CHEM/BIOCHEM

Newsletter for Alumni and Friends

Spring 2015

From the Chair's Desk

Peter Geissinger

Welcome to the Spring 2015 edition of the Department of Chemistry & Biochemistry Newsletter.

The end of the academic year is always a good opportunity to look back at accomplishments over the past year. Foremost, this occurs at our annual Student Awards Day, which took place on April 3rd in the Wisconsin Room at the UWM Student Union. It was organized perfectly by this year's Graduate Student Council members Nina Yuan, Margaret Guthrie, Karl Koebke, Josie Corby and Kelly Teske, who arranged for everything from presentation space to food. We were pleased to welcome colleagues from regional universities as poster judges, Dr. Daniel Sem and Dr. Joseph McGraw (both Concordia University), Dr. Timothy Hagen (Northern Illinois University), Dr. Thomas Lawton (Northwestern University), Dr. Daniel Killelea (Loyola University Chicago), Dr. Paul House (University of Wisconsin-Whitewater), Dr. Joseph Piatt (Carroll University), and Dr. Gary Wood (University of Wisconsin-Parkside), who spent many hours evaluating the large number of graduate and undergraduate student posters that reflect the inspired research and hard work of our students over the past year. UWM Chancellor Mark Mone and College of Letters & Science Dean Rodney Swain gave opening remarks for the award presentation (see article below). These awards were made possible by generous donations of our alumni and friends, for which the Department would like to express our heartfelt gratitude.

Just one week after Awards Day, we were hosting for the second time the state-level competition of Wisconsin Science Olympiad. This event brought almost 1,000 of the best STEM high-school students to UWM for a full day of competitions. On the day prior to the competitions, the Natural Sciences and Engineering departments provided a full day of informational events from hands-on activities to Science Bag lectures and laboratory visits to showcase UWM STEM. A large number of students, staff, and faculty responded enthusiastically to the call for volunteers to support all events and activities and presented the UWM STEM disciplines in the best light to our visitors.

Also in this newsletter, you will read about a host of other outreach activities conducted by Department personnel, all of which spread the message of our Department being a great destination for undergraduate and graduate studies.

Moreover, in this edition you will find a summary of information that we compiled for our Chancellor on the importance of chemistry/biochemistry for the economy of the State of Wisconsin. One quite remarkable fact is that 96% of all manufactured goods involve technologies of chemistry, illustrating that the designation of Chemistry as the central science is fully justified.

Finally, we would like to announce our new "Industrial Fermentation and Biotechnology" option for the Biochemistry BS and Microbiology BS, which will be offered starting in the fall 2015 semester. This one-year option, which contains identical courses for both chemistry students and biology students, provides theory and practice on the use of fermentation processes in the biotechnology and pharmaceutical industries. More details will follow in our next newsletter.

Again, I would like to thank our alumni and friends who have donated to our program. In addition to the awards presented at Awards Day, your donations support conference attendance and other professional development opportunities of our students and have a lasting impact on their careers.

Best Wishes,

NEW & Improved website

Learn more about us and find up-to-date information on our different facilities, outreach programs, and current events.

Alumni? We'd love to hear your story and even feature your profile on our Alumni page. Please email our Department Manager, Kevin Blackburn (blackbuk@uwm.edu), or our Undergraduate Coordinator, Megan Garrett (garretms@uwm.edu), with your success stories and photos.

www.uwm.edu/chemistry

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College of Letters & Science

Chemistry Donation helps create Masterpiece

Our Department donated glassware to sophomore Lionel Rocheleau, an Arts major at the UWM Peck School of the Arts. He used the glassware to create a project which represents how science and nature can support each other. The glassware, along with natural, raw wood was used to invoke elements and themes of nature.

Rocheleau states, "In my piece, I wanted to explore the importance of science not only in my life but in everything around us. To emphasize this, I created a small chemistry set inside a typical, wooden box. Throughout the box, however, you will notice various pieces of wood (from a tree) used as supports for its construction. This is to represent how nature and science go hand-in-hand to support one another. Science is what helps us understand the world around us and it is often seen as something separate. Science is, in fact, essential to our everyday life. As we move towards a future with more technology advancements, it is essential to recognize the existence of this connection to understand what we are and where we may go as human beings."

This story was also featured in the Letters & Science newsletter. Well done!

Graduate Degrees Conferred (Ph.D.)

