CHEM/BIOCHEM

Newsletter for Alumni and Friends

Winter 2014

From the Chair's Desk

Dr. Peter Geissinger, Chair

Welcome to the Winter 2014 edition of the Department of Chemistry & Biochemistry Newsletter.

Another challenging year is coming to a close. The University continues to struggle with a difficult budget situation compounded by declining enrollments. The Department met these challenges with strong enrollments in Chemistry and Biochemistry courses and extraordinary productivity of our faculty, staff and students.

One of the highlights was the establishment of the Southeast Wisconsin Applied Chemistry Center-of-Excellence, which contains in its Shimadzu Laboratory for Advanced & Applied Analytical Chemistry a suite of six top-of-the-line mass spectrometers. This was made possible by a $3M Incentive Grant from the University of Wisconsin System and a $1.13M matching contribution by the Shimadzu Corporation. The laboratory is fully operational and many students and faculty are taking advantage of the training programs on these instruments. Once the new Kenwood Interdisciplinary Research Complex building is completed (expected to be May 2015), the Shimadzu Laboratory will move into custom-designed showcase space in this building.

In addition to the grant described above, Department faculty received substantial research funding from the National Institutes of Health, the National Science Foundation, and a variety of other funding sources. This funding combined with the hard work of our students, leads to results, which is demonstrated by the large number of publications as well as submitted and issued patents.

We celebrated the accomplishments of our students at our annual student Awards Day in April, an event organized by our Graduate Student Council. Throughout the day, faculty from regional institutions, to whom we were grateful for their time and effort, judged research posters to determine the award winners. This year's keynote address was given by Dr. Tom Lawton, an alumnus of our undergraduate program who recently earned his PhD in Chemistry from Northwestern University. This was followed by a presentation by the SMART (Students Modeling a Research Topic) Team from Brown Deer High School, who illustrated in a skit the issue of ligand discrimination in myoglobin, which was at the heart of their molecular modeling project. The ceremony concluded with the presentation of the awards. I would like to highlight the recipients of this year's Chair's Outstanding Academic Service Awards, Ms. Gloria Freschl and Ms. Pat Nylen, who both are outstanding and long-serving educators in our Department.

We are also pleased to report that four faculty members earned promotions; Associate Professors Andy Pacheco, David Frick, and Mahmun Hossain were promoted to full Professor, Anja Blecking was promoted to Assistant Professor, and Assistant Professor Kristen Murphy was promoted to Associate Professor with tenure. A crucial component of the promotion process is the evaluation of the professional stature of the candidates by research faculty from universities and research laboratories across the U.S. and abroad. The fact that our faculty passed this rigorous evaluation is testimony to the high-impact research and education carried out in our Department.

Finally, we are pleased to report that we were selected to host, for the second time, the Wisconsin State Science Olympiad state competition on April 10 and 11, 2015. We expect 1,000 of the best STEM students from Wisconsin will converge on our campus on that weekend. This event presents an ideal opportunity for recruitment of science students to UWM, and we are busy planning lab tours, class sit-ins, lectures, and, most importantly, several meet-and-greet opportunities that connect the visiting high school students to our students and faculty. It promises to be another exciting event.

As always, we would like to encourage you to stay in touch with the Department. We love hearing from you and would like to wish you Happy Holidays and all the best for the New Year!

Best Wishes,

Peter Geissinger

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Grants

Our department has been very successful in seeking new funding for research and education. More than $6.3 million has been awarded in the past two years:

National Science Foundation

Kristen Murphy, Peter Geissinger and Anja Blecking received a three-year, $339,719 grant from NSF. Dr. Murphy works extensively in science education research, and the money will be used for increasing the science literacy of undergraduate students in STEM (Science, Technology, Engineering and Mathematics).

Wilfred Tysoe received a $483,955 grant for three years to work on the quantitative prediction of sliding friction using integrated theory and experiments. The research is about obtaining a quantitative understanding of energy dissipation, interfacial structure and friction of model boundary films.

Andy Pacheco and Marius Schmidt received a grant in the amount of $438,011 to study the structure-function relationships in metalloenzymes with multiple redox-active centers.

Graham Moran received a $344,000 grant to redefine the function of renalases.

National Institutes of Health

Dr. James Cook, Dr. Alexander (Leggy) Arnold and Dr. Fred Helmstetter received a $1,850,690 grant from the National Institute of Mental Disease to design new therapeutic agents to treat schizophrenia.

