Hermans has served as assistant professor at the Swiss Federal Institute of Technology Zurich (ETH-Zurich), where he also completed a

postdoctoral fellowship. He had previously earned a Ph.D. and M.Sc. in physical chemistry and a post-graduate degree in business administration from University of Leuven (KU Leuven) in Belgium. Hermans' catalysis research efforts will complement the department's growing focus on catalysis.

"Ive brings a unique skill set to our department and campus," Professor Shannon Stahl says. "Few individuals bridge the gap between chemistry and engineering in the way that Ive does. And, his connections to the chemical industry, especially at this early stage of his career, are quite rare among chemistry faculty in the U.S."

Read on to learn about research in the Hermans group, Hermans' interest in collaborations with industry, and the part of Belgium from which he hails.

Q: What is the focus of your research?

IH: My team focuses on sustainable chemistry and catalysis engineering. We try to mechanistically understand reactions that are of (potential) industrial interest, and to use those insights to improve the synthesis of important chemical building blocks. Those improvements might come from the catalyst side or might come from a more suitable reaction engineering.

Q: What most excites you about UW-Madison?

IH: One of the things that I immediately appreciated, besides the collegial atmosphere, is that people recognized the opportunities at the intersections between disciplines. I'm very excited that the engineers also supported me for

a dual appointment. It is clear that both the chemistry and chemical engineering departments are highly valued in the academic and industrial communities. It is a pleasure and an honor to become part of that family.

Q: What role do industry partnerships play in your work?

IH: I appreciate interacting with industry. Not only because they sponsor research, but also to stay connected to reality. Also, students usually appreciate it when they get a chance to interact with people from industry.

Q: What chemist or scientist has played the largest role in inspiring your work?

IH: Several people I have met during my studies and professional life have made deep impressions on me, both in academia and in industry. But I'm not really the groupie-type who just admires that one rock-star scientist. One thing I have noticed is that really serious people don't take themselves as seriously as their work. All the people I admire have a healthy sense of humor and self-realization.

Q: Where are you from?

IH: I'm originally from the Flemish part of Belgium. As you might know, we have a Flemish (I would call it sophisticated Dutch) and a French-speaking community in Belgium. Once in a while the differences between the two communities get Belgium in the news, for instance after the elections in 2009, when it took more than 500 days to form a government. I often joke about it and say that the situation is hopeless but not serious. At least there is great Belgian beer and chocolate. Of course the Belgian chocolate is much better than the Swiss chocolate that I was subjected to during the last 5 years when I was a postdoc and an assistant professor in Zurich, Switzerland.

Q: What do you enjoy doing outside of work?

IH: My wife and I enjoy travelling and good food (a consequence of growing up in Belgium). I try to do some sports and we have a small dog that is very good in attracting our attention.

To learn more about the Hermans group, visit hermans.chem.wisc.edu.

Institute for Chemical Education

The Institute for Chemical Education (ICE), led by Professor John Moore and Outreach Coordinator Andrew Greenberg, continues to play a major role in campus outreach activities. ICE also continues to lead the education



and outreach activities of the UW-Madison Nanoscale Science and

Engineering Center (NSEC). The NSEC, in year four of a five-year \$14 million renewal, includes four interdisciplinary research thrusts and the ICE education and outreach group; all explore complementary concepts around the central theme of self-assembly at the nanoscale. The NSEC education and outreach program aims to cultivate the next generation of nanoscale science and engineering experts, building on UW's vast experience in science education and infrastructure provided by ICE. Chemistry graduate students and ICE staff guide all NSEC education outreach programs.



Chem Camps

Last summer, we hosted four sessions of science camps for middle-school children. Topics included Fun with Chemistry, Fun with Forensics Science, and Fun with Inventions. For the first time, we collaborated with the UW-Madison Materials Research Science and Engineering Center (MRSEC) to develop new activities and experiments to include in the Fun with Inventions camp. As always, we incorporated a variety of chemistry topics into the camp themes: acid-base chemistry, molecular structure, oxidation and reduction reactions, biological chemistry, and experimental design, to name a few. More than 200 students participated in the camps, coming from as far away

as New York, Chicago, and Minneapolis. Our group leaders were undergraduate students who provided individualized instruction to the campers as they performed experiments, continuing the long-standing tradition of giving campers a hands-on lab experience.

Students Participating in Chemical Education

Students Participating in Chemical Education (SPICE) continued visiting schools, museums, and libraries and performing demonstration programs for student groups visiting campus. They participated in more than 30 events during the course of the school year, including hands-on activities, science fairs, and family science nights. Over the summer, SPICE participated in National Chemistry Week and in Explorando las Ciencias by organizing an exploration station. Adding to their repertoire of demonstrations and hands-on activities, SPICE continued its collaboration with the Fusion Science Theater (FST), a group of chemists and theater artists who have developed an innovative method for science outreach shows. Last year most of the SPICE members attended a training workshop and performed in several FST shows around Madison.

Sigma-Aldrich Provides Funding and Employee Volunteers in New Partnership with ICE

Through a grant from the Sigma-Aldrich Foundation, Madison-area Sigma-Aldrich employees will soon begin partnering with ICE to help support ICE outreach efforts. Funding from Sigma-Aldrich will support SPICE, Chemistry Camps, SCIENCountErs, and other ICE programs. Support provided by the grant will help increase the number of camp scholarships available to Chemistry Camps participants; ICE will offer an additional 30 Sigma-Aldrich Chem Camp scholarships in summer 2014. Also, local Sigma-Aldrich employees will volunteer their time to help teach local Boys & Girls Clubs members about science through ICE's SCIENCountErs program. This will mark the first time SCIENCountErs has brought in scientists from industry to work with students.

SCIENCountErs

SCIENCountErs, an after-school science outreach program, has continued to thrive thanks to the continued support of the NSEC and the Boys & Girls Clubs of Dane County. More than 150 children from the Boys & Girls Clubs of Dane County participated in the program, and more than 25 UW-Madison undergraduate and graduate students

volunteered to guide the children through inquiry-based activities. SCIENCECountErs aims to inspire and excite students about science by providing weekly hands-on science experiments and activities. Last spring, the children began a new unit with a focus on renewable energy. They worked on a variety of engineering projects while learning about biodiesel, ethanol, solar power, biogas, and the importance of energy conservation.

Research Experience for Teachers

ICE and the NSEC continued to host the annual Research Experience for Teachers (RET) program. This year's participants included three local teachers and a teacher from Rockford, Ill. Returning participants were Jeanne Nye, a seventh grade teacher at Lake Mills Middle School; Jason Strauss, a chemistry teacher at Verona High School; and Jeanine Gelhaus.

Research Experience for Undergraduates

ICE hosted three Research Experience for Undergraduates (REU) programs during summer 2013. Andrew Greenberg continued to serve as director of the NSEC- and MRSEC-supported Research Experience for Undergraduates in Nanotechnology program, the Research Experience for Undergraduates in Chemistry and Chemical and Biological Engineering, and the Research Experience for Undergraduates in the Chemistry of Materials for Renewable Energy. The REU programs participated in the Graduate School's Summer Research Opportunities Program, which is a consortium of 15 campus summer research programs that all share the common goal of increasing the diversity of the prospective graduate student pool.

Together, the three REU programs hosted by ICE attracted 42 students from the U.S. and Puerto Rico. Each student spent 10 weeks conducting research in a lab on campus. The Department of Chemistry hosted 11 REU students, and participating faculty included Professors Judith Burstyn, Padma Gopalan, Robert Hamers, Song Jin, Laura Kiessling, Clark Landis, Mahesh Mahanthappa, J.R. Schmidt, and Shannon Stahl. The summer culminated in a department-wide poster session where students presented results from their summer research. We recently learned that the REU program has been renewed by NSF and will continue to run through summer 2016.

Visit ice.chem.wisc.edu to learn more about our programs.



Above: Dane County students experiment and explore science through the SCIENCECountErs after-school program.

Wisconsin Initiative for Science Literacy



Professor Mike Leckrone and members of the UW Band join Shkhashiri and Schreiner at Memorial Union Terrace during the "Science of Fireworks" show. Photo courtesy of John Powell.



Saturday Science at Discovery, where Shkhashiri and Schreiner demonstrated the "The Science of Flashes and Bangs." Photo courtesy of John Powell.

Society addresses critical issues both through a skilled, creative, and productive workforce as well as through a science-literate citizenry. The Wisconsin Initiative for Science Literacy, led by Professor Bassam Shkhashiri and Dr. Rodney Schreiner (Ph.D. '81, Shkhashiri), seeks to boost opportunities for educational success for all students, especially those from under-represented groups, and to empower adults to participate responsibly in our cherished democratic institutions. WISL aims to enhance the development of talent for careers in science and science education and to advance the level of appreciation of science among the non-practitioners who are its beneficiaries. WISL advocates the exploration and establishment of links between science, the arts, and the humanities and promotes the elevation of discourse on significant societal issues related to science, religion, politics, the economy, and ethics.

One of the ways WISL accomplishes its goals is by creating opportunities for outreach in Madison and other areas. In 2013, WISL was pleased to present many local events. Throughout the year, Shkhashiri appeared on the Larry Meiller Show on Wisconsin Public Radio to discuss current topics and take questions from callers. Recent topics on the show included prominent science personalities like Don "Mr. Wizard" Herbert and Neil deGrasse Tyson, climate change, world population growth, and science education. Summer was a busy time for Science is Fun presentations, with appearances at the Wisconsin Science Festival (with Roald Hoffmann), Saturday Science at Discovery, the Memorial Union Terrace (where Professor Mike Leckrone and UW

Band members joined in an Independence Day celebration), and College for Kids. Shkhashiri also made his yearly visit to Boston to give the Phyllis A. Brauner Memorial Lecture at the Museum of Science in celebration of National Chemistry Week. The year of presentations culminated in the 44th Annual "Once Upon a Christmas Cheery, In the Lab of Shkhashiri." You can view images from the presentation at go.wisc.edu/holidaylecture.

This was also a busy year for travel. Shkhashiri made trips to regional and national ACS meetings, organizing several symposia and giving many talks. Subjects included "The Last 25 Years of Carl Djerassi," "Understanding Climate Science: A Scientist's Responsibility," "Water: A Grand Challenge for Science and Society," and "Advancing Graduate Education in the Chemical Sciences." He also made trips to the Chemical Heritage Foundation (to give the Heinz Heinemann Memorial Lecture on "The Rewards and Responsibilities of Freedom," which can be viewed at vimeo.com/79118382), to New York to celebrate The Worlds of Oliver Sacks, to the Southeast Chemistry Chairs Conference in Orlando, the Committee of Distinguished Advisors Meeting at the University of Maryland and the AAAS Meeting in Boston.

WISL is lucky to have staff members who are talented in a wide range of areas. Schreiner participated in the November installment of SoundWaves, a program held at the Discovery Building and featuring presentations by scientists, artists, and musicians all revolving around a common theme. The theme for November's event was "Color in Sight and Sound," and Schreiner's segment was called "What Color

Can Tell a Chemist and You.” During his presentation he displayed several chemical reactions that produce color changes and described what these reactions have in common and what information the changes reveal.

In February, WISL presented a Concert at Chemistry celebrating WISL Fellow Marc Fink’s promotion to professor emeritus. Since his appointment as fellow in 2005, Fink has had a close relationship with WISL, bringing his musical participation to many events, including the 2013 Christmas Lecture.

Dr. Jerry Bell, faculty associate, chairs the ACS Climate Science Working Group. He gave presentations on climate change at Newton South High School, the Illinois-Heartland and Northeastern ACS local Sections, the University of Massachusetts-Boston, and in a symposium at the ACS National Meeting in New Orleans. He developed and gave workshops with hands-on activities relating classroom chemical concepts and climate change concepts for the Northeastern ACS Local Section, the Wisconsin Science Festival, and NSTA area conferences in Portland, Charlotte, and Denver.

Bell and Shkhashiri presented an ACS Climate Science Toolkit information session for ACS staff in Washington and Columbus. They wrote an editorial for *Science*, (go.wisc.edu/climatescience) and an article for the *Arabian Journal of Chemistry* (go.wisc.edu/arabianjournal) calling on scientists to take responsibility for helping nonscientists understand the science of climate change.

Bell, Schreiner, and Shkhashiri have also continued their research and development work on chemical demonstrations.

From top to bottom: Shkhashiri with Carl Djerassi (Ph.D. '45) at the ACS National Meeting in Indianapolis, at a symposium honoring Carl's 90th birthday. Photo courtesy of Linda Wang.

Shkhashiri, Bell, Schreiner, and Roald Hoffmann participating in the 2013 Wisconsin Science Festival.

In February, WISL Fellow Marc Fink was celebrated in a Concert at Chemistry to honor his promotion to professor emeritus. Photo courtesy of John Powell.

Shkhashiri performs a demonstration for College for Kids in 1983.

The summer 2013 College for Kids group. Photo courtesy of John Powell.



