

The University of Texas at Arlington College of Science  
**MAVERICK SCIENCE**  
Spring 2006



**New Chemistry and Physics Building  
Opening March 2-4 2006**

Welcome to the first edition of *Maverick Science*. This magazine is designed to keep our alumni and friends informed of the latest happenings in the College of Science. There was a contest for the name of this magazine, and the winner was Dr. Jim Horwitz, Chair of the Physics Department. The title is designed to match the new focus of UT Arlington and our unique identity as a University and as Mavericks ([www.uta.edu/whatisamaverick.com](http://www.uta.edu/whatisamaverick.com)).

This past year has been an exciting one in the College of Science. We made some excellent new faculty hires including our first Welch Chair in Chemistry (see article pg.12). We will be hosting the official opening of the Chemistry and Physics Building on March 3<sup>rd</sup>. The public will be invited to tour the building and experience the first showings at the Planetarium on March 4<sup>th</sup>. On March 2<sup>nd</sup>, there will be a special pre-opening event for those who have sponsored planetarium chairs to support the planetarium educational endowment. For more information on the planetarium and the chair sponsorship opportunity, go to [www.uta.edu/planetarium](http://www.uta.edu/planetarium).

One of the highlights of 2005 was the Distinguished Alumni Gala. Dr. Maxwell Scarlett was recognized for

his distinguished career of service to the medical profession, including a position as the

medical director of the emergency department at Rollins Brook Community Hospital. He maintains an active involvement in the arts community in Fort Worth and Dallas. He has been the recipient of several awards at UT Arlington, including the Outstanding African American Alumni Award and the Multicultural Trailblazer Award. We are proud to have Dr. Scarlett as one of our alumni and are thankful for his many contributions to his community and UT Arlington.

We hope you will enjoy *Maverick Science*. Please don't hesitate to get in touch with us by using the form in this magazine or by email. We would love to hear from you.



Dean Paulus with Dr. Maxwell Scarlett

A handwritten signature in black ink that reads "Paul Paulus". The signature is fluid and cursive, with the first name "Paul" and last name "Paulus" clearly distinguishable.

Paul Paulus, *Dean*  
*UT Arlington College of Science*

# Arsenic and Water

## - A Deadly Combination



Dr. Johannesson in her laboratory

**Arsenic:** The very word conjures up images of hideous crimes, but did you know that the major perpetrator of arsenic poisoning is not a culprit poisoning a foe? Most arsenic poisoning comes from drinking water, chiefly from groundwater sources according to the conclusions of research by Associate Professor in Earth and Environmental Sciences, Karen H. Johannesson.

Arsenic poisoning currently affects millions of people in the Ganges Delta and other regions of Southeast Asia. Since groundwater is also the chief source of drinking water, understanding the factors responsible for arsenic mobilization in aquifers is critical. Dr. Johannesson's National Science Foundation-funded research investigates how subsurface water (i.e., groundwater) interacts with the earth and organic compounds within the earth.

Dr. Johannesson and her team are examining groundwater chemistry and microbial processes occurring in the deep subsurface in order to understand the process that leads to the high levels of arsenic in waters. The thinking so far is that this process is microbially driven, perhaps, by bacteria that actually live off arsenic. Drinking

arsenic-laden water results in open lesions and other health problems for the consumer. Apparently, arsenic rich water is not only a problem overseas. There is an arsenic laden aquifer in Maryland.

It is a truly amazing experience to travel through Johannesson's labs and see refrigerator upon refrigerator filled with water samples from all over the world. Hours are spent analyzing water to see how different compounds interact with each other. We are certain, this research will bring about viable solutions to this important environmental health problem.

An indication of Dr. Johannesson's respect in the field is her recent appointment as an associate editor of *Geochimica et Cosmochimica Acta*, one of the top geochemistry journals. The visibility of her work will also be enhanced by her edited volume on *Rare Earth Elements in Groundwater Flow Systems* that was published last year by Springer.

[www.uta.edu/geology/](http://www.uta.edu/geology/)

## *A Doctor's Calling to Treat Pain*

Dr. Yuan Bo Peng was doing his residency as an M.D. in orthopedic surgery in China when he became interested in the nerve regeneration problems experienced by many patients who had a finger or hand reattached after amputation. So interested, in fact, he decided that instead of becoming a practicing surgeon, he would enroll in doctoral studies in neuroscience and begin a career of studying the issue of nerve regeneration and the causes and cures of pain. After receiving his Ph.D. degree from the UT Medical Branch at Galveston and post-doctoral appointments at Johns Hopkins University and the National Institutes of Health, he joined the neuroscience program in UT Arlington's Psychology Department.

The main focus of Dr. Peng is with the devastating problem of pain in people's lives. The great majority of patient visits to doctors are related to pain such as in the cases of arthritis, lower back pain, post-stroke pain, and cancer. Prescription drugs, rehabilitation and surgery are some of the options for dealing with pain, but, these work only for some conditions and some patients. Dr. Peng is involved in pioneering biomedical research to find techniques with broad utility in pain management and studies the mechanisms of pain transmission by recording activities of neurons.

Like much of cutting-edge science, Dr. Peng's research requires collaboration with a broad range of scholars. He has collaborated with Dr. Hanli Liu in Biomedical Engineering on the use of infrared optical techniques to measure neuronal activities in normal and pathological conditions. With Dr. Jung-Chih Chiao of Electrical Engineering, he has investigated the use of wireless technology for recording and stimulating neurons. The idea is to stimulate areas of the brain and spinal cord that are involved in blocking the transmission of pain signals. This technique can then be used by both patient and doctor to relieve pain. So just imagine in the future that instead of taking pills one can simply activate a small wireless device on our cellphone to get rid of that stress headache! Dr. Peng hopes to explore some of these practical possibilities and gain grant support from federal agencies for his innovative work. For the sake of the many people suffering with pain, we hope he will continue to make important new discoveries.

You can learn more about Dr. Peng's research at [www.uta.edu/psychology/faculty/peng/](http://www.uta.edu/psychology/faculty/peng/)

# MAVERICK SCIENCE

## Magazine Team

**Dean of Science**  
Paul Paulus

### Contributing Writers

Laura Gough  
Karen Johannesson  
Lori Norris  
Paul Paulus  
Yuan Bo Peng  
Krishnan Rajeshwar  
Zoltan Schelly  
Tristine Slayton

### Editors

Tristine Slayton  
Sue Stevens

### Designer

Tristine Slayton

### Photographer

Tristine Slayton  
Brian Moon (page 11)

The University of Texas at Arlington  
is an equal opportunity/affirmative action  
employer.

## Table of Contents

A Great Science in a Great New Building	2
College of Science and College of Engineering Research Day	4
Making a Difference in Math and Science Education	5
To Russia with Love	6
Advisory Council	7
Going Nano with Magnets	7
Leadership Giving – Family Legacy	8
From Texas Heat to Arctic Tundra	10
Research Centers in the College of Science: Center for Renewable Energy Science and Technology (CREST)	11
The College of Science Fills Chemistry Chair	12
Arsenic and Water - A Deadly Combination	13
A Doctor's Calling to Treat Pain	back cover

**Great Science  
in a  
Great New Building**



Public Opening  
March 4, 2006



UT Arlington welcomes a new addition to the campus. A new \$39.9 million Chemistry and Physics Building will have its public opening ceremony on March 4<sup>th</sup>. The building boasts 128,000 square feet, including a state-of-the-art planetarium, labs, research facilities, a conference room and study areas.

The building will create a hub for educational excellence, scientific discovery and economic development that will serve the entire Metroplex. The research and teaching labs housed in this new building will serve the Chemistry, Biochemistry and Physics programs, as well as the Center for Nanostructured Materials, a major grid computing facility and collider detector construction facilities for UT Arlington's internationally-known High Energy Physics collaboration.

The building is constructed to maximize research interaction between chemistry and physics and to foster student access to high quality teaching and research areas. It features a major new conferencing area for the College of Science, as well as public interaction and staging areas for large groups in a spacious foyer outside the planetarium.

The planetarium is a focal point of this new science building. With a sixty-foot diameter dome and seating for 165 people, it is the largest dedicated planetarium in the State of Texas. It is equipped with Digistar 3 – the most advanced planetarium imaging system available today and used in the best planetariums around the world. This advanced system will accommodate full color “star” shows and work like an IMAX theater for feature productions and interactive computer simulations of a variety of science phenomena. The Planetarium at UT Arlington is world-class.

The primary use of the planetarium is for teaching. Other uses include field trips for public school students and other groups, public shows for a fee, and special events.

UT Arlington now has 1,000 students in astronomy classes each semester. Each class can have as many as 200 students, not only science majors but also liberal arts students or business majors. The astronomy classes can be used as lab courses for non-science majors, affording students exposure to the scientific method and recent advances of knowledge about our universe. The College of Science predicts additional growth in astronomy classes with this new planetarium.

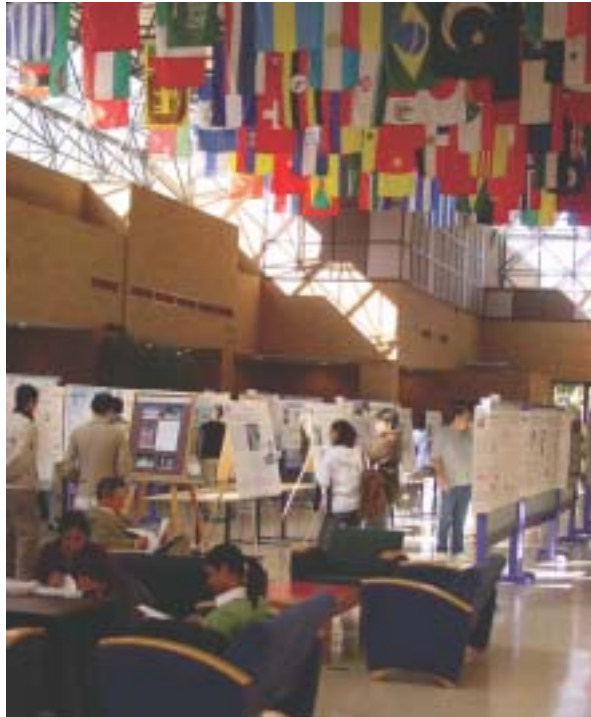
Planetarium Director Robert Bonadurer said the images produced by the new digital technology are truly spectacular. The Digistar 3 system will allow students to see solar systems, stars and galaxies, and the birth and death of stars, as well as programs on the exploration of the universe by unmanned space craft. There are also programs available which present information on other scientific disciplines, such as biology, which can be used in these classes.

The College of Science is very excited about the completion of this new building, which shows the dedication of UT Arlington to science education and groundbreaking research. An aggressive public outreach program will use the planetarium as a venue to offer planetarium, physics and chemistry shows to help motivate students about the exciting fields of science. As a showcase theater for science, it will encourage further participation by science teachers and their students in UT Arlington outreach activities. For more information, please visit [www.uta.edu/planetarium](http://www.uta.edu/planetarium).



Inside the new Planetarium.

# College of Science & College of Engineering Research Day



The Colleges of Science and Engineering Research Day was a very successful inaugural one-day celebration of research performed by students and faculty in the Colleges of Science and Engineering at UT Arlington. The event was held October 26, and it had overwhelming participation by both students and faculty. The objectives of this meeting were to: (a) introduce new faculty to ongoing research and development at UT Arlington; (b) seed collaborative efforts among faculty; and (c) identify clusters for developing large-scale centers of excellence and pursuing major grants. Plans are to use this event in the upcoming years to showcase the research and development advances in the two colleges at UT Arlington to outside constituencies, including city and state officials, industry and other area universities.

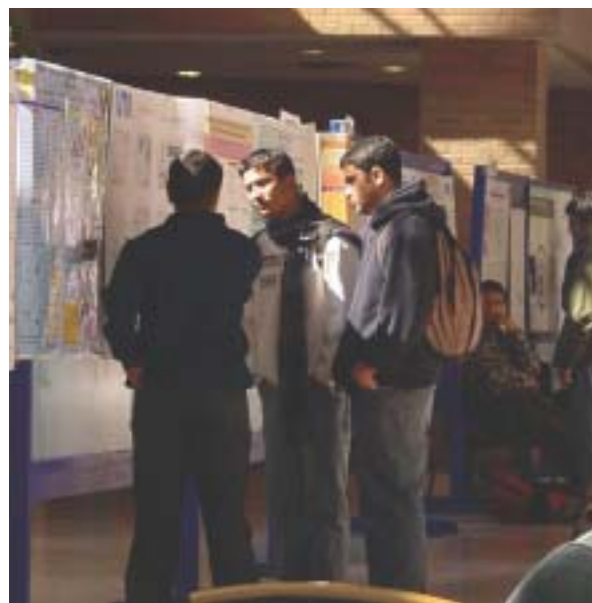
The day began with a keynote lecture to faculty by Dr. Art Ellis, Division Director of the National Science Foundation. After Dr. Ellis spoke, faculty members

broke out into panel sessions to discuss research and develop relations with other faculty members with similar interests and research to explore collaborative ideas.

These panel sessions broke into the topics of biotechnology, renewable energy, software/wireless communications, semiconductors and nanotechnology. The third component of the meeting was an afternoon poster session open to faculty, postdoctoral scholars and students. The meeting concluded with a debriefing/summary session and a discussion of action items for follow-up.

The most visible aspect of the day was the poster session where posters were hung wherever space was available. Students enjoyed mingling with other students and learning about their research and their professors' research.

Both the College of Science and the College of Engineering look forward to next year's Research Day. You can also visit [www.uta.edu/researchday](http://www.uta.edu/researchday) to learn about upcoming dates.



Students discussing their research posters

# Making a Difference in Science and Math Education

The MAIS (Master of Arts in Interdisciplinary Science) program reached a milestone last August when 13 science teachers from the Hurst-Eules-Bedford Independent School District completed the program. Although other local districts, such as Dallas, have had multiple students in the program, the “HEB Cohort” was the first group to begin and complete the degree as a group. This thirty-six hour non-thesis masters program led by Dr. Greg Hale offers K-12 science teachers updated content knowledge and hands-on teaching techniques that are compatible with standardized testing benchmarks and grade-level appropriate.

According to cohort member and HEB District Science Coordinator Gloria Chatelain, an unexpected benefit of having multiple teachers from one district enrolled was the opportunity for them to coordinate their curriculum and teaching techniques to eliminate information gaps between grade levels.

“Learning together as a cohort provided time for our teachers to bond and collaborate on multiple science and math topics, which helped us immensely in aligning our curriculum. It was an exciting opportunity to learn and raise the bar in science education,” Chatelain said.

The expense of graduate school tuition is often an obstacle on a teacher’s salary, but collaboration with the UT Arlington College of Education resulted in a successful grant application funded by the Sid Richardson Foundation, which paid half of the cohort’s tuition.

The benefits to local school districts are obvious. HEB superintendent Dr. Gene Buinger is a strong advocate for the program and has plans for a similar collaboration with UT Arlington for writing instruction.

“The sorry level of math and science achievement in this nation confirms the need to increase the numbers of teachers who hold masters degrees in these fields. The MAIS program at UT Arlington meets this important objective,” said Buinger.

Back in their home classrooms this year, cohort members eagerly share their new knowledge and skills with their own students. Building on this successful foundation, the College welcomed a new 15-member cohort from the



Graduation Day for 13 teachers with Dean Paulus and Dr. Hale (foreground)

Arlington ISD this semester. For these teachers, it’s back-to-school time – on the other side of the desk.

Another very successful program is the Master of Arts in Mathematics (MAMT). This program has graduated 14 students since 2001 and enrolls about 45 students in various courses each year. Dr. James Epperson was recruited from Texas Tech University to help develop this program, which is one of the few in the country that explores math content in such a way that teachers get the deeper understanding they need to effectively teach math at the secondary level. The course also enables them to utilize the latest technology for teaching mathematics using group and discovery learning approaches.

There is an increased emphasis on providing problem solving experiences in the schools. The curriculum and experiences provided in the MAMT program enable teachers to be effective in posing math problems and facilitating discovery of their solutions. This is essential for increasing student interest in mathematics and hopefully increasing the success of our schools in meeting state and national standards. The first graduate of this program was Mark Cox.

“This program has given me an insight to mathematics, the teaching of mathematics, and how students learn math. It has provided me many different avenues to reach my students through a wide range of teaching methods,” Cox said.

It is exciting for the COS to play such a positive role in enhancing the teaching of mathematics and science, and perhaps, the beneficiaries of this teaching will come to UT Arlington to continue to explore math and science.

# To Russia with Love

One of the exciting aspects of academic life is the opportunity to travel to conferences and universities all over the world. Although deans have little time for travel during the academic year, last summer provided a unique opportunity for Dean Paulus to visit some great universities.

Conferences in The Netherlands and Germany presented an avenue to connect with other scholars and discover the latest research developments. In Germany, the conference was held at the University of Würzburg on Röntgen Strasse, the street on which Wilhelm Röntgen discovered X-rays on his way to the first Nobel Prize in Physics in 1901. In The Netherlands, Dean Paulus spent a week at the University of Groningen located only a short distance from many of his relatives.

One highlight was the visit of Dean and Mrs. Paulus to St. Petersburg State University in Russia. The hosts for this visit were Dean Igor V. Buldakov of the Faculty of Geology, UT Arlington's Professor Merlynd Nestell and Adjunct Professor Galena Nestell. The Nestells were in Russia to continue their extensive geological research in that region.

St. Petersburg University has over 35,000 students and more than 5,000 lecturers and professors. It has a great history in science. Among the great scholars who taught there were Mendeleev and eight Nobel Laureates, including Ivan Pavlov. Impressive statues, busts, and museums highlight this glorious past. Visits to several

campuses and faculty provided an opportunity to learn about ways of increasing faculty and student exchange between the two universities.

Of course, no visit to St. Petersburg is complete without a tour of its many architectural and artistic wonders. The famous Hermitage and summer palace at

Peterhof were among the highlights. One unique experience was a boat tour of the Neva River through the center of St. Petersburg. Dean and Mrs. Buldakov treated their visitors to an exceptional dinner in the front section of the boat often used by President Putin for visiting dignitaries.

The Dean and Mrs. Paulus were most impressed by the vitality of the city and its people.

"I was very surprised by all of the large American, European, and Japanese luxury cars on the streets of St. Petersburg," said Dean Paulus.

He noted, however, that Dean Buldakov's car was an old Russian model. Apparently, academics in Russia, like most of those in the United States, tend to be among those of more modest means!

Yet, it was clear that scientists in Russia are as committed as those in the U.S. to advancing our state of knowledge and providing the basis for solutions to many of the challenges faced in this world. Possibly, increased collaboration between our two universities can help us make more rapid progress in this direction.

For further information see [www.spbu.ru/e/](http://www.spbu.ru/e/).



Dean Paulus with Mendeleev et al. in St. Petersburg

## Advisory Council Checks Out Planetarium



The College of Science Advisory Council

The College of Science Advisory Council kicked off the new year in style, hosting their January 25<sup>th</sup> meeting in the new third-floor conference room above the planetarium in the new Chemistry and Physics Building. The business meeting was followed by a “sneak preview” of the planetarium, which opens to the public on Saturday, March 4<sup>th</sup>.

Led by Chair Wayne Hoskins, First Vice Chair Dale Martin, and Second Vice Chair Don Reaser, this 35-member group of local business, industry and community partners works closely with Dean Paul Paulus and the COS staff to enhance COS connections to the local community. Now in its second year, the Council seeks to identify tangible ways to build stronger partnerships, enhance development efforts and heighten community awareness of the educational and research strengths of the college.

The Advisory Council operates under the rules and regulations of the Board of Regents of the University of Texas System. Membership is by invitation only, and members serve two or three year terms.



Dr. Ping Liu and students

## Going Nano with Magnets

The significant interest in advanced materials and the corresponding advances in information processing and storage have created a great demand for new generations of nanostructured magnetic materials. Spurred by a recent \$5 million dollar Multidisciplinary University Research (MURI) grant, Professor J. Ping Liu of the Department of Physics is currently studying hard and soft nanomagnetic materials spanning all four space dimensions: nanoparticles (0 dimension or 0D), nanorods and nanowires (1D), thin films and multilayers (2D) and nanostructured bulk magnets (3D).

The MURI program is a multiagency Department of Defense initiative that supports research teams drawn from academia and industry whose efforts intersect more than one science or engineering discipline. This particular MURI grant was awarded to a project team led by Dr. Liu at UT Arlington with collaborative research groups at Georgia Institute of Technology, Brown University, University of Maryland and Argonne National Laboratory.

Recent breakthroughs in Prof. Liu's group include a clever and simple strategy to make active iron-platinum composite nanoparticles of a particular structure with record coercivity—the magnetic field needed to reduce the magnetization of the material to zero. Their innovation centers around a method to get this particular structure without the problems which have plagued other research groups. By a simple chemical treatment of the nanoparticle surfaces, Liu and co-workers were able to prepare well defined nanoparticles with a narrow size distribution (particle diameters ranging from 4 to 15 nm) and coercivities in excess of 3 Tesla (Tesla, a unit of magnetic field). The production of the active iron-platinum nanoparticles by this method can be easily scaled up from the research laboratory to a manufacturing plant scenario and has the potential to be very economical.

Other ongoing studies revolve around the incorporation of iron-platinum and other types of nanoparticles in a nanocomposite film form using a novel electroplating technique. These studies are paving the way for magnetic nanoparticles to be used as building blocks for magnetic recording media and for biomedical (e.g., drug delivery) applications.

[www.uta.edu/physics/](http://www.uta.edu/physics/)



Barbara and Bill Hughes

## Leadership Giving – A Family Legacy

In the fall of 1925, William L. Hughes joined the biology faculty at North Texas Agricultural College. Across campus, Martha Woodson was beginning her teaching career in chemistry and women’s physical education. Perhaps it was “chemistry” that brought them together, or a shared passion for teaching. They married in 1927 and established a family tree whose roots still run deep at UT Arlington.

Dr. Hughes served as Chairman of the Biology Department from 1943 until 1963 and continued teaching until he retired in 1965. His wife went on to a second career in the Arlington public schools where she taught science for almost twenty years. Dr. and Mrs. Hughes’ devotion to this campus continues to make a difference today through the endowed William L. and Martha Hughes Award for the Study of Biology, which was established by their son, William “Bill” Hughes Jr. and his wife Barbara.

Soon after Bill Hughes was born in the early 1930’s, his parents built their family home on West Street, north of the present-day Baptist Student Ministry building. Hughes tells many stories about his formative years on campus.

“It was my playground,” he says fondly.

His days were spent exploring the underground tunnel system and watching the grandeur of the ROTC recruits drilling on the parade ground on the site of today’s Hereford University Center. When Bill graduated from Arlington High School he entered NTAC and spent two years here before completing his law degree at UT Austin. His successful career in law led to his eventual appointment as a Judge of the 48<sup>th</sup> District Court of Texas.

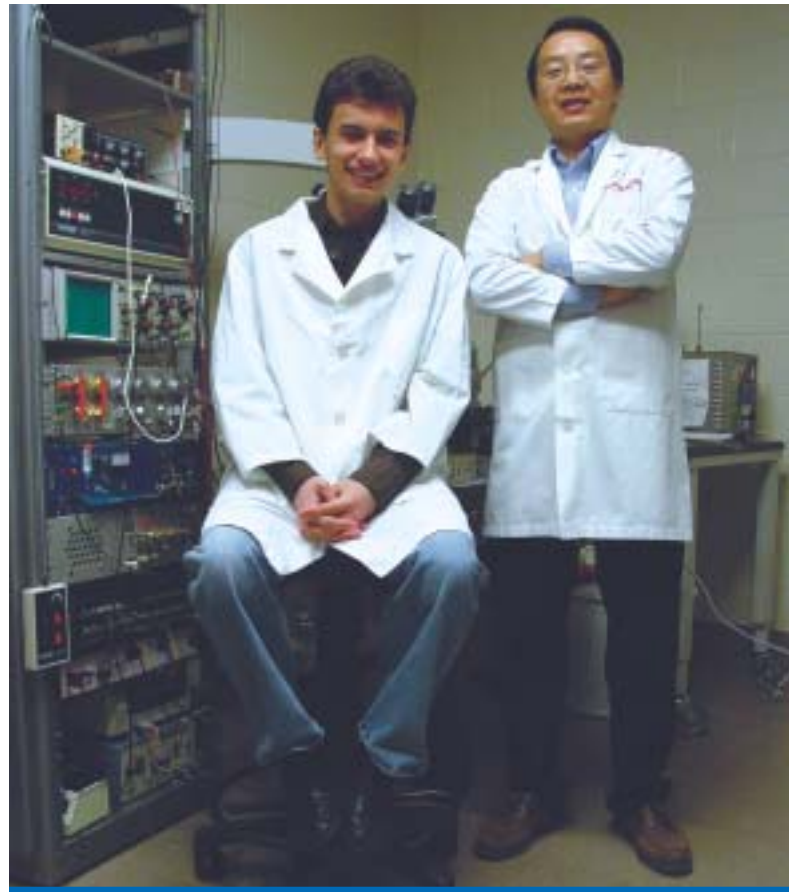
By that time, Bill had a son of his own, known as “Bill Three.” When it was time for him to begin college, UT Arlington was the obvious choice. Years of roaming the campus with his biologist grandfather had instilled in him a bond with the campus. That bond endures today as evidenced by the enrollment of two of the latest generation of the Hughes family – great grandsons Travis and Reid. “Bill Three” teaches government and coaches soccer at Kennedale High School, and his sons hope to follow in his footsteps as fourth-generation educators.

When asked about the motivation behind the endowment established in his parents’ honor, Bill Hughes paused to reflect for a moment.

“My mom and dad were schoolteachers. They didn’t make a lot of money in their lifetime, but when they died I wanted to do something with their money that would

be meaningful to them. My dad loved this place. In addition to serving as Biology Chairman, he coached the baseball team and served as chairman of the Athletic Council and secretary of the Pioneer Athletic Conference. His heart and soul were invested in UTA, as were my mother's. They were big believers in scholarships, and this seemed like a good way to honor that passion."

His parents would be proud to see the seeds they planted in the previous century are still flourishing at UT Arlington. The endowment has grown to the point that it now provides scholarships to five outstanding students in the Biology Department – students like Oleg Lobanov. Lobanov maintains a 4.0 GPA, while pursuing pain research under the direction of Yuan Bo Peng, M.D., Ph.D., Department of Psychology. His work has been submitted for publication to the *Journal of Neuroscience*, a very rare honor for an undergraduate. As the endowment grows, more students will receive scholarships annually through one family's legacy of love for UT Arlington.



Oleg Lobanov and Dr. Yuan Bo Peng

## Invest in the future of your College of Science!

Please fill out and return to us

Please update your address, request information, or tell us about yourself and your latest achievements:

Name \_\_\_\_\_ Grad Year/Major \_\_\_\_\_  
 Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
 Home Phone \_\_\_\_\_ Business Phone \_\_\_\_\_  
 Employer/Position \_\_\_\_\_  
 Email Address \_\_\_\_\_

I would like to be included the following:

- Dean's Excellence Fund
- College of Science Excellence Fund
- Planetarium chairs
- Speaker series
- Named or endowed professorships
- Science building naming opportunities
- Donation for
  - Memorial \_\_\_\_\_
  - Department \_\_\_\_\_

I would like information on the following:

- Dean's Excellence Fund
- Scholarship funds in the College of Science
- Equipment/Gifts-In-Kind
- Science Education Program
- Bequests and charitable gift planning
- Alumni Association membership
- Please subscribe me to the College of Science
- e-newsletter. My e-mail is listed above.

Please let us know what you are doing and about recent developments in your life (careers, education milestones, etc.):

Contact Gwen Notestine, Director of Development, to learn how it make an impact on the College of Science. \_\_\_\_\_  
 (817) 272-1497 or gnotestine@uta.edu

Send to: Office of Development, Box 19198, 701 South Nedderman, Rm. 421, Arlington, TX 76019-0198

**[Make your gift payable to UT Arlington](#)**

# From **Texas Heat** to **Arctic Tundra**

Imagine escaping the north Texas summer to work in the relatively cool Alaskan tundra with 24 hours of daylight. You spend much of your time studying how global warming is affecting plant growth and how that in turn affects animal activity. Sounds incredible, doesn't it? This is what Dr. Laura Gough, Biology Associate Professor, has been doing for ten years with funding from the National Science Foundation. A couple of her lucky students earn the right to travel with her each summer. It sounds like a dream vacation except for the fact that up until a couple of years ago the research station where Dr. Gough and her students stay didn't have running water. It can snow at any time (even in July!), and the mosquitoes buzz incessantly.

Her Alaskan research takes place during June and July and for the remainder of the year her research continues at the Fort Worth Nature Center and Refuge (owned by the city of Ft. Worth) which holds 3,600 acres of the remaining natural/original ecosystem of the metroplex. Dr. Gough and several of her students work with Refuge employees to help collect data on prairie management, including controlled burns and bison grazing. One of the biggest culprits of destroying the natural prairie of the area is Johnson grass which was imported from the Mediterranean in the late 1800s. This grass produces a cyanide compound when stressed and exudes a chemical from its root that is toxic to native prairie plants—once this grass is planted, you can't plant anything else in its place.

Since 1996, Dr. Gough has been investigating patterns of species diversity in arctic tundra plant communities in northern Alaska. Initially as a postdoctoral researcher she has tested hypotheses related to the influence of landscape age (time since deglaciation), soil pH, nutrient and light availability, temperature, and herbivore activity on species diversity. Much of our understanding of terrestrial tundