4-2016

Mole Street Journal, April 2016

University of Arkansas, Fayetteville. Dept. of Chemistry and Biochemistry

UNIVERSITY OF ARKANSAS
J. WILLIAM FULBRIGHT COLLEGE OF ARTS & SCIENCES

The Mole Street Journal

Department of Chemistry and Biochemistry

Volume 15, Issue 2 April 2016

Special points of interest:

- ABI in the News
- New project for Durham
- Fulbright Competition
- Students admitted to Candidacy
- Alumni Highlight
- Biophysical Society Meeting Highlights

Inside this issue:

Biosciences Institute Passes Half-Billion in Grant Dollars

Leveraging money from the state's share of a 1998 national tobacco settlement, the Arkansas Biosciences Institute has surpassed a half-billion dollars in outside research grants, it announced Tuesday. The institute reached $508,780,000 this year in outside research grants awarded by both private foundations and federal agencies that include the National Science Foundation, the U.S. Department of Agriculture, the U.S. Department of Defense and the National Institutes of Health. The announcement came at a news conference at the State Capitol in Little Rock that included Gov. Asa Hutchinson.

The Arkansas Biosciences Institute is an agricultural and biomedical research program created by the Arkansas Tobacco Settlement Proceeds Act of 2000. It includes scientists at the University of Arkansas for Medical Sciences, Arkansas Children's Hospital Research Institute, Arkansas State University, the University of Arkansas at Fayetteville and the University of Arkansas Agriculture Division. The institute, which focuses on improving health, utilizes its partnership of scientists to compete for national research grants, leveraging funding from the tobacco settlement to bring such outside research grant money into the state. The first funding for the institute came in 2002.

The $508 million represents an average of $36 million a year in leveraged funds, said Dr. Robert McGehee, the institute's executive director and a professor of pediatrics at UAMS.

"The money is not targeted for Arkansas, but this brings new money into the state," McGehee said of the competitive process through which the research grants are awarded.

Other achievements heralded at the news conference include funding to support 350 full-time equivalent knowledge-based jobs annually at the five member institutions; 152 patent filings by its research investigators; and 34 patent awards for innovations in areas such as drug dependency, cancer treatments and the treatment of Alzheimer's, according to institute statistics.

Hutchinson singled out the patent awards as an example of how the research helps the state improve its economy.

"That means a revenue stream, it means technology, it means discovery," the governor said. The institute is also partially funded by the Arkansas Tobacco Settlement Commission.

Susan Hanrahan, chairman of the commission, thanked the Arkansas Legislature for staying committed to using 100 percent of the state's tobacco funds for health-related programs, while many other states have shifted funds to other purposes. The Arkansas Biosciences Institute is one of seven programs overseen by the commission and funded by the tobacco settlement proceeds.

"There are six others doing great work, too," Hanrahan said. "Arkansas has stayed committed to those seven programs. That's not true across the United States. Healthy people create a healthy community for all of Arkansas."

"ABI's work is not done," she continued. "We still have a lot of work to do." McGehee echoed that statement.

"It took us nine years to reach $250 million," McGehee said. "In a very short five years since we've doubled that. Our goal is to see if we can double it again in another five years."

The program grew out of a settlement reached with major U.S. tobacco companies accused of targeting youths in marketing campaigns and of misleading the public about the addictions associated with nicotine. When the companies settled, states had an option to join the settlement upon agreeing not to sue the tobacco companies.

Arkansasonline.com, March 30, 2016
By Jake Sandlin

UA faculty in a number of departments, including Chemistry and Biochemistry, have benefitted from access to shared equipment, seed funding for new projects, and bridging funding for projects between extramural research grants. A number of recent and ongoing publications, therefore, acknowledge partial support from the Arkansas Biosciences Institute.

Faculty News

On the Go

Foysal Khan, Benjamin J. Jones, Christena K. Nash, and **Ingrid Fritsch**. Expanding lab-on-a-chip applications for redox-magnetohydrodynamic microfluidics through polymer-modified electrodes and enhanced current-magnet relationships," Invited talk in the symposium on Magnetoanalytical Science: Separation, Characterization, and Imaging, Pacifichem 2015, Honolulu, HI, December 15-20, 2015.