In Memoriam

Alexander Renton Amell (Ph.D. '50, Daniels)

Alexander "Sandy" Renton Amell, 89, died Feb. 26, 2013. In 1943 he served in the U.S. Army Air Force. Upon returning to the U.S., he married his college sweetheart, Allison Moore, and completed his undergraduate degree at the University of Massachusetts. He then attended UW-Madison, where he earned a Ph.D. in chemistry in 1950. He was a faculty member at Hunter College (New York City) from 1950-52; Lebanon Valley College from 1952-55; and the University of New Hampshire from 1955 until his retirement in 1988. While at UNH he was head of the Chemistry Department for 15 years; Fulbright Professor at University of San Marcos (Lima, Peru) in 1964; and interim dean of the College of Engineering and Physical Sciences from 1981-83.

Paul Frederick Bente Jr. (Ph.D. '42, Walton)

Paul Bente Jr., 95, died Jan. 22, 2013. He graduated *summa cum laude* in chemistry from Indiana University, where he was elected to Phi Beta Kappa. He received a Ph.D. in chemistry from UW-Madison. He began his career at DuPont. He retired in 1969 as venture planning manager at DuPont. He later founded an aquaculture company, Marifarms, Inc., which was based in Florida. During the Ford administration, Bente was appointed to the senior staff of the President's Council on Environmental Quality. He served as executive director of the Bio-Energy Council from 1979 to 1985. He and his wife, Edna, were married in 1942.

Sheldon Bernstein (B.S. '49)

Sheldon Bernstein died May 3, 2013, at age 86. After serving in the U.S. Navy, he received his B.S. in chemistry and Ph.D. in biochemistry ('52) from UW-Madison. He was very involved with his family and was president of the family business for more than 35 years. Bernstein also was president of the Beth El Ner Tamid Synagogue and was involved in numerous Jewish organizations and community affairs.

August Sven Bjornson (B.S. '44)

August Sven Bjornson died Dec. 29, 2013. Originally from Iceland, he received a scholarship to UW-Madison, where he earned a bachelor's in chemistry and later a master's in biochemistry ('45). While at UW-Madison, Bjornson was a member of the Link group, whose research led to the discovery of Coumadin (warfarin sodium), an anticoagulant that is still in use today. Upon earning his Ph.D. from the University of Kansas, he was recruited by the E.I. DuPont Company. He retired in 1988 and formed

his own research and licensing company. In 1995, he was knighted by the president of Iceland for his contributions to research and industry development in his native country. He was a member of the American Chemical Society, the Licensing Executive Society, Alpha Chi Sigma, Sigma Xi, and Phi Lambda Upsilon. He is survived by his wife, Helen.

W. Wallace Cleland

W. Wallace "Mo" Cleland, age 83, died March 6, 2013. He received his A.B. from Oberlin College in 1950 and his Ph.D. in biochemistry from UW-Madison in 1955. After pursuing postdoctoral research at the University of Chicago, he became an assistant professor at UW-Madison in 1959. He was the J. Johnson Professor of Biochemistry, Steenbock Professor of Chemical Science, and co-chair of the Enzyme Institute. Elected to the National Academy of Sciences in 1985 for his pioneering work on enzyme mechanisms, he received many major awards in the field of biochemistry. In 2008, he was honored with a Lifetime Achievement Award in Philately from the Smithsonian Institution.

Warren James Close (Ph.D. '46, Wilds)

Warren James Close, 92, died Feb. 9, 2013. He received an A.B. in chemistry from DePauw University in 1942 and a Ph.D. in chemistry from UW-Madison in 1946. Close married Verna Lee Beggs in 1943. He was director of chemical research for Abbott Laboratories and was a member of the American Chemical Society, the American Association for the Advancement of Science, the American Society for Microbiology, the American Society of Pharmacognosy, the Society of Research Administrators and Sigma Xi. Close loved nature and was a member of 35 nature and environmental organizations.

Phillip Maynard Cook (Ph.D. '72, Dahl)

Phillip Maynard Cook earned a B.S. at Tufts University, a master's of geochemistry from Colorado School of Mines, and a doctorate from UW-Madison. Cook married Elsie Unruh in 1963. He was awarded the EPA National Honor Award for Scientific Achievement, the U.S. EPA Silver Medal, five U.S. EPA Bronze Medals and seven U.S. EPA Scientific and Technological Achievement Awards, and had numerous other professional accomplishments. Cook was the technical case coordinator for the Reserve Mining Case. He belonged to the American Chemical Society, Society of Toxicology and Environmental Chemistry, International Association for Great Lakes Research, and Sigma Xi.