Dr. David Petering received a two-year grant from the National Institute of Environmental Health Sciences (NIEHS) in the amount of $218,503 to develop effective methods to identify the toxic metal, proteome.

UWM's Milwaukee Institute for Drug Discovery (MIDD): Dr. James Cook, Dr. Alexander (Leggy) Arnold and Dr. Douglas Stafford (also MIDD Director) received a four-year, $1,965,763 grant from the National Institutes of Heart, Lung, and Blood to develop a new drug therapy for asthma by targeting $GABA_A$ receptors. The research team also includes Dr. Charles Emala at Columbia University College of Physicians and Surgeons and Dr. Mitchell Grayson at the Medical College of Wisconsin.

Argonne National Laboratory

Mahmun Hossain received a $140,000 grant to work together with Mark Jensen on the development of new aqueous complexes for Americium-Curium separation.

Catalyst Grant (UWM Research Foundation)

James Cook, Alexander (Leggy) Arnold, and Doug Stafford received a $50,000 grant to verify that selective $GABA_A$ modulator can target the $GABA_A$ receptors in the lung.

Xiaohua Peng and Alexander (Leggy) Arnold received a $60,000 grant to determine the pharmacokinetics and In vivo efficacy of ROS-activated anticancer prodrugs.

David Frick received a $60,000 grant to identify new Dengue fever drugs that target the viral helicase.

Peter Geissinger received a grant in the amount of $79,914 to develop optical fiber thermometry for battery applications.

UW System Incentive Grant from the School of Freshwater Sciences

Peter Geissinger and Alan Schwabacher received a one-year, $100,000 water catalyst grant for "Real-Time Optical Sensors for Wastewater-Treatment Process Control."

SE Wisconsin Applied Chemistry Center of Excellence

Alexander (Leggy) Arnold and Dan Sem received $84,346 to develop and commercialize a universal kinase and GTPase assay.

Peter Geissinger received $84,823 to develop optical sensors for real-time effluent monitoring of wastewater-treatment systems.

Graham Moran, in partnership with Sigma-Aldrich, is developing known drug and herbicide targets as commercial products. The amount awarded was $50,492.

Nicholas Silvaggi received a $56,670 grant to manipulate the immune response focusing on the enhanced prediction of cathespin cleavage sites.

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Comings and Goings:

Megan Garrett joined us in September 2014 as our new Undergraduate Coordinator.

Christopher Johnson, our newest Laboratory Technician, joined us in February. He is a great addition to our team.

Carolyn Aita retired after many years of service as a Distinguished Professor. She's been with the Chemistry department since 2010. She was a great asset and she will be missed!

Faculty Promotions

Dr. Anja Blecking to Assistant Professor.

Dr. Kristen Murphy to Associate Professor.

Dr. David Frick, Dr. Mahmun Hossain and Dr. Andy Pacheco all to full Professor.


David Frick


Kristen Murphy


Anja Blecking


Mahmun Hossain


Andy Pacheco


Megan Garrett


Carolyn Aita


Christopher Johnson

Graduate Degrees Conferred

Spring 2013:

PhD (advisor)

Sarah Garvey (Dietz)

Steven Kopitzke (Geissinger)

Matthew Youngblut (Pacheco)

Ryan R. Kohlmeyer (Chen)

Maika Lor (Aita)

William Wobig (Petering)

Megan McCallum (Arnold)

MS (advisor)

April R. Grant (Aldstadt)

Summer 2013:

PhD (advisor)

Andrew Nowakowski (Petering)

Lisa Kendhammer (Aldstadt/Murphy)

Fall 2013:

PhD (advisor)

Eduardo Alberch Garcis (Hossain)

Michael Garvey (Tysoe)

Athena Marie Baranowski (Arnold)

Spring 2014:

PhD (advisor)

Alan Pawlak (Dietz)

Maria Shteynbuk (Hossain)

John Kestell (Tysoe)

Summer 2014:

PhD (advisor)

Dharaban Shah (Moran)

MS (advisor)

Amin-Patel Alaknanda (Woehl)

Belaynesh Feleke (Arnold)

Poonam Biawat (Cook)

Veronica Maria Marco Alvarez (Aldstadt)

Fall 2014:

PhD (advisor)

Mohammad Haque (Peng)

Taher Ababneh (Woehl)

Ali Namdarghanbari (Petering)

Jörg Woehl received a $100,000 grant to develop a prototyping platform for accelerated chemical analysis and drug discovery at the single molecule level.