Ingrid Fritsch gave an invited talk "Electrochemistry, Magnetic Fields, and Fluid Flow: Programming the Next Generation of Microfluidics" at Brigham Young University on March 24, 2016 and the University of Utah on March 25, 2016.

S.J. Jenkins, E.K. Miller, D.G. Meeker, M.S. Smeltzer, J. Chen. Engineering gold nanostructures for targeted delivery and controlled release of antibiotics. NanoEngineering for Medicine and Biology, 2016, Houston, TX; Poster (February 21-24, 2016). Miller received "Honorable Mention" among 67 students and post-docs who attended the poster competition of 2016 ASME NEMB. (See picture below)

J. Chen, **S.V. Jenkins, E.K. Miller, D.G. Meeker, M.S. Smeltzer**. Polymer-coated gold nanocages for photothermally-controlled release of therapeutic agents. International Congress of Hyperthermic Oncology, 2016, New Orleans, LA (Oral presentation, April 11-15, 2016).

Jingyi Chen gave a departmental seminar at the University of Texas Rio Grande Valley March 29, 2016, titled "Shaping bimetallic nanostructures with tunable optical and catalytic properties." This trip was also part of the recruiting activities of the department. Pictured below is her talk at UT Rio Grande Valley, where 80% of the student population belongs to underrepresented groups.

Publications

N. Kotagiri, **J. Sakon**, H. Han, V.P. Vladimir, P. Zharov, and J.W. Kim. Fluorescent ampicillin analogues as multifunctional disguising agents against opsonization. *Nanoscale* (2016) accepted.

Vishal Sahore, Adam Kreidermacher, Foysal Z. Khan, and **Ingrid Fritsch.** Visualization and measurement of natural convection from electrochemically-generated density gradients at concentric microdisk and ring electrodes in a microfluidic system. 2016. *Journal of Electrochemical Society*, 163(4):H3135-H3144.

Christena K. Nash and **Ingrid Fritsch.** Poly(3,4-ethylenedioxythiophene)-modified electrodes for microfluidics pumping with redox-magnetohydrodynamics: Improving compatibility for broader applications by eliminating addition of redox species to solution. 2016. *Analytical Chemistry* 8(3):1601-1609.

M. Fruchtl, **J. Sakon**, R. Beitle. Alternate carbohydrate and nontraditional inducer leads to increased productivity of a collagen binding domain fusion protein via fed-batch fermentation. 2016. *Journal of Biotechnology*, accepted.

US Provisional Patent filed: Cleavage resistant photoluminescent proteins and applications thereof. Bob Beitle Jr., Rudra Palash, Mukherjee; **Suresh Thallapuranam**, David S. McNabb, **Josh Sakon.**

Kyla M. Morris, Rory Henderson, Colin D. Heyes, T.K.S. Kumar, and **Paul D. Adams.** A switch I Mutant of Cdc42 bound to an effector protein influences its ability to inhibit GTP hydrolysis. *Small GTPases* 2016, 7(1):1-11.

I. Prudovsky, D. Kacer, **J. Davis**, V. Shah, **S. Jayanthi**, I. Huber, D. Rajalingam, O. Ganter, R. Soldi, D. Neivandt, U. Guvench, and **T.K.S. Kumar**. 2016. Folding of the fibroblast growth factor 1 is critical for its non-classical release. *Biochemistry*, 23, 1159-1167.

D.G. Meeker, **S.V. Jenkins, E.K. Miller**, **K.E. Beenken**, A.J. Loughran, A. Powless, T.J. Muldoon, E.I. Galanzha, V.P. Zharov, M.S. Smeltzer, **J. Chen.** 2016, Synergistic photothermal and antibiotic killing of biofilm-associated staphylococcus aureus using targeted, antibiotic-loaded gold nanoconstructs. *ACS Infect. Dis.*, DOI:10.1021/acsinfecdis.5b00117.