Thomas Allan Gibson (B.S. '65)

Thomas Gibson died Oct. 27, 2013. He graduated from UW-Madison with a bachelor's in chemistry. He worked for the Wisconsin State Lab of Hygiene as a chemist for more than 39 years until his retirement in 2005. He was a collector of coins, pistols, and swords.

Dennis Greunke

Dennis Greunke, age 61, died Nov. 28, 2013. Greunke married Rebecca Hensler in 1982. He served as scientific glassblower for the Department of Chemistry for many years. Greunke's faith was a very important part of his life, and he loved spending time with his family.

Denis L. Hennessy Jr. (B.S. '49)

Denis Hennessy Jr., 89, died Feb. 1, 2013. He received a bachelor's degree in chemistry from UW-Madison. Hennessy served in the U.S. Army tank corps during World War II. He received many medals for his service, including invasion ribbons and a Purple Heart award. Hennessy served as the chief metallurgist at United States Steel. He is survived by his wife, Ann, with whom he celebrated 61 years of marriage.

Jackson Boling Hester, Jr. (Ph.D. '60, Van Tamelen)

Jackson Boling Hester, Jr., 80, died Oct. 10, 2013. Hester received a bachelor's degree from the Massachusetts Institute of Technology and a doctorate from UW-Madison. In 1960, he joined the Upjohn Company, where he had a successful career as a medicinal chemist until his retirement in 2004. Credited with more than 120 patents and the discovery of three significant drugs, Hester has been regarded by many as one of the finest medicinal chemists of his generation. Among his discoveries are the anti-anxiety medication Xanax, which remains the most prescribed psychiatric drug in the U.S. His many accolades include the highest award in the pharmaceutical industry: the Pharmaceutical Manufacturers Association Discoverers Award. Hester was a quiet, humble, and profoundly curious man who loved nature.

Erwin Nick Hiebert (Ph.D. '54, Ihde)

Erwin Nick Hiebert, 93, died Nov. 28, 2012. He was a prominent historian of science who taught most recently at Harvard University (1970-89) and was professor emeritus there from 1989 to 2012. Hiebert was an active and prolific scholar and teacher to scores of students who became well-known academics in the field. Before moving to Harvard, he taught in the Department of History of Science at UW-Madison from 1957-70, serving as department chair from 1960-65. Hiebert filled numerous prominent positions in the field of history of science, serving as president of

the National History of Science Society in 1973-74. His research and teaching focused on 19th- and 20th-century history and philosophy of science. His wife, Elfrieda, whom he married in 1943, preceded him in death.

Jack Howard Jefferson (Ph.D. '55, Meloche)

Jack Howard Jefferson died March 4, 2013. He earned a bachelor's in chemistry and mathematics at Langston University, then in 1937 earned a master's in mathematics with a minor in chemistry from University of Iowa. At UW-Madison, he earned a doctorate in chemistry with a minor in mathematics. In 1953, he began what was to become a 30-year career of distinguished teaching, research, and service at Southern University (Louisiana). He was a member of the American Chemical Society, Phi Lambda Upsilon, Sigma Xi, and Alpha Phi Alpha fraternity. Jefferson's exemplary work was admired by the best teachers at the universities he served, and by community groups, national organizations, and agencies, including the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCCHE).

George Alvin Koehler (B.S. '47)

George Alvin Koehler, 93, died May 30, 2013. He married Dorothy Lincoln in 1942. Prior to college, he served in the U.S. Army Air Force from 1942-46. He completed a bachelor's in chemistry at UW-Madison in 1947 and earned a law degree from UW-Madison in 1951. Koehler was an attorney for Crum & Forester for 30 years and for Dar Allen Insurance until his retirement in 2000. He was a member of the Republican Central Committee Executive Board and a member of Stephen County Board for 10 years, spending six of those years as County Board chair.

Karl Russell Lindfors (Ph.D. '64, Cornwell)

Karl Russell Lindfors died Feb. 15, 2013. He received a bachelor's from the University of Michigan and later a doctorate in chemistry from UW-Madison in 1963. Following his doctorate, Lindfors became a chemistry professor at Central Michigan University in 1965.

