

Chemmmunicator

Chemistry Department Develops New Strategic Plan

The chemistry department has developed a new strategic plan defining its mission, vision and objectives for the period of 2014-2020. Plans include a revival of the Missouri S&T Academy of Chemists and Biochemists and expanding our annual BBQ into a homecoming event for alumni. CBE (Chemical and Biochemical Engineering) will soon vacate Schrenk Hall and move into their new building. During this transition, we will identify and pursue necessary renovations including research and teaching infrastructure improvements.

The new campus strategic plan (<http://strategicplan.mst.edu/>) includes significant expansion and involves hiring as many as 100 additional faculty members over 7 years. In the short term this means two new positions for the chemistry department. A search is underway to fill a Biochemistry position and a new position in Polymer chemistry is expected to be approved soon.

Dr. Richard Dawes Receives DOE Early Career Award

Dr. Richard Dawes, assistant professor of Chemistry, has been selected to receive an Early Career Award from the U.S. Department of Energy through the Office of Basic Energy Science. This is the first and only award given in Missouri in the DOE early career award program's five year history. His research, titled "Multiple Coupled Potential Energy Surfaces with Application to Combustion," will receive \$750,000 in funding over the next five years from the DOE. Dawes plans to use the research funding to study the fundamental molecular dynamics of combustion at Missouri S&T.

Dawes and his collaborators use computer simulations to understand the properties and behavior of chemicals and materials in diverse environments such as hydrocarbon combustion in automobile engines, the dynamics of atmospheric species like ozone and the chemistry of interstellar space and planetary atmospheres.

The theory used to describe the interactions of atoms and molecules is the potential energy surface (PES). The PES is central to the way chemists think about the structure and dynamics of molecular systems, Dawes says, because it can be used to describe the energy of a system as a function of its geometry.

"Much of our work involves piecing together thousands of individual calculations at different geometries into continuous surfaces," he says. He is working on algorithms that combine hundreds or thousands of individual processors on high-performance computing clusters to automate that work.



Greetings From the Chair



In the chemistry department we look back at a very successful and exciting year. I am proud to say that we outperformed earlier years in our attempt to improve research support, graduate and undergraduate education, and the national ranking of our department. Research achievements such as Yinfa Ma's cancer detection method and Nuran Ercal's eye drops to prevent cataracts were named S&T's research highlights by Chancellor Cheryl Schrader and were mentioned in several news articles across the country. The redesigned Chem 1 course also received wide-spread attention. Journalists for newsletters of higher education used Chem 1 at Missouri S&T as example for successfully incorporating teaching technology, online components, and active-learning strategies in large-enrollment courses. Assistant teaching professor Emma Satterfield continues to incorporate new ideas into our chemistry education. She was named an S&T eFellow and received a grant supporting her project of learning enhancement by utilizing iPads.

I am thrilled to report a large number of prestigious research awards and recognitions chemistry faculty members received during the last year. Richard Dawes received the first DOE Early Career Award ever given to a researcher in Missouri. Acknowledging his achievements in computational chemistry he was also awarded an S&T Faculty Research Award, and he will be the recipient of the 2013 UM President's Award for Early Career Excellence. Jay Switzer was named AAAS (American Association for the Advancement of Science) Fellow for his groundbreaking work in materials chemistry and electrochemical synthesis, and Yinfa Ma will be the recipient of the 2013 UM President's Award for Mentoring. Our own alumnus Bill Acree (B.S., M.S., and PhD), Chemistry Professor and Department Chair at University of North Texas, was bestowed with the honor of an S&T Professional Degree. Jeff Winiarz became the director of the campus-wide LEAD (Learning Enhancement Across Disciplines) program after former director Ron Bieniek (Physics) left Missouri S&T for a dean position at Marshall University in West Virginia.

If you visited the department last year, you might have been surprised by the new faces in the department office. Shannon Roark, with his two years of service to the department, is now the senior staff member. We have hired Melinda (Mel) Warner as senior secretary and recently Tina Balch as additional office staff. They have been of immense support to our current students, staff, faculty, and visitors. It is a delight to work with them and benefit from the expertise they have gathered in such a short time of employment.

It is now time to take a step forward, continue our path of success, and aspire to improve laboratory infrastructure, chemical instrumentation, and student support. We have a desperate need for upgrading existing instrumentation and adding new analytical technologies. With the largest class of incoming chemistry majors in the history of the department, our efforts to provide cutting-edge and industry-relevant education becomes harder and more financially challenging. We recently received a sizeable gift from Brewer Science to enhance our NMR instrumentation and a brand-new ICP-MS instrument from Perkin-Elmer. But we are still looking for gifts to replace an NMR console that is 15 years old. The replacement of this console has become part of the campus strategic initiative and moneys directed toward replacing the console will be matched 100% by the UM system (up to a maximum \$100,000). A new NMR console will give graduate and undergraduate students the opportunity to gain access to modern NMR techniques with industry-standard software. This type of hands-on education is exactly what most employers look for.

I sincerely thank you for the support of your alma mater, wish you a successful and pleasant year, and hope you enjoy reading this edition of the "Chemcommunicator".

Welcome!

Dr. Garry "Smitty" Grubbs, II

The Chemistry Department is pleased to welcome Dr. Smitty Grubbs, Assistant Professor, to the faculty for the Fall 2013 semester. Dr. Grubbs received his B.S from Texas A&M University, his PhD from the University of North Texas under the direction of Stephen A. Cooke, and did his postdoctoral research at Wesleyan University under the direction of Stewart E. Novick. He is a member of Alpha Chi Sigma, ACS, APS, the current chair of the Graduate Affairs Committee, and is involved in many on-campus and off-campus outreach programs.

Dr. Grubbs' research interests lie in molecular rotational spectroscopy, particularly those molecules containing elements toward the bottom of the periodic table where data is needed to aid in theoretical understanding of these systems. His research involves building, maintaining, and implementing novel spectrometers with laser ablation sources. Currently Dr. Grubbs is in the process of restoring or building 3 rotational spectrometers: Two Fourier transform microwave (FTMW) spectrometers and one chirped pulse Fourier transform microwave (CP-FTMW) spectrometer. These will be used to study molecules of interest in helium storage, semiconductors, catalysis, atmospheric, and the interstellar medium.

Tina Balch

The chemistry department is pleased to welcome Tina to the department as a new office staff member. Tina is currently working in a temporary position for the next three months. She will help the current staff with any and all functions necessary to make the department run smoothly.

Melinda Warner

The chemistry department is pleased to welcome Melinda to the department as Senior Secretary. Melinda comes to us with a wealth of knowledge. She will primarily work with the ordering of supplies and with the department chair on various accreditation reports.

Alumni News

Dr. Cynthia Bolon, received two awards for outstanding effort and achievement residence halls. Dr. Bolon volunteers in the Thomas Jefferson Hall here on campus.

Dr. Richard Dawes, received the University of Missouri President's Award for Early Career Excellence.

Dr. Yinfa Ma, received the University of Missouri President's Award for Mentoring.

Dr. Jeffrey Winiarz, became director of the S&T campus-wide LEAD (Learning Enhancement Across Disciplines) program.

Arlene Ruth James, wife of Dr. William (Bill) James, passed away January 3, 2014 at the age of 92. Arlene and Bill were married for more than 71 years.

Dr. D. Vincent Roach, associate professor emeritus passed away March 23, 2014. A former chair of the chemistry department, Dr. Roach joined the chemistry department in 1965 after working as a research chemist at the U.S. Naval Weapons Laboratory in Dahlgren, Va.

Dr. David S. Wulfman, former Professor of Chemistry, passed away December 27, 2013. Dr. Wulfman joined the chemistry department in 1963. He last lived in Nova Scotia, Canada, which is also where he is laid to rest.

Dr. Nuran Ercal Researches Eyedrops to Prevent Cataracts

Dr. Nuran Ercal, Richard K. Vitek/Foundation for Chemical Research Endowed Chair in Biochemistry and an M.D., is conducting research that could prevent or cure cataracts, macular degeneration and other degenerative eye disorders using eye drops prepared with the antioxidant N-acetylcysteine amide, or NACA.

“NACA eye drops could represent an alternative to costly surgery, while greatly improving the quality of life for those afflicted,” says Ercal, who has been testing NACA on HIV-related problems, lead poisoning and other toxicities for 10 years. About four years ago she began testing it on eye disorders.

Ercal received a three-year, \$378,000 research grant from the National Eye Institute of the National Institutes of Health using preliminary data based on research by her former student, Joshua Carey, who earned bachelor’s degrees in chemistry and physics in 2007 and a Ph.D. in chemistry in 2012.

“The NACA solution prevented cataracts from forming,” says Ercal. “Our research will build on Josh’s research, to see if NACA can actually reverse the degeneration as well.”

Dr. Shakila Tobwala, Sri Krishna Yasaswi Maddirala, and Hsiu-Jen Wang at Missouri S&T’s chemistry department are currently working on this project. Others in the research group include the grant’s co-investigator, Dr. Humeyra Karacal from the ophthalmology department at Washington University in St. Louis.



Dr. Yinfa Ma Develops Technique to Detect Breast Cancer in Urine

Dr. Yinfa Ma, Curators’ Teaching Professor of Chemistry, has developed a new screening method that uses urinalysis to diagnose breast cancer before it can be detected with a mammogram. A clinical trial to confirm the technique’s effectiveness is underway at Mercy Breast Center in Springfield, MO.



Dr. Ma, uses a device called a P-Scan, to detect the concentration of certain metabolites, called pteridines, in urine samples. These biomarkers are present in the urine of all human beings, but abnormally high concentrations can signal the presence of cancer. Ma believes the levels continue to rise as the cancer advances.

“Cancer cells grow much faster than normal cells,” Ma explains. “So they release more waste into the urine and we begin to see a rise in the metabolite level.”

Currently all testing is done manually, but once the validation study is complete, Ma will work with Emergence BioScreening in St. Louis to develop an automated, FDA-approved instrument that can be manufactured for clinical use. Ma and his students plan to build the prototype P-scan instrument with funding from the University of Missouri System Intellectual Property Fast Track Funding Program.

Dr. Jay Switzer named AAAS Fellow

Dr. Jay Switzer, the Donald L Castleman/Foundation for Chemical Research Professor of Discovery, has been named a fellow of the American Association for the Advancement of Science (AAAS), the world's largest general scientific society.

Switzer was selected by AAAS for his distinguished contributions to the fields of materials chemistry and electrochemistry, particularly for pioneering work on the electrochemical synthesis of ceramic films and nanostructures. His current research focuses on developing catalysts for splitting water using sunlight, and the disposition of thin-film metal oxides for solid-state memory.

AAAS is an international nonprofit organization dedicated to advancing science around the world. It publishes the journal *Science*, as well as newsletters, books and reports. This year, AAAS elected 388 of its members as fellows. Switzer was presented with an official certificate and a gold rosette on February 15, 2014 at the AAAS Fellows Forum during the AAAS Annual Meeting in Chicago.



2013 Chemistry Phonathon

Last April's Chemistry Department phonathon was a great success thanks to you, our alumni. The department received pledges totaling \$8,940. Thank you to all who helped to support our students!

This year's phonathon will be held April 17-24. Any amount you can contribute will be greatly appreciated. Taxpayer support accounts for 40% of the university's general revenue, making your donations vital to furthering our department's strategic initiatives. This year our target is to improve undergraduate teaching instrumentation.

Congratulations Graduates!

May 2013

Basler, Brandon BS
Bass, Kelsey BS
Burton, Casey BS
Hart, Allison BS
Hull, Caleb BS
Jentsch, Nicholas BS
Mann, Easton BS
Marting, Caleb BS
Millier, Andrew BS
Mollhagen, Ariel BS
Pensel, Morgan BS
Smith, Stephen BS
Walker, Jessica BS
Wiggins, Marcus BS
Dan, Yongbo MS
Khayyat, Ahdab MS



July 2013

Chen, Minghang Ph.D
Chidambareswarapattar,
Chakkaravarthy, Ph.D
Mishra, Sukhada Ph.D

December 2013

Bergthold, Marissa BS
Dachroeden, Karl BS
Nocito, Dominique BS
Walsh, Kelly BS
Carr, Peris MS
Kacham, Rakesh MS
Mahadik, Shruti Ph.D
Wisner, Clarissa Ph.D

Academic Scholars 2013

This recognition is given to full-time students who earned a 3.2 or above GPA for that semester.

Spring 2013

Armstrong, John
Bass, Kelsey
Beltz, Justin
Burton, Casey
Castro, Alyssa
Choi, Jihee
Choi, Sunghee
Clark, Kevin
Cocke, Justin
Czeschin, Kathryn
Dachroeden, Karl
Donovan, Ariel
Frye, Hannah
Garr, Zachary
Gremminger, Thomas
Hendrix, Rachel
Hull, Caleb
Jentsch, Nicholas
Kelly, Kristen
Kosbar, Autumn
Landers, Alan
Manahan, Kevin

Mann, Easton
May, David
Meyer, Henry
Miller, Andrew
Miller, Joshua
Mollhagen, Ariel
Nocito, Dominique
Norman, Spencer
Patterson, Matthew
Pensel, Morgan
Puleo, Emily
Townzen, Daniel
Vollertsen, Steven
Wiesner, Hayle
Williams, Joshelp
Zimmerman, Casey

Cox, Olivia
Dachroeden, Karl
Demster, Ashley
Donovan, Ariel
Force, Nicholas
Franz, Sonia
Frye, Hannah
Gremminger, Thomas
Hendrix, Rachel
Holtmeyer, Caleb
Kopel, Jonathan
Landers, Alan
Martin, Tammy
May, David
Miller, Joshua
Norman, Spencer
Payton, Nicholas
Persinger, Thomas
Primm, Danielle
Steele, Samuel
Townzen, Daniel
Upschulte, Ashley
Williams, Abigail

Fall 2013

Bergthold, Marissa
Choi, Jihee
Choi, Sunghee
Clark, Kevin
Cocke, Justin

2013-2014 Scholarship Recipients

Choi, Jihee
Clark, Kevin
Daily, Colton
Donovan, Ariel
Fink, Anna
Holste, Natalie
Holtmeyer, Caleb
Insall, Mikaela
Johnson, Lucas

Kinder, Lisa
Kopel, Jonathan
Patterson, Matthew
Persinger, Thomas
Primm, Danielle
Saunders, Anastaia
Wellman, Josh
Williams, Abigail



Thank you!!!

Contributions

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Brewer Science Inc.
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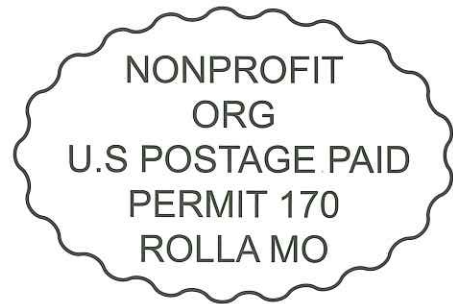
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Jill Renee Akers
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Name _____ Year attending UMR/Missouri S&T _____

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