Pooja Bajwa, Feng Go, Anh Nguyen, Benard Omogo, and **Colin D. Heyes.** Influence of the inner shell architecture on quantum yield and blinking dynamics in core/multi-shell quantum dots. 2016. *ChemPhysChem*. 17, 731-740.

From the Chair ~ *Wesley Stites*

As you may know, Dr. Bill Durham will be retiring at the end of this semester. This is not an attempt to celebrate the many highlights of his distinguished career. We'll do that in a later issue of the Mole. No, instead my purpose today is to explain something Bill wants to do in retirement and highlight how our alumni and friends can make a difference for today's students.

When we renovated the Chemistry building seven years ago, we included a space adjoining the main hallway right by the main entrance with tables, chairs and vending machines. Students wait there for class changeover and there are often groups studying at all hours. In short it has been a very successful alteration to the building, making it much more friendly to our students. But as great as it is, I had an unrealized ambition to make it better. As you can see in the accompanying photo, the flooring is a rather undistinguished carpet. I thought it would be nice if we could put in terrazzo, to match the adjoining hall. But terrazzo is not cheap and we were watching pennies. I had an even more ambitious goal, too. It would be very neat, I thought, if we could somehow embed a periodic table in the terrazzo floor. But terrazzo with a design is even more expensive.

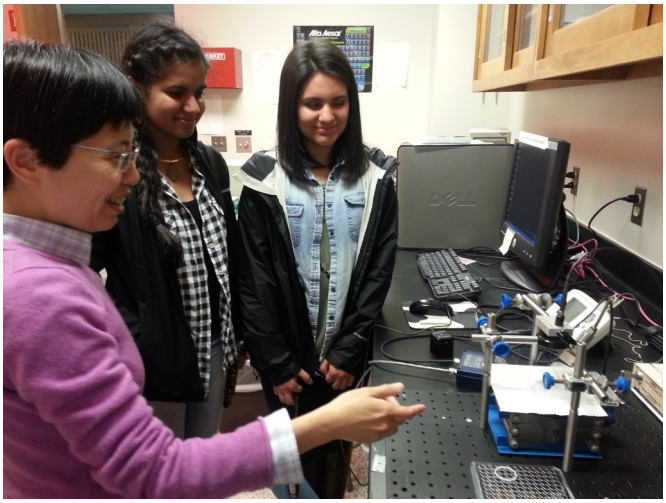
Well, time has marched on and we now have a lot of experience with terrazzo tile products in the renovation of Discovery Hall and they are much more affordable than casting in place. Soon to retire University Professor Bill Durham, who is never happier than when tinkering, has agreed to tackle in retirement (i.e. free labor) a project to put some pop and sizzle into our waiting room. We are going to use water-jet cutting of terrazzo tile to make a periodic table design for the waiting room. At least, we are going to do that if we can get some help from our readers. This isn't an essential expense like keeping the lights on or the walls painted, but it would add a unique 'chemical' spin to an otherwise somewhat mundane space that sees heavy usage. This is exactly the kind of project we couldn't think of tackling without the flexibility that gifts from our supporters affords us. So, if you want to make your old department stand out to today's students, we'd greatly appreciate your help to make this idea reality. Bill's wife probably will appreciate it too. I think she would rather have him down here measuring, planning, ordering, and laying tile than hanging out at home in retirement driving her crazy. If you are wanting to support this, please make sure to mention the waiting room project when you send in your gift. So on behalf of our students and Carol, thank you in advance!

Students can be found using this lounge at all hours, day and night.

Bill Durham on his tractor. This is his fate if his lounge flooring project doesn't materialize.

Chen Participates in High School Job Shadowing Program

Jingyi Chen is an ACS Science Coach, working with chemistry teacher Lara Irvin at Har-Ber High School in Springdale, AR. As part of the program, Chen hosted two high school students, Srusti Maddala and Clara Puente, for their job shadowing day on March 1, 2016. She explained to the students the measurement of temperature increase due to the photothermal conversion of gold nanocages.