Fall 2014:

Natalia Stein (Pacheco), Thesis: "Spectroscopic and Electrochemical Studies of *Shewanella oneidensis* Cytochrome c Nitrite Reductase, and Improving c-heme Expression Systems"

Joseph Ulicki (Hossain), Thesis: "Part I: Synthesis and Biological Evaluations of Potent Class I Selective Histone Deacetylase Inhibitors Part II Aqueous Complexes for Efficient Size-Based Separation"

Spring 2015

Matthew Marcus Huisman (Hossain), Thesis: "A Symmetric Synthesis tryptophan Driviatives and Its Application to Streamlined synthesis of Tryprosatain A and B"

Mausumi Mahapatra (Tysoe), Thesis: "Chiral Modification of the Pd(111) Surface by Small Organic Molecules"

Md. Abdul Momen (Dietz), Thesis: "Improved Extraction Chromatographic Materials for the Separation and Pre-concentration of Metal Ions"

Huabing Sun (Peng), Thesis: "Application of Coumarin Derivatives in DNA-Associated Study: Mutation Detection, Site-Specific Labeling, Photo-induced Interstrand Cross-link and Ligation Reactions"

Noreena Labrague Sweeney (Frick), Thesis: "Discovery and Analysis of Small Molecules that Inhibit Hepatitis C and Degue Viruses"

Md. Nazim Uddin (Hossain), Thesis: "I. Palladium(0)-Catalyzed Asymmetric Rearrangement of Allyl Enol Ether for the synthesis of x-Aryl Quaternary Carbon Center. II. Synthesis of Chiral Tryptophan Analogs and Studies towards Synthesis of Tryprostatin A and B"

Phi Beta Kappa Inductees

Phi Beta Kappa is the nation's oldest and most prestigious undergraduate honor society.

It celebrates excellence in the liberal arts and sciences, admitting approximately the top 10% of America's leading college and university students.

From the Department of Chemistry and Biochemistry, the 2015 inductees were:

- Marcus Jellen
- Robert Miller
- Talon Radke
- Luis Sanchez.
- Dana Shannon
- Michael Sportiello
- Christina Tersine

Congratulations!

A Search-and-Destroy Strategy for Tumors by Laura Otto

Featured in the 2015 UWM Research Report


Xiaohua Peng

Current cancer drugs do not distinguish between malignant cells and healthy ones. To destroy tumors, current drugs target all cells in the body.

"There are many ways of treating cancers, but the common problems are the side effects, so the patients suffer a lot during the treatment," says bioorganic chemist and Assistant Professor, Xiaohua Peng.

But new compounds developed by Peng are actually attracted only to the cancer. The compounds she has designed are activated by trademark conditions inside cancer cells – increased oxidative stress and hypoxia – in order to selectively kill just the diseased cells.

Oxidative stress occurs naturally in the body during process like metabolism. Cancer cells grow and divide so quickly that they're literally engaged in a metabolic marathon, leading to the formation of high levels of hydrogen peroxide and free radicals. Peng's compounds dispatch a toxic agent to the exact location of increased oxidative stress. The drugs have shown promise in recent laboratory screen tests conducted by the National Cancer Institute and the University of Texas MD Anderson Cancer Center, which investigated the compounds' effect on human cancer cells. The screenings found a 60-90 percent reduction in various kinds of cancer cells – leukemia, colon, renal and some types of lung cancer.

MD Anderson's tests also found the compounds had no adverse effects on normal human cells. Next, Peng and her lab members will test these compounds on mice with cancer.

Also in progress is a second family of anticancer compounds developed by Peng. These seek another environmental trait of tumors – the presence of little to no oxygen. Hypoxia is common among tumors that are located farther away from blood vessels, and it diminishes the effectiveness of radiation and treatment. Peng's hypoxia-targeting compounds could also provide a way to improve results of radiation treatment.

"This unique approach, where the agent will only be converted to the toxic form in the presence of both radiation and hypoxia, holds considerable promise," she says.

In the last five years, Peng has supported her research with funding from a mix of local and national sources: a Bradley Catalyst grant from the UW-Milwaukee Research Foundation, a Shaw Scientist Award from the Greater Milwaukee Foundation, and a grant from the National Institutes of Health.