William Edward Link (Ph.D. '54)

William Edward Link, 92, died Aug. 10, 2013. He was a captain in the U.S. Army during World War II and continued to serve in the Army Reserves. He graduated from UW-Madison with a doctorate in chemistry in 1954. Link worked for Archer Daniels Midland and Ashland Chemical before retiring as vice president of Research and Development at Sherex. He was a loving husband, father, grandfather, and great-grandfather.

Samuel Harry Lipton (B.S. '42)

Samuel Lipton died Jan. 15, 2013. He earned a bachelor's in chemistry from UW-Madison in 1942. After service in the U.S. Army Air Force, he returned to UW-Madison, where he served as a teaching assistant and earned his master's and doctorate in biochemistry. He held research positions at the Pabst Brewery and the Enzyme Institute at UW-Madison. In 1966, he began working with the U.S. Department of Agriculture's Experimental Center. Lipton conducted extensive research in his field and authored many papers, which appeared in various journals. He was an active member of the American Chemical Society.

Adlai Eldon Michaels (B.S. '35)

Adlai Eldon "Mike" Michaels, age 96, died Feb. 27, 2010. He was a professor at Washington & Jefferson College (Pennsylvania). He was a member of the Okeechobee Presbyterian Church and Phi Beta Kappa. Michaels held numerous patents for detergent gasoline. He was the author of several chemical manuals and was secretary of the Industrial Development Authority in Pennsylvania.

David Elliott Miran (M.S. '71)

David Elliott Miran, age 65, died May 21, 2013. Miran worked for the Wisconsin State Laboratory of Hygiene for 37 years. He was an avid sailor and had been the education officer for the Madison Sail and Power Squadron for the last 10 years. He is survived by his wife, Claudia Berry Miran.

Thomas William Panunto, (M.S. '85)

Thomas William Panunto died July 18, 2013. He was the husband of Mary Margaret Mitzy Cullen. Panunto graduated from Drexel University, received his master's from UW-Madison, and earned his doctorate from the University of Minnesota. He was employed by Air Products and Chemicals for 22 years, until 2009. He enjoyed dogs, baseball, gardening, and Japan.

Theodore Emil Pauly (B.S. '55)

Theodore "Ted" Emil Pauly, age 92, died April 27, 2013. In 1948, he married Sibylla Schroeder. Pauly was a UW-Madison graduate and a veteran of World War II and the Korean War. In 1966, he co-founded National Electrostatics Corporation in Middleton, Wis., and retired from there in 1980.

Robert John Sexe (B.S. '57)

Robert John Sexe, age 75, died Oct. 8, 2010. He was married to Betty Underdal Sexe. Sexe was a wonderful person who will be missed by many.

Gary William Shaffer (B.S. '64)

Gary Shaffer, 71, died Nov. 19, 2013. Shaffer earned a bachelor's in chemistry from UW-Madison in 1964 and then a doctorate in organic chemistry from the University of California, Berkeley. He later worked in fragrances and flavors. He attained many professional achievements and patents in his field until his retirement and subsequent move to Nevada in 2001. His greatly valued his family.

Victor Freeman Springer (B.S. '41)

Victor Freeman Springer, 95, died Jan. 15, 2013. Springer graduated from UW-Madison and worked for B.F. Goodrich Co. in Akron, Ohio. He lived in Ohio, Texas, and New Hampshire before retiring to Rice Lake, Wis. in 1982. He enjoyed woodworking and carving decoys.

Charles Hugh Stammer (Ph.D. '52, McElvain)

Charles Hugh Stammer, 88, died Aug. 7, 2013. A native of Indianapolis, he was preceded in death by his wife, Shirley, in 2006. Stammer, professor emeritus of chemistry at the University of Georgia, retired after 28 years of teaching and research. He was a veteran of the U.S. Army and was commended for honorable service during World War II. He was captured as a prisoner of war, for which he later received the Purple Heart award.

Leo Norman Stetzer (B.S. '51)

Leo Norman Stetzer, age 83, died Jan. 25, 2013, exactly one year after his wife of 40 years, Jane Stetzer. Stetzer served in the U.S. Army during World War II. He attended Iowa State University, and then UW-Madison, graduating with a degree in food chemistry. He had been employed at Badger Ordinance in Baraboo, Ladish Malt Company, was the head chemist for Stoppenbach Foods in Jefferson, and then worked for the U.S. government as a food chemist. Stetzer enjoyed traveling the world and loved taking family trips.