Graduate Students Admitted to Candidacy

Two graduate students have passed their cumulative exams (cumes) and cleared any course deficiencies, and have, therefore, been admitted to candidacy.

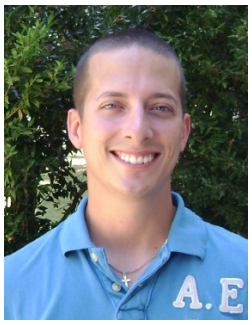
Fahmida Afrose entered the program in the fall of 2014. She is from Bangladesh and received her BS and MS from the University of Dhaka. She is a member of the Koeppe lab.

Julie Davis Eberle also entered the program in the fall of 2014. She is from Benton, AR, and received her BS from the University of Central Arkansas in Conway. She is a member of the Kumar lab.

Mengjia Hu Defends Dissertation

"Development of Electrochemical Sensors Suitable for In Vivo Detection for Neurotransmitters." Her advisor is Dr. Ingrid Fritsch. Mengjia entered the program in the fall of 2010. She defended March 4, 2016.

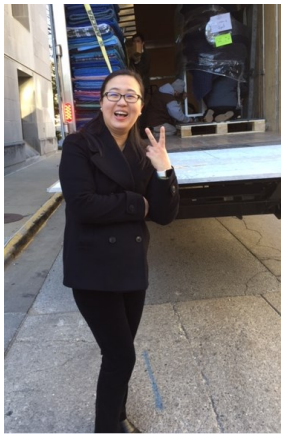
Graduate Students S. Morris and Moudy Participate in Fulbright Competition



Scott Morris

The inaugural three minute Fulbright Thesis Competition (explaining your research topic to a lay audience in three minutes with only a single static slide for visuals) took place February 9, 2016. **Scott Morris** and **Matt Moudy** represented the department, and Matt achieved second place! This competition is something we are hoping to incorporate with greater participation in the coming years. All departmental divisions are encouraged to hold a competition this semester with actual cash prizes at stake. The two winners of each division will advance to a departmental contest later this semester. Now that we know this is coming, next year we will hold the divisional and departmental contest in the fall ahead of the university contest. (Our contest is separate from the university, but Dr. Stites encourages all graduate students to participate in both). Being able to explain the importance of our work to a lay audience (i.e. taxpayers) is vital for all scientists. Well done!

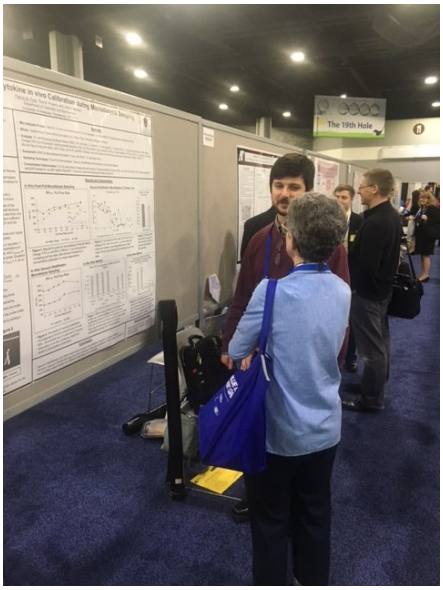
Matt Moudy



New Equipment

February 10, 2016, Dr. Jie Xiao accepted delivery of, in simplified terms, a glove box for CHBC 108. This apparatus allows her to assemble batteries in argon gas environments. Her lab is coming together. It was cold outside!

Undergraduate Patrick Pysz Presents Research



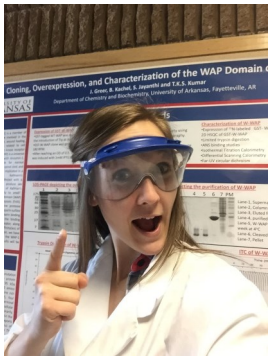
Pittcon 2016 was held March 6-10 at the Georgia World Congress Center in Atlanta, Georgia. **Patrick Pysz**, an undergraduate in the Stenken lab, presented his research, "Methods for Improving Cytokine in vivo Calibration during Microdialysis Sampling," co-authored by Patrick Pysz, Tina Poseno, and Julie Stenken.