Shimadzu Lab moved to the Kenwood Interdisciplinary Research Complex

After nearly two years of construction, new Department of Chemistry and Biochemistry facilities in the Kenwood Interdisciplinary Research Complex (KIRC) will be ready to occupy this May. The Department's Shimadzu Laboratory for Advanced Applied and Analytical Chemistry will relocate its core instrumentation to a new 2,000 square foot specially-designed laboratory and office suite. Instrumentation will include six state-of-the-art mass spectrometers, sample preparation tools, UV/visible and FTIR spectrometers, and liquid and gas chromatography systems. A fully-equipped tissue culture suite is also in place to support discovery and toxicology research. The KIRC, on the northwest corner of Maryland and Kenwood, will house cross-disciplinary science, technology, engineering, and mathematics programs, and the Department's resources will further be available for collaborations with regional academic centers and industry. Full story in our next newsletter.

Professor Walter England, 1942-2015

It is with great sadness that we learned of the passing of Professor Walter England, of the Department of Chemistry and Biochemistry at the University of Wisconsin-Milwaukee, on March 23rd. Professor England was born in the small town of Hallettsville, Texas on August 23rd 1942 and, in spite of having spent most of his life in the Midwest of the United States, remained a Texan at heart. Walter obtained his B.S. degree in Chemistry in 1965 and went on to study for his doctoral degree with Klaus Ruedenberg, with collaborations with Mark Gordon at Iowa State University, obtaining his doctoral degree in 1973 for work on the bonding in acyclic hydrocarbons. After a brief postdoctoral position at the Colorado State University, he moved to the Midwest and obtained a staff position at the Argonne National Laboratory in Chicago. Here he worked on the quantum properties of solids and embarked on his lifelong interest in using quantum mechanical calculations to provide precise models for simple molecular systems.

Walter joined the Chemistry Department (before it was renamed to Chemistry and Biochemistry) in 1978 as an Assistant Professor in the relatively newly formed Laboratory for Surface Studies. He continued his work on using quantum mechanics to obtain precise energies for small molecules and collaborated with the organic chemists of the Department to help them understand their experimental results. He was promoted to Associate Professor in 1983. Here he continued his work to push to obtain more precise results for the energies of small molecular systems and developed an accurate perturbation method based on a proposal by the Nobel-prize-winning theorist, Richard Feynman.

Professor England's chemical versatility allowed him to teach both freshman chemistry courses and senior-level physical chemistry courses. Over the years he probably taught General Chemistry more than any other faculty member in the Department of Chemistry. He also taught both courses in the Physical Chemistry sequence and virtually all of the Graduate Physical Chemistry courses offered by the Department.

Walter took on the onerous duty of serving as Chair of the Department from 2003 to 2006, where he helped steer the Department through difficult budgetary times.

Walter was always helpful and supportive of his colleagues and could always be counted on to give sage advice on most matters. He was an extremely talented theorist who strove to obtain more and more precise quantum-mechanical solutions for small molecules eschewing the urge to follow others in their quest to develop not-so-accurate solutions to bigger systems. He often argued that "if you can't do the little things properly, there is no point in trying to do more complex problems." Walter had strong opinions about most things; his arguments were always carefully and logically thought out, but firmly anchored in his Texan libertarian roots. He was always a great person with whom to discuss any subject on earth. His friendship, advice and wisdom enriched us and will be missed.

Mary C. Layde, 1917-2015

We would like to send our deepest condolences to the family of Mary L. Layde, wife of Durward "Duby" C. Layde, who passed on May 3, 2015 at age 97, twenty-two years after her beloved husband. Mary, along with her 5 children, sponsored the Durward C. Layde Memorial Fellowship, which our department has been awarding since 2006. She has attended multiple annual awards ceremonies held by the department. The family asked, if desired, memorials be made to the University of Wisconsin-Milwaukee Chemistry Scholarship Fund. (See donation form on the back page.)

Distinguished Professor, Dr. David Petering, gave the following remarks about Professor Durward C. Layde's contributions: "Duby was one of the founders of the UWM Chemistry Department, having served in our predecessor, the Wisconsin State Teachers College. He taught general chemistry and served as Chair in the early part of the 1970s. In looking back, UWM was created in the late 1950s by taking the faculty of the teachers college and making it the tenured faculty of UWM, conceived of as a completely different sort of institution. Because of its origin, UWM had a difficult time making the transition to a research university because its starting faculty base had different interests and skills. The result was that for 25 years or more, some departments struggled with their identities.

I realized at some point that Duby and the other founders had done a great service for the Chemistry Department. In the 1960s, instead of hiring more "teachers" like themselves, they deliberately brought in four senior research faculty in order to provide a foundation for our transition to a research department. These folks were George Sosnovsky, Peter Kovacic, Alex Hill, and Werner Brandt. They, in turn, insured that other faculty hires would be strong researchers. As a result, we had a thriving graduate program when I arrived in 1971."