Translational Grant Program award for "Industrial Fermentation and Biotechnology Option for the B.S Degree in Microbiology and the B.S. Degree in Biochemistry Including Laboratory Experiences and Internships to Serve Regional Biotechnology and Pharmaceutical Industries" Investigators: Daad Saffarini (UWM Biological Sciences - Lead PI), Mark McBride (UWM Biological Sciences), Peter Geissinger, Graham Moran, Alexander Arnold, Nicholas Silvaggi, & Mahmun Hossain (UWM Chemistry & BioChemistry)

Awards Day 2014

On April 18, the Department of Chemistry and Biochemistry held its annual Research Symposium and Awards Ceremony in the Wisconsin Room of the UWM Student Union. Organized by the department's Graduate Student Council, led by Lisa Mueller, Dan Pauly and James Wankowski, the event showcased the research of graduate, undergraduate and even high school students with 56 posters. The first poster session was at a relatively early hour, but the discussions were lively and animated. The pace of scientific discussions held right through to the end of the third and last poster session.

The department was proud to welcome three teams of high school students from the SMART Teams program administered by the Milwaukee School of Engineering: Brown Deer High School, Brookfield Academy, and Wauwatosa West High School. SMART (Students Modeling a Research Topic) will pair teams of high school students and their teacher with a research scientist mentor. Together, the teacher and mentor help the team explore cutting-edge research and obtain hands-on insight into the process of scientific inquiry. The teams build a physical model of a macromolecule to illustrate some aspect of the mentor's research and then present this as a formal poster and an informal presentation for a lay audience.

Awards Recipients

Chair's Outstanding Academic Service Award
Gloria Freschl and Patricia Nylen

The Introductory Chemistry Award
Kimberly Butler

Graduate Student Poster Keith Hall Award
Hannah Wagie

Graduate Student Poster Keulks Award
Jaclyn Trate

Graduate Student UWM Promoted Awards
Megan Corby and Kelly Teske

Undergraduate Poster McFarland Award
Shady Girgis

Undergraduate Poster UWM Sponsored Awards
Colin Brook and Andrew Brandl

Analytical Chemistry Award
Jonathan Bogart

Biochemistry Award
Chay Teng Yeo

Inorganic Chemistry Award
Sean Bannier

Organic Chemistry Award
Jonathan Bogart

Outstanding Junior Award
Christina Tersine

Outstanding Senior Award
Jason Van Roo

Durward Layde Memorial Scholarship
Sean Bannier

Moczynski Awards
Matthew Huisman and Muhammad Nazmul Hussain

The Sosnovsky Award
Huabing Sun and John Kestell

Faculty Awards and Patents

In addition to our outstanding productivity in terms of peer-reviewed publications and invited lectures, a number of faculty in Chemistry received prestigious awards and honors, and many are demonstrating their entrepreneurial spirit through patents:

2014

Dr. Alexander "Leggy" Arnold received one of two Young Investigator Awards at the 16th International Vitamin D Workshop honoring his contribution to the field of vitamin D.

Dr. Alexander "Leggy" Arnold was selected to receive the Office of Research/UWM Foundation Research Award. "Alexander has developed, equipped and staffed a laboratory with broad expertise to perform in vitro pre-clinical assays and evaluate biological specimens from test animals. This capability is a cores resource for my laboratory and many other investigators with the MIDD," said nominator and UWM Distinguished Professor James Cook.

Dr. Alan Schwabacher was recognized with a UWM Accessibility Resource Center Excellence Award.

John Kestell

Graduate John Kestell (Advisor Tysoe) won the ProQuest Distinguished Dissertation Award (first ever for a UWM student) for the State of Wisconsin. He and 60 other contestants will be competing nationally in Washington D.C. The title of his thesis was "The Surface Chemistry of Adatom Mediated Oligomers of Aromatic Diisocyanides and Dithiols on Au(111) and Granular Films."

This is the eighth consecutive year in which a PhD student from Chemistry has won a poster award at the international SciX Conference, the annual meeting of the Federation of Analytical Chemistry and Spectroscopy Societies. This year, Bradley Moran (Advisors Woehl and Geissinger) won a second-place conference award and a Society for Applied Spectroscopy poster award for his contribution, "Assessing Intrinsic Active Site Electric Fields via Stark Deconvolution." The winners last year were Hannah Wagie (Geissinger) and Bradley Moran (Woehl and Geissinger).

2013

Dr. Kristen Murphy received the American Chemical Society Henry Hill Award recognizing her distinguished service to the profession. She is sharing her award with Donna Nelson.