Undergraduate Craig McLean Awarded Fellowships

Craig McLean (left) with research advisor Dr. Paul Adams

Craig McLean is the recipient of a 2016 National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP) Fellowship. His selection was based upon his demonstrated potential to contribute to strengthening the vitality of the U.S. science and engineering enterprise. The fellowship period is 5 years, with financial support provided for 3 years.

Craig was also chosen as a 2016 GEM Full Fellow. The mission of The National GEM Consortium is to enhance the value of the nation's human capital by increasing the participation of underrepresented groups at the maser's and doctoral levels in engineering and science. As part of this fellowship, he will be doing an internship with Pacific Northwest National Lab in Richland, Washington this summer. He will be working in soil microbiology metabolomics.



Joke Time - *with Julie*

"Why can't you trust an atom?"

Because they make up everything!

(ba dum dum)

Alumni Notes

We encourage each of you to share any news, personal or professional, with us. Ron Thurston was kind enough to update us on his time here and what has happened with him since.

> "My years at the University of Arkansas were in the early - to late 1960's and I have never forgotten the Chemistry Department (as it was known then). Particularly important was the guidance of Jacob Sacks. We remain friends with some of those early connections and people - my wife and I are good friends with B. C. Wang who is at the University of Georgia. I spent most of my career at Clemson University in South Carolina in what is now the Department of Animal and Veterinary Sciences. After receiving my master's degree at UofA in Animal Sciences I continued with graduate school at the University of Missouri in Columbia where I obtained the Ph.D. in Animal Physiology and remained on staff at the Harry S. Truman Hospital - involved in pulmonary medicine research until joining the Clemson faculty in 1977. My years at Clemson were enjoyable as I mentored many graduate students, conducted extensive research and taught graduate level physiology courses. My wife and I retired from Clemson in 2003 and moved back to Arkansas where we make our home in Benton County on the Thurston family property which has now been annexed into Bella Vista. I did serve on the UofA Biosafety Committee for a couple of years after moving back to the area. Our military-retired sons and their families have moved to the area and our five grandchildren are the bright stars in our life these days."

Ron also keeps active with music in the Arkansas Winds saxophone ensemble and manages the JM Band of Northwest Arkansas, playing Big Band music. Rumor has it that they are open to gigs (www.jmbandnwa.com).

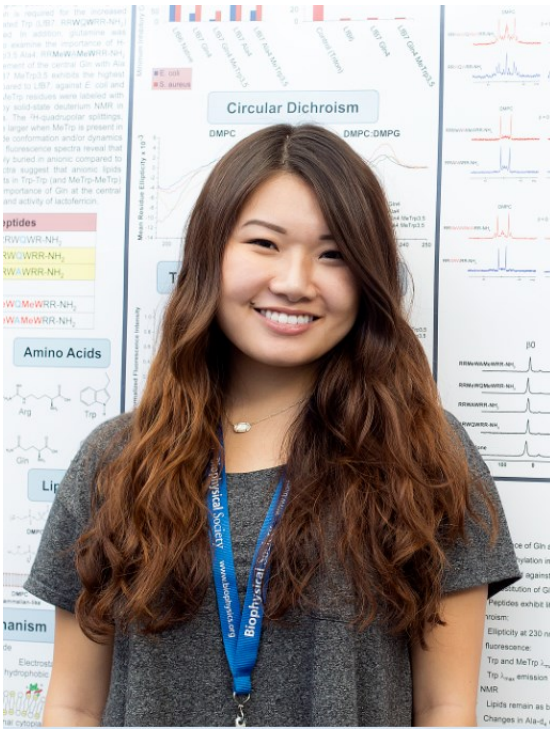
Students Attend 60th Annual Meeting of Biophysical Society

Undergraduate and graduate students from the Biochemistry division attended and presented their research at this annual meeting. It was held February 27—March 2, 2016 in Los Angeles, California at the Los Angeles Convention Center. The dynamic five-day Meeting provides attendees with opportunities to share their latest unpublished findings and learn the newest emerging techniques and applications. There were nearly 7000 attendees, with over 900 poster presentations and 500 speakers selected from submitted abstracts.

Poster presenters from the department were Matthew McKay, Fahmida Afrose, Jordana Thibado, Ashley Martfeld Henderson, Venkatesan Rajagopalan, Alexandrea Kim, Armin Mortazavi, and Ryan Wendt. Their presentations are listed below.

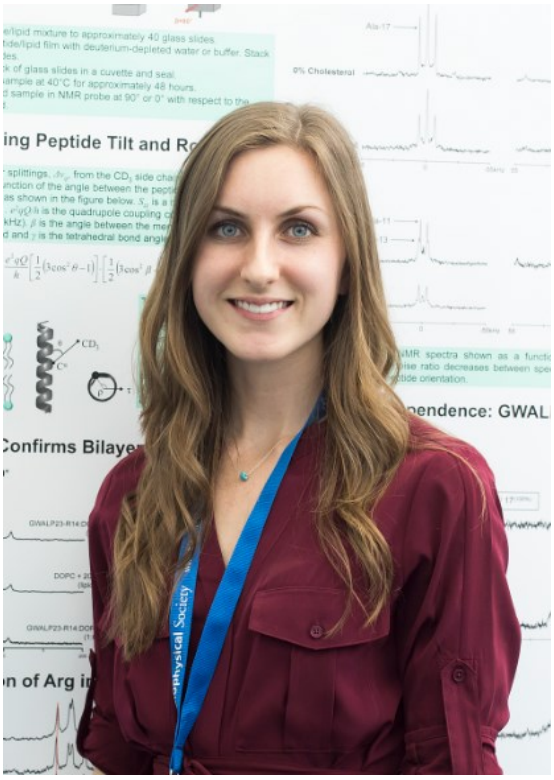
- Matthew J. McKay, Ashley N. Martfeld, Denise V. Greathouse, Roger E. Koeppe II. Monitoring the consequences of relocated the tryptophan anchors on transmembrane peptide dynamics and alignment.
- Radda Rusinova, Roger E. Koeppe II, Olaf S. Andersen. A general mechanism for drug promiscuity: Studies with amiodarone and other antiarrhythmics.
- Fahmida Afrose, Denise V. Greathouse, Roger E. Koeppe II. Solid-state NMR investigations of a transmembrane peptide having interfacial histidine residues.
- Jordana K. Thibado, Ashley N. Martfeld, Denise V. Greathouse, Roger E. Koeppe II. Cholesterol influence on arginine-containing transmembrane peptides.
- Ashley N. Martfeld, Denise V. Greathouse, Roger E. Koeppe II. Use of transmembrane peptides to understand ionization properties of histidine residues in lipid bilayers.
- Venkatesan Rajagopalan, Denise V. Greathouse, Roger E. Koeppe II. Varied approaches to the ionization behavior of specific BLU residues that face the lipids in transmembrane helices.
- Alexandrea H. Kim, Denise V. Greathouse. Lactoferricin peptides: The importance of methyl-tryptophan and glutamine for structure and activity.
- Armin Mortazavi, Venkatesan Rajagopalan, Denise V. Greathouse, Roger E. Koeppe II. Helix fraying may stabilize transmembrane alpha helices.
- Ryan M. Wendt, Venkatesan Rajagopalan, Denise V. Greathouse, Roger E. Koeppe II. Investigating possible interactions between ionizable residues in model transmembrane peptides.

Photos are courtesy of Denise Greathouse



Above: Alex Kim

Below: Jordana Thibado



Left: Armin Mortazavi

Below: Ryan Wendt

Bottom of Page: The Koeppe group with Professor Olaf Andersen's Group (Weill Cornell Medical College) and Dr. Julia Koeppe (Ursinus College) enjoying dinner together.