Maria Shteynbuk, Associate Lecturer

We want to welcome back Dr. Maria Shteynbuk, a 2014 Graduate student of our department, as our newest Associate Lecturer. Maria's bubbly personality is a great asset to our department and we are excited to have her back!

Jerry Praeger, Graduate Student

Jerry was raised in Wisconsin, but had the opportunity to travel the world as part of the U.S. Navy. He graduated from UW-Parkside in 2000 with majors in Chemistry and Mathematics. Immediately after graduation, he joined Sigma-Aldrich in Milwaukee where he was a pilot plant development lab chemist for about a year, and then worked in glassware-scale production for six years. In that time, he worked in organic and inorganic synthesis and accumulated a great deal of laboratory experience. Jerry's last position at Sigma-Aldrich involved being responsible for all the chemical naming and structures for the worldwide chemical catalog.

Jerry's hobbies include physical fitness (especially running), cooking, and gardening. He especially likes spending time with his wife who is also his best friend.

Jerry's desire to pursue a PhD started two years after completing undergraduate work. He missed doing the research that one does in academia. His love for research started in college during an independent study class in mathematics. Jerry developed a new a numerical method to solve the Schrodinger equation. His research results were submitted and accepted for publication in *Physical Review*. Jerry said, "It was the most proud moment in my life when I learned that my work was accepted by a journal of such high standards." Jerry regrets that it took him about 10 years before life events allowed him to return to school, but he is very excited to be part of the UWM Department of Chemistry & Biochemistry now. Welcome Jerry!

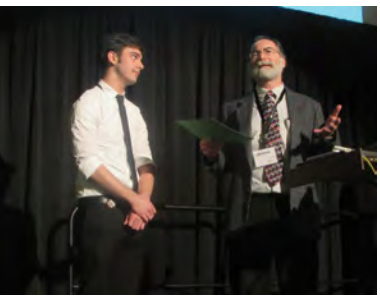
Daniel Knutson, Graduate Student

Daniel graduated from Rockford College, Rockford, Illinois, in 1997 with a Bachelor of Science in Chemistry. His industrial chemistry career began soon after graduation as a Process Development Chemist for Sigma-Aldrich. In this role, he developed reactions and processes for scaling in the Milwaukee and Sheboygan plants to support the custom business, chiefly pharmaceutical intermediates. Additionally, he was responsible for developing new products. In 2005, he was promoted to Production Supervisor in the Sheboygan Plant. In this role, he supervised a team of chemists and chemical operators in a 24/7 operation responsible for manufacturing custom, catalog, and bulk chemical products. Later in 2013, he transferred to SAFC-Madison as a Manufacturing Supervisor in the cGMP manufacturing group, a division of Sigma-Aldrich which synthesizes in highly potent active pharmaceutical compounds on lab and plant scale.

After his 17 year career with Sigma-Aldrich, he decided to return to UW-Milwaukee to pursue his doctorate in Chemistry. He has joined Cook's research group and is currently a teaching assistant for CHEM 100.

Daniel is happily married with 5 children ranging from years 10-18 (4 girls and 1 boy). He is currently the chair of the school board for Good Shepard Lutheran School in East Troy where his two youngest attend grade school. His oldest daughter will be starting school at UW-Milwaukee in the fall studying architecture and design.

At home, he and his family raise chickens and ducks for eggs and poultry, maintain a large garden for all sorts of canned goods and fresh produce, and keep bees for honey. In the summer, he enjoys canoeing, camping and exploring in the Boundary Waters Canoe Area in Minnesota and Canada with family and friends. He also enjoys golfing, hunting, playing the piano, pipe organ, saxophone and guitar. He was even part of a rock band called "Burnt Sienna" with some of his old college buddies. They recorded a studio album "Don's Bonus Party" and toured Chicago and Rockford. Some of their songs can be found on YouTube. Welcome Daniel!



Annual Awards Day, April 3rd, 2015:

On April 3rd, our annual Research Symposium and Awards Day Ceremony was held in the Wisconsin room of UWM's Student Union. Every year, this event is organized by our Graduate Student Council. This year's members are: Nina Yuan, Margaret Guthrie, Karl Koebke, Josie Corby and Kelly Teske.