John D. Stockham (B.S. '49)

John D. Stockham, age 89, died March 6, 2013. Stockham was a graduate of UW-Madison and the Illinois Institute of Technology. For his service in World War II, he was awarded the Air Medal with five OLC, the Purple Heart award, and the ETO Campaign Ribbon with three battle stars. Stockham worked as a chemist at Standard Oil, at IIT Research Institute as a manager of fine particle research, and at the Environmental Protection Agency as chief of toxic substances. He enjoyed his family, friends, golf, and the Green Bay Packers. He is survived by his wife, Joanne.

Robert Edward Tarney, (Ph.D. '58, Johnson)

Robert "Bob" Tarney, age 82, died Aug. 6, 2013. Tarney earned a bachelor's in chemistry from Purdue University and a doctorate in chemistry from UW-Madison. He joined the DuPont Company's Elastomers Division Research Unit and worked at DuPont for 40 years. He then consulted for an additional five years after retiring. The majority of his work was on Nordel, Viton and Kalrez. He held 37 patents on products used worldwide in automotive applications and production of computer chips. He married his wife, Corlina, in 1966. Tarney's passion for literacy led him to co-found the Friends of the Hockessin Public Library.

Keneth Loren Temple (M.S. '42)

Kenneth Temple, age 95, died Sept. 30, 2013. He majored in chemistry at Middlebury College (Vermont), earning his degree in 1940. He then received a master's in chemistry at UW-Madison in 1942. During World War II, Temple became an employee of the U.S. Navy, working at Naval Research in Washington, D.C. He married his wife, Ruth, in 1943. After the war, Temple earned a doctorate in microbiology from Rutgers University. He then became a postdoctoral researcher at West Virginia University, where he did ground-breaking work on sulfuric acid runoff from coal mines. Temple discovered and named the organism responsible, *thiobacillus ferrooxidans*. He also worked for Texaco. He moved to what was then Montana State College in 1955 and identified what are now called extremophiles during his research.

Jean Blanchard Umland (Ph.D. '53, Goering)

Jean Blanchard Umland, age 87, died Aug. 1, 2012. She was professor of chemistry at the University of Houston Downtown from 1975 to 1994. There, she was named the top teacher for 1994, the year of her retirement.

James Manley Wood Jr. (Ph.D. '52, Bender)

James Manley Wood Jr., age 85, died May 19, 2013. Wood received his doctorate in physical chemistry from UW-Madison and began the romance of his life there when he met and married Marian, his wife of 60 years. During his 38 years as a chemist for Ethyl Corporation (later Albemarle), he worked on projects that received multiple patents and contributed to research that ranged from rocket fuel to batteries for electric cars to computer chips. Wood stood strongly for social justice and civil rights.

We have also been informed of the deaths of the following alumni:

Thomas Jacob Baldwin (B.S. '47)

James Percy Bennett (Ph.D. '18)

Betty Jane Binzel (M.S. '48)

Edward Stanton Bloom (Ph.D. '40, Adkins)

Allen Ervin Brehm (B.S. '47)

Leland Jew Chinn (Ph.D. '52, Johnson)

Frank Carey Fleming (B.A. '35)

John Fenwick Hansbrough (B.S. '67)

Elizabeth Louise Hendrickson (B.S. '45)

Gene Edgar Kalbus (B.S. '53, Ph.D. '57)

Maurice Steward Labowitz (B.S. '39)

Rudolph Manriquez (B.S. '49)

Frederick John Mathews (Ph.D. '43, Johnson)

Jane Elizabeth Mc Kinley (B.A. '48)

Reiji Mezaki (M.S. '61)

Donald Frederick Saunders (Ph.D. '50, Daniels)

Thor Lowe Smith (Ph.D. '48, Ferry)

Donald Leroy Sullivan (B.Ph. '34)

Jerome Timmons (Ph.D. '62, Van Tamelen)

Nancy Piltch (Ph.D. '81, Woods)



A 1977 Reich group bike trip down the Elroy-Sparta bike trail. From left: Professor Hans Reich, Marty Cohen, Marty's friend Terry, Bill Willis, Steve Peake, Pam DeLuca, Sue Wollowitz, Rick Olson, Ieva Reich. Photo courtesy of Hans Reich.

Professor Hans Reich Builds a Lasting Legacy among Colleagues and Students

Professor Hans Reich credits his decision to major in chemistry to a high school chemistry teacher who kept the laboratory unlocked, even at lunchtime.

“Somebody told us if you mix zinc metal and sulfuric acid, you make hydrogen, so we went there at noon and did it,” Reich says.

As a first-year chemistry undergraduate at the University of Alberta (Canada), his interest in chemistry grew after taking an organic chemistry class with the “very charming and influential” Professor Reuben Sandin, he says.

Reich graduated at the top of his class and pursued a doctorate at the University of California, Los Angeles under the guidance of Nobel laureate Donald Cram. After two postdoctoral positions, the first at the California Institute of Technology with Professor J. D. Roberts and the second at Harvard with Professor R. B. Woodward, Reich began his independent career at UW-Madison in 1970.

Reich came to Madison with his wife, Ieva; they met as students in the doctoral program at UCLA. For the first five years, Ieva worked in the Reich lab and contributed substantially to the group’s first publications. She later became an undergraduate organic chemistry lecturer and has won department and university teaching awards. She retired in 2012.

To build his research program, Reich looked for and found areas that were novel, unique, and important. Early in his career, his group investigated synthetic applications of selenium chemistry. They then transitioned to studying organo-silicon compounds. For the last 15 years, Reich has focused on the study of lithium carbanions, including the ways in which variations in structure and aggregation state influence reactivity.

In the narrow space leading to his office, Reich displays a colorful array of bound Ph.D. theses from his former graduate students. The author of the first of these theses, Dr. Jim Renga (Ph.D. ’75), recalls that Reich was a hands-on mentor and often worked in the lab.

“He taught me the importance of doing quality research on relevant problems,” Renga says. “This lesson has served me well in my career in both discovery and process research.”

Another former Reich graduate student, Dr. Amanda Jones (Ph.D. ’07) is an assistant professor at Wake Forest University. She describes Reich as a mentor who “maintains extraordinarily high standards for his students and expects the utmost attention to detail. His students learn to be conscientious and thoughtful scientists.”

Among his colleagues, Reich is esteemed for being thoughtful, analytical, and fair. He has garnered respect for

his commitment to fundamental science and his ability to attack challenging problems in creative and enlightening ways. He was associate chair of the department for a number of years, and also served twice as director of the Chemistry Instrumentation Center.

The faculty see Reich as a source of insight and wisdom. “I always felt safe asking Hans questions,” Professor Samuel Gellman says. “He wasn’t judgmental, even though he knew basically everything.”

In 2012, Reich received the James Flack Norris Award — a top honor in the field of physical organic chemistry. He has also garnered the Arfvedson-Schlenk Prize in Lithium Chemistry from the German Chemistry Society. In addition to his major scholarly awards, Reich is a proud recipient of the department’s James W. Taylor Excellence in Teaching Award.

Among graduate students and alumni, he is renowned for teaching “Structure Determination Using Spectroscopic Methods,” a graduate-level class that focuses on the interpretation of NMR spectra of organic compounds.

“The students who take that class have a unique insight in terms of interpreting NMR data,” Gellman says. “[Reich] has trained thousands of organic chemists in this way.”

Reich also regularly taught Chemistry 547, an advanced organic chemistry class he created for undergraduate students. Professor Eric Strieter was once among the students in this class.

“It was clear to everyone taking that class that he was absolutely enamored with the subject,” Strieter says. “Throughout my career, the way [Reich] thinks about organic



Hans and Ieva Reich at the presentation of Ieva’s first major teaching award, the Chancellor’s Excellence in Teaching Award, in 2008.

reaction mechanisms has remained in the back of my mind. I try to be as methodical as he is in my own research.”

Reich retired in January after 43 years with the department. A departmental symposium will be held in his honor on May 17.

— Grace Pham, communications project assistant

Professor Hans Reich Celebration Symposium

Please join us for a symposium and banquet to honor Professor Reich on the occasion of his retirement. The event will feature talks by Professors Emeriti Charles Casey and Edwin Vedejs, as well as Stanford University Professor Barry Trost and several Reich group alumni.

Symposium

When: Saturday, May 17, 9 a.m.

Where: Chemistry Building

Banquet

When: Saturday, May 17, following the symposium

Where: Imperial Gardens Restaurant

Visit reichsymposium.chem.wisc.edu for more information and to learn how to register. All alumni and friends of the department are welcome.



DEPARTMENT OF
Chemistry
UNIVERSITY OF WISCONSIN-MADISON

1101 University Ave.
Madison, Wisconsin 53706

chem.wisc.edu
608.262.1483

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