Huabing Sun (Advisor X. Peng) received the Distinguished Graduate Student Fellowship (2013-2014). His research focuses on the detection of DNA mutation and the discovery of photo-induced DNA crosslinking agents as potential anticancer drugs.

Ryan Kohlmeyer (Advisor J. Chen) won the National Research Council Research Associateship award.

Issued Patents

"Treatment of microbial infections with compounds that inhibit 4-Hydroxyphenylpyurvate dioxygenase" – Graham Moran and Panqing He

"Cysteine prodrugs to treat schizophrenia and drug addiction" – Jim Cook, Wenyuan Yin, and Edward Merle Johnson

"Nanoparticle electrostatic trap" – Jörg Woehl and Christine Carlson

"Anti-cancer agents" – Xiaohua Peng, Sheng Cao, Yunyan Kuang, Yibin Wang, and Wenbing Chen

Submitted Patents

"Design and synthesis of compounds with activity against bacteria and mycobacteria including Tuberculosis and Methicillin resistant bacteria," "New compounds to Treat Schizophrenia and Reduce Drug Cravings," and "Compounds for gram-positive bacterial infections" – Jim Cook

"Native SDS-PAGE and methods of the use to separate proteins with retention of native properties" – David Petering

"'High throughput identification of promiscuous inhibitors among screening libraries with the use of an intrinsically fluorescent probe" and "Vitamin D receptor coregulator inhibitors" – Alexander (Leggy) Arnold

"Development of a compounds to control airway hyperresponsiveness and inflammation in asthma" – Douglas Stafford, James Cook and Alexander (Leggy) Arnold

"HCV Helicase Inhibitors and Methods of Use Thereof" – David Frick

Friends of Chemistry

Friends of Chemistry: Your contributions enhance the educational experience of our students and strengthen the research and development of our faculty and staff. Please join us in thanking our friends (gifts from 3/2013-9/2014):

- Pfizer Foundation matching gift for John Stodola
- Ms. Lynn C. Moscinski
- Ms. LeAnn Lobrot
- Ms. Barbara Ann Regent
- Mrs. Shirley W. McLean
- Mr. William F. Gutknecht
- Mr. Thomas G. Kottke
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- Mr. Neil R. Kestner
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- MeadWestvaco Foundation matching gift for Kevin Ellis
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For more information on becoming a Friend of Chemistry and Biochemistry, please see the pledge form on the back, visit our website or contact Christina McCaffery at (414) 229-4963 or cmmakal@uwm.edu.

George and Christine Sosnovsky Lecture Series

Professor Emeritus Dr. George Sosnovsky recently renewed his support for the George and Christine Sosnovsky Lecture Series in Cancer Research through a generous donation that will allow us to continue this highly successful lecture series for many years to come. Professor Sosnovsky's initial donation established the lectures series in 2008, which brings renowned cancer researchers to campus for a two-day visit to present two lectures and to interact with Department students and faculty who are engaging in cancer research. Previous Sosnvosky Lecturers were:

2008: Professor Iwao Ojima, State University of New York

2010: Professor Gunda George, University of Minnesota

2011: Professor Piyush Gupta, Whitehead Institute of Biomedical Research (MIT)

2012: Professor Peng Huang, University of Texas

2013: Professor Lisa Coussens, Knight Cancer Institute Oregon Health & Science University

2014: Professor Laurence J. Marnett, Vanderbilt University

The 2015 Sosnovsky Lecturer will be Professor Craig Jordan of the MD Anderson Cancer Center in Houston. He will visit on Thursday, April 30th and Friday, May 1st, with the keynote on Friday at 3 pm in the Chemistry Building, room 180.

Please join us!

Highlights: Faculty Publications

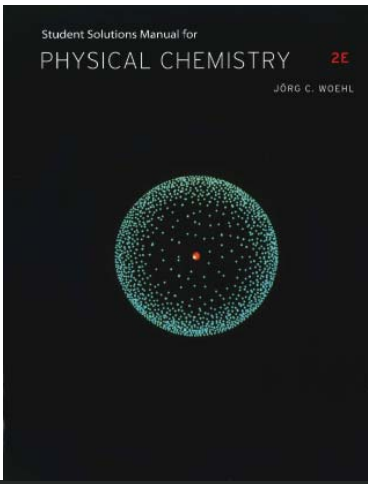
George Sosnovsky and C. Thomas Gnewuch

Harmful Effects of Solar Radiations, Myths and Facts About Sunscreen Agents, Oxidative Stress, Cancer and Other Inflammatory Diseases. Attempts and Prevention – 2013, ISBN 0615840361

This book describes the reaction between molecules and light in a biological setting and how sunscreen components and other compounds elevate or inhibit the negative effects of sunlight inducing various malfunctions in the human body including cancer and inflammation.

Jörg Woehl

Student Solutions Manual to accompany the 2nd edition of David Ball's "Physical Chemistry" textbook – Cengage Learning, 2014, ISBN 1285074785



Jörg wrote the fully worked-out, detailed solutions to all odd-numbered problems of the 22 chapters of the textbook. The topics cover classical thermodynamics, quantum mechanics, symmetry, spectroscopies (rotational, vibrational, electronic, magnetic), statistical thermodynamics, kinetic gas theory, kinetics, crystals, and surfaces.

Dr. David Frick publishes article in the Journal of Biomolecular Screening (JBS)

Dr. David Frick's publication "Discovering New Medicines Targeting Helicases: Challenges and Recent Progress" in the *Journal of Biomolecular Screening* was honored as the issue's cover story. The review summarizes the biochemistry of frequently targeted helicases. These proteins include viral enzymes from herpes simplex virus, papillomaviruses, polyomaviruses, coronaviruses, the hepatitis C virus, and various flaviviruses. Bacterial targets examined include DnaB-like and RecBCD-like helicases. Also discussed are common complications encountered while searching for potent helicase inhibitors and possible solutions for these problems.

Dr. Jian Chen and team design polymeric material that moves under infrared light

When exposed repeatedly to IR light for about two minutes, a hinged strip of nanotube-filled plastic walks an inch up an inclined surface.

Gone are the days when robots were made solely from rigid metal parts and electronic circuitry. Scientists now strive to make flexible, soft, nonmechanical robots that can change shape and delicately handle fragile objects. To help turn that vision into a reality, researchers led by Jian Chen have designed a soft polymeric material that moves when hit with a flash of infrared light (Angew. Chem. Int. Ed., DOI: 10.1002/anie.201210232). The team fabricated the robotic substance by polymerizing and stretching a mixture of acrylate-based liquid-crystal monomers and carbon nanotubes. They attached a sheet of the composite material to the top of a passive layer of silicone. When exposed to IR light, the nanotubes in the liquid crystal-silicone bilayer heat up, causing ordered polymers to undergo a phase transition and become disordered. The motion induces strain that forces the bilayer to bend. To demonstrate the material's usefulness, the researchers turned a sheet of it into a light-activated gripper that curls around small objects, enabling their transfer from one point to another. The team also added hinges of the polymeric bilayer to a plastic sheet and activated them in sequence to make the whole device walk slowly forward.

SE Wisconsin Applied Chemistry Center-of-Excellence

One of the biggest stories in the Department over the past year was the $3 million grant awarded under the University of Wisconsin System Incentive Grant Program with a match of $1.13 million from Shimadzu. This grant, a collaboration with UW-Parkside, allowed us to create the "SE Wisconsin Applied Chemistry Center-of-Excellence." The Incentive Grant Program is designed to strengthen the relationships between the UW System and Wisconsin businesses. As such, funded programs and activities are expected to support economic development programs, develop an educated and skilled workforce, and improve affordability of post-secondary education. The Center addresses each of these program goals by connecting facilities, small grants for collaborative projects between researchers and local businesses, and student internships.

The analytical instrumentation, now located in UWM's Chemistry Building, will move in early 2015 to a new 2,000 sq. ft. laboratory in UWM's new Kenwood Interdisciplinary Research Center. Instruments in the Shimadzu Laboratory of Advance and Applied Analytical Chemistry include:

- MALDI-7090 with AcuSpot and CHIP (MALDI TOF-TOF platform for proteomics, metabolomics, and tissue imaging)
- LCMS-IT-TOF (hybrid UPLC with integrated ion trap and TOF systems)
- GCMS QP-2010 Ultra with DI probe
- Triple Quad LCMS-8040 (with high speed positive/negative ionization switching)
- LCMS-2020 single quad
- FTIR-IR Tracer NIR/FAR
- UV-2600 spectrometer

A Shimadzu ICP-mass spec has been purchased and will come on-line in 2015. Laboratory instrumentation and space for samples preparation (e.g., chemical ink jet printing and matrix application), tissue culture, chromatography, and data analysis are also available.

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