The event began with a welcome speech from Margaret Guthrie. This led to the 3 poster sessions split by a catered lunch for students, guest, and judges. Posters were created by graduate students, undergraduates, and high school students from Brookfield Central, Brown Deer, and Brookfield Academy High Schools.

Dean Rodney Swain from the College of Letters & Science and UWM's Chancellor Mark Mone gave outstanding speeches highlighting the fantastic program we offer and our professors' and students' accomplishments. Our special keynote speaker, Tracy Hamilton from the University of Alabama Birmingham, then explained the "Chemistry of Coffee."

The day came to a conclusion with Dr. Kristen Murphy, assisted by other professors from the department, presenting the following awards to our amazing winners:

Undergraduate Awards:

- Outstanding Performance in Introductory Chemistry (Mackenzie Wade)
- Outstanding Performance in Analytical Chemistry (Kelsey Holbert)
- Outstanding Performance in Biochemistry (Dianah Kornov)
- Outstanding Performance in Inorganic Chemistry (Liv Heidenreich)
- Kovacic Award for Outstanding Performance in Organic Chemistry (Michael Sportiello)
- Vanselow Award for Outstanding performance in Physical Chemistry (Sean Bannier)
- Chemistry Emeritus Award, Outstanding Junior(Elliot DiMilo)
- Chemistry Emeritus Award, Outstanding Senior (Kelsey Holbert)
- Durward Layde Memorial Fellowship (Christina Tersine)

Graduate Awards:

- Moczynski Outstanding Teaching Assistant Award (Shalini Srinivasan)
- Sosnovsky Award for Excellence in Graduate Research (TIE-Phani Babu & Kelly Teske)
- Faculty of the Year Award (1st place-Dr. Jorg Woehl, 2nd place TIE – Dr. Alexander "Leggy" Arnold & Dr. Peter Geissinger)

Graduate Posters:

- 4th Place Chemistry Alumni Award for Graduate Research (Shalini Srinivasan)
- 3rd Place McFarland Graduate Research Award (Ted Theuening)
- 1st and 2nd place TIE (Lisa Mueller & Nina Yuan)

Undergraduate Posters

- 3rd place Chemistry Alumni Award for Undergraduate Research (Trevor Melkonian)
- 2nd place Chemistry Alumni Award for Undergraduate Research (Kelsey Holbert)
- 1st place McFarland Undergraduate Research Award (Chris Goetz)

Wisconsin Science Olympiad:

The 34th year of the Wisconsin Science Olympiad (WSO) state event was hosted by UW-Milwaukee on April 10th and 11th. This is the second year that UWM hosted (previously in 2013), and we will host the state competition again in 2017. The lead coordinator from UWM was our very own Assistant Department Chair and Associate Professor, Dr. Kristen Murphy. WSO participants were teams of high school students from around the state who competed in regional tournaments under the guidance of their coaches (teacher, parents or local volunteers) in a variety of events in STEM (Science, Technology, Engineering and Math). The winners of these tournaments then traveled to UWM to compete in a state competition. Approximately 800-1000 high school students arrived on April 10th for events including a presentation by Lee Marek of the University of Illinois-Chicago (chemical demonstrator, famous for appearances on David Letterman's tonight show) and an opening ceremony with a live performance by "Unclear on the Concept". Following the competition events on Saturday, the Science Olympiad closed with an Awards Ceremony.

The 2015 Wisconsin Science Olympiad was presented by Northwestern Mutual. Additional sponsors included the Army ROTC, SC Johnson and Graef. We would like to also give special thanks to everyone who assisted from UWM in making this event successful:

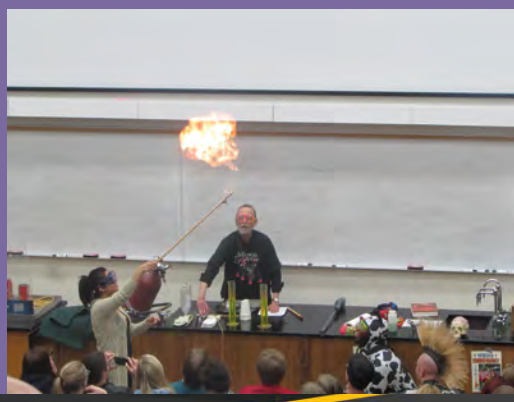
Lead Coordinators: Peter Geissinger & Kristen Murphy