60TH ANNUAL MEETING Biophysical Society

THE MOLE STREET JOURNAL IS AN INTERNAL PUBLICATION OF THE DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY
CHAIR, WESLEY STITES
LESLIE JOHNSON, EDITOR

Mailing Address
CHEM 119
1 University of Arkansas
Fayetteville, AR 72701

Phone: 479-575-4601
Fax: 479-575-4049
Email: cheminfo@uark.edu

We're on the web!
Fulbright.uark.edu/departments/chemistry/
&
Department of Chemistry and Biochemistry *University of

Safety Tip:
by Bill Durham

Chemists can easily imagine molecules with shapes and functional groups that may serve a function when testing a theory. When theory meets the actual synthesis, be careful that you have not inadvertently created a seriously toxic or carcinogenic material. You can do this by looking up the hazards of similar compounds.

Department of Chemistry and Biochemistry

Calendar of Events

April
04 Seminar: Jonathan Rocheleau, University of Toronto, 3:30 Chem 144. The Design of Islet-on-Chip Devices and Apollo-NADP+ Sensors to Image Cellular Metabolism in Tissues
08 CUME - CHEM 144, 5:00 p.m.
11 Seminar: Barry Snider, Brandeis University, 3:30 Chem 144. Synthesis of Biologically Active Natural Products
18 Honors Day, 2nd Floor CHEM
25 Seminar: Rendy Kartika, LSU, 3:30 Chem 144. New Chemistries with Oxyallyl Cations
27 National Administrative Professionals Day
29 CUME - CHEM 144, 5:00 p.m.

May
04 Star Wars Day (May the fourth be with you)
05 Last Day of Classes
06 Annual Dead Day Departmental Picnic, 5:00 p.m. at The Gardens
08 Mother's Day
14 Commencement
22 REU and INBRE summer research program begins
30 Memorial Day. Office is closed
31 Summer Classes begin

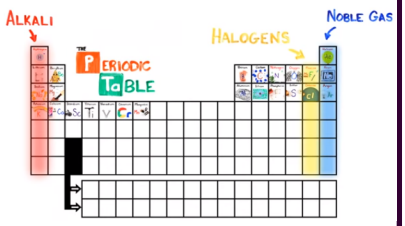
The department of chemistry and biochemistry at the University of Arkansas strives for excellence in research, teaching and service in chemistry - the central science. We aspire to positions of leadership regarding the discovery of new scientific knowledge, the training of students, and the economic development of the State of Arkansas. We seek to recruit and retain a diverse group of the best faculty, students and staff to address the challenges of the future through interdisciplinary and multidisciplinary research and education.

Faculty Receive Grant

The Honors College has awarded Professors **Jingyi Chen, Rob Coridan,** and **Stefan Kilyanek** a Faculty Equipment and Technology Grant. They will be provided with $10,000 toward the purchase of research equipment. Winning proposals, such as theirs, expertly elaborated on the following four points: Direct impact of the grant on honors students; Timeline for the number of students affected over a specified period; Transformational nature of technology or equipment; and Deliverables.

This is probably the best way to memorise the periodic table - because who doesn't need a refresher?

http://bit.ly/1oyjTy2



You needed an earworm, right?

Library Hours

CHBC Library (CHEM 225)
http://libinfo.uark.edu/chemistry

Spring Semester Hours: January 19 - May 14

Saturday and Sunday	CLOSED
Monday - Thursday	8:00 am - 9:00 pm
Friday	8:00 am - 6:00 pm

Exceptions to Regular Spring Hours

Sat - Mon	Jan 16-18	CLOSED
Friday	March 18	8:00 am - 5:00 pm
Mon - Thurs	March 21-24	8:00 am - 5:00 pm
Friday	March 25	CLOSED
Friday	May 13	8:00 am - 5:00 pm

The chemistry and biochemistry library resources can be accessed in the following LibGuides: http://uark.libguides.com/content.php?pid=110953. Please bookmark for future use.
Theses and dissertation resources can be found on the following LibGuide: http://uark.libguides.com/content.php?pid=123035 &sid=1057466.