Event Supervisors: Anja Blecking & Nick Silvaggi

Facilities & Equipment Coordinators: Kevin Blackburn & Michelle Koranda

Event Assistants: Christine Carlson, Maria Sheytnbuk & Hannah Wagie

Volunteer students, professors, and office staff for lecture visits, tours, activities, and Science Bag: James W., Xavier U., Liv H., Elliot D., Alex G., Lanlan H., Lisa M., Nick K., Kate M., Elizabeth M., Kameron F., Shalini S., Noreena S., Shelley H., Megan G., Raveena R., Rickey K., Mahmun H., Jian C., Gloria F., Doug S., Dave F., Michelle K., Paul H., Mark W., Josie C., Amanda Y., Steve R., Michael K., Jason V., Marcus J., Toufiqur R., Marie N., Nina Y., Revathi, Chris J., Quintus O., Kelly T., and many undergraduate volunteers!



Smart Team Visit, December 2nd, 2014:

Like in previous years, faculty and graduate students in the Chemistry and Biochemistry department expressed their commitment to education by serving as mentors for SMART (Students Modeling A Research Topic) teams. The high-school SMART teams investigate the structure, functionality, and applications of a specific protein. The program is led by the Milwaukee School of Engineering (MSOE) and each team has to complete a variety of tasks while moving through the different phases of the program: the qualification phase, research and design phase, and the presentation phase.

As part of the research phase, students visit their mentors at their workplace and our department had the pleasure of welcoming Audubon High School (Peter Geissinger & Hannah Wagie's team) and St. Joan Antida High School (Anja Blecking & Josie Corby's all-girls team). The students and their teachers had a lot of fun visiting labs in biochemistry and physical chemistry. They were introduced to the art of scientific glassblowing by Neal Korfhage, and also enjoyed "department-made" vanilla ice cream, courtesy of LN_2.

"Chemistry for K-8 Teachers" class presents their posters

On December 8, 2014, students enrolled in Chemistry 185 (taught by Anja Blecking) presented the results of their hard work in form of a poster presentation to the entire department. As part of their final course assessment, students investigated different aspects of a chemical concept relevant in K-8 science instruction. Beside pure content, this complex task included the discussion of concept related student misconceptions, introduction of hands-on activities, the use and design of suitable models, and also suggestions for effective student assessment. The students approached the assignment with curiosity, knowledge, and creativity and the results were astounding. The successful "poster lessons" were celebrated with hot chocolate, brownies and good conversations, and, thanks to the generosity of the students, the posters can soon be enjoyed by children in the department's outreach space on the 4th floor.

"Women in Science and History" in Kenosha

On March 14th, the Kenosha Public Museum hosted a "Women in Science and History" event attended by some of our department faculty and graduate students. Assistant Department Chair and Associate Professor Kristen Murphy and Assistant Professor Anja Blecking, joined by graduate students Jackie Trate and Shalini Srinivasan, participated in this family-friendly event designed to get people of all ages excited to learn about science. The UWM Chemistry team engaged in lots of interesting discussions with museum guests about science teaching, chemistry, and current research projects while also providing age-appropriate science learning entertainment for children, such as games and activities. Other invited presenters interpreted the call for "hands-on activities" slightly differently, and so the UWM team was surprised to find themselves 15 feet away from a very cheerful female member of the science community slowly dissecting a raccoon (roadkill, previously frozen, definitely TMI!). Still, overall it was a very enjoyable event for everyone except for the raccoon!

Our Impact in the Community

Distinguished Professor, David Petering and Director of MIDD, Dr. Douglas Stafford compiled information regarding our department's contributions of applied chemistry to the knowledge-based world of the 21st Century. Below are excerpts from this compilation. You can read the full report at: uwm.edu/chemistry/category/news/. This collection has information about materials, labs, research interests, patents, licenses, and partnerships!

Applied Chemistry in Wisconsin

- 96% of all manufactured goods involve technologies of chemistry; in Wisconsin, chemistry impacts the State's priorities across the industrial spectrum, including chemical and biochemical manufacturing, healthcare, food and beverage, water technologies, consumer goods, industrial monitoring, and general manufacturing.
- According to the American Chemistry Council, chemistry companies in WI directly employ 16,175 people and indirectly contribute 44,330 jobs to the State. For every chemistry-industry job created, an additional 2.7 jobs are generated within the State's economy. Importantly, 60% of all WI chemistry jobs are located within the SE region. Chemistry industry jobs are high-paying; the average wage of a chemistry industry employee in WI is $72,220, which is 40% higher than the average manufacturing job.
- These jobs generate $1.165 billion in earnings and $79 million in state and local taxes. Wisconsin's employment is projected to grow by 8.0% from 2006-2016, and there will be more than 680,000 job openings due to replacement needs during this time. One in ten jobs in WI are in STEM fields (chemistry training is essential in most STEM disciplines) and will account for more than one in five of the new jobs created from 2006-2016.

UWM and Applied Chemistry in Wisconsin

- UWM's Department of Chemistry and Biochemistry impacts Wisconsin's global competitiveness by providing critical educational, research, and economic development leadership. This resource is key in developing the highly-skilled human capital essential for economic development.
- The Department's faculty and academic staff (21 + 1) attracted more than $49 million in grants and contracts during the past decade. With a number of these researchers joining the Department within the last 5-7 years, the average yearly research support per member has been $276,000, comparable to that achieved in top chemistry departments across the country. Such funding supports graduate and postdoctoral student education, undergraduate student learning and research, and the financial operation of the Department.
- Between 2005 and 2015, the Department graduated 73 doctoral and 31 Masters students and trained 42 postdoctoral fellows. Virtually all of them obtained positions in their fields. A remarkable 33% remained in Wisconsin, providing expert staff for educational and medical institutions, businesses, and public sector organizations.
- Most of the faculty and staff (16) contribute to regional applied chemistry initiatives through present collaborations (24), patents (22) and numerous current patent applications and licenses (3)
- UWM's Department of Chemistry and Biochemistry impacts Wisconsin's global competitiveness by providing critical educational, research, and economic development leadership. This resource is key in developing the highly-skilled human capital essential for economic development.
- The size of the faculty in 2015 like that of 1971 is 21, painfully small in comparison with peer institutions, having dipped to 13 in the 1990s after earlier budget cuts; its graduate student population hovers near 70. Virtually all faculty members have strong research programs, and many are nationally and internationally recognized for their studies. Most have maintained strong extramural grant funding. Also, as in 1971, undergraduate research is emphasized and, indeed, is required for majors. As in 1971, those who do the research do the teaching. But, of necessity because of the continual budgetary constriction, more courses are taught by lecturers.
- In 1972 the new University of Wisconsin-System structure dealt a major blow to UWM. Gone was its specific identification with UW-MAD and its major research funding from WARF. Over the succeeding 40 years, UWM was basically funded like one of the comprehensive university campuses and today receives about 40% of the state support per student that is allocated to UW-MAD. In the 17 years following 1987, UWM was blocked by the UW-System from adding a single doctoral program to its small array. It is a tribute to the laudable efforts of its faculty and staff over the last decade that UWM is now recognized nationally as a major doctoral research institution.

A Focus on Students

One of the main goals of the Department of Chemistry & Biochemistry is to help our students succeed. We continue to provide the following programs:

Study Day

Since Fall 2013, we have been offering walk-in tutoring sessions on Study Day (the day between the last day of classes and final exams) for up to five hours in all of the discussion/seminar rooms of the first floor teaching wing. Students from all undergraduate courses have been invited to bring their questions and homework problems to undergraduate teaching assistants staffing the sessions. Many students have attended over the past four semesters that we have offered this, and we are excited to continue this service.

Mentoring Program

Since Fall 2011, our incoming teaching assistants have been part of a mentoring program in the department. This was initially provided only to new graduate teaching assistants but has since been extended to new undergraduate teaching assistants as well. The mentors prepare three workshops for new teaching assistants focused on running a laboratory, running a discussion, and being an effective teaching assistant. This is complemented with department policies, using D2L and PAWS, FERPA regulations, and student accessibility needs.

Participants in the Mentoring Program

The mentors then continue to play an active role in the new teaching assistant's progress throughout their first semester by attending discussions or laboratory sections, providing regular feedback through weekly informal meetings, and serving as an ally and point of contact for questions or concerns related to the role of a teaching assistant.

The program has been very successful! The new teaching assistants have indicated that they appreciate having a better understanding of what to expect in the classroom for the first time. They also cite the value of having a knowledgeable contact for questions related to teaching and being a new graduate student. The success of our program can be seen through the seven mentors who were themselves part of the program as mentees and have now continued to serve as mentors.

The Department is grateful to all of our highly qualified and dedicated instructors! The service and commitment shown by these mentors exemplifies the best our Department strives for in our educational mission.

Former and current mentors: Athena Baranowski, April Grant, Lisa Kendhammer, Mausumi Mahapatra, Megan McCallum, Bradley Moran, Alan Pawlak, Ryan Schmeling, Hannah Wagie, Xavier Udud, James Wankowski, Heather Adams, Veronica Alverez, Phani Babu, Mohamed Haque, Mohamed Karim, Dan Pauly, Kelly Peshman, Alaknanda Patel, Kelly Teske, Md. Sharif Al Asad, Josie Corby, Dhara Shah, Shalini Srinivasan, Huabing Sun, Ted Thuening, Margaret Guthrie, Md. Nazmul Hussain, Md. Zubair Ahmed Khan, Marie Nider, Sarah Oehm, Adebola Oyefusi, Jackie Trate, Nina Yuan, Afsana Mahim, and Noreena Sweeney

Thank you all for your hard work and dedication!

Tutoring

Our Department has been noted for years as providing free tutoring to students in the McFarland Learning Center. Historically, this has only been staffed in a limited capacity with CHEM 100, 101 and 106 teaching assistants. Beginning in Fall of 2013, we increased this staffing to include teaching assistants from all 100-level courses and organic chemistry courses. Between 50 and 60 tutoring hours per week per semester has been offered to students seeking additional help, with many hours staffed by 2 or more teaching assistants. This has been very well received by the students and heavily utilized.

As of April, 2015, the McFarland Learning Center moved to a more prominent location on the first floor, Room 164. This space holds 16 computers with brand new 23" monitors, large table space, a white board and WIFI for the convenience of our students. It is rare that there are not many students utilizing this space. Kudos to the teaching assistants for the hundreds of hours of tutoring they have provided to the thousands of students in our undergraduate courses!

Grants, Awards and Publications

- Barry Cameron, Geosciences; Peter Geissinger, Chemistry and Biochemistry; David Heathcote, Biosciences; Valerica Raicu, Physics; Nigel Rothfels, Office of Undergraduate Research; Daad Saffarini, Biosciences; and Kyle Swanson, Mathematical Sciences, have received a $50,000 Undergraduate Research and Discovery Grant from UW System to develop lower-division, course-based undergraduate research opportunities in the sciences as part of efforts to increase STEM persistence.
- Mark Dietz received a $116,427 grant from the Brookhaven National Laboratory for an Integrated Basic Research Program for Advanced Nuclear Energy Systems based on Ionic Liquids.
- James Cook received a UWM Foundation Catalyst Grant for "Pharmacological Proof of Concept for a First-in-Class Asthma Therapy," $50,000 (2014-2015). He also received an NIH grant for "Development of a GABA(A) Agonist to Control Airway Hyperresponsiveness and Inflammation in Asthma", $2,400,000 (2014-2019).
- Emeriti Professor, George Sosnovsky and Associate Profess, Jorg Woehl are being honored at the UWM Authors Collection in the Golda Meir Library. Golda Meir Library will keep a copy of all work and put the books on display.
- Garvey, Sarah L., Shahmohammadi, Golbon, McLain, Derek R., Dietz, Mark L. "Determination of Calcium in Dietary Supplemements: Statistical Comparison of Methods in the Analytical Laboratory." *Journal of Chemical Education 92 (1).* (2015), 167-169.
- Garvey, Sarah. L., and Dietz, Mark. L. "Ionic liquid anion effects in the extraction of metal ions by macrocyclic polyethers." *Separation Purification Technology 123.* (2014) 145-152.
- Pawlak, Alan J. and Dietz, Mark L. "Thermal Properties of Macrocyclic Polyethers: Implications for the Design of Crown Ether-Based Ionic Liquids." *Separation Science and Technology 49.* (2014) 2847-2855
- Dietz, Mark L., Cory A. Hawkins, Momen, M.A., Garvey, Sarah L., Kestell, John, Kaminski, Michael D. "Evaluation of solid-supported room-temperature ionic liquids containing crown ethers as media for metal ion separation and preconcentration." *Talanta 135* (2015). 115-123.
- Sweeney, Noreena L., Alicia, Hanson M., Mukherjee, Sourav, Ndjomou, Jean, Geiss, Brian J., Steel, John J., Li, Kelin, Frankowski, Kevin J., Schoenen, Frank J., and Frick, David N. "Benzothiazole and Pyrrolone Flavivirus Inhibitors Targeting the Viral Helicase." *ACS Infect. Dis 1.* (2015): 140 -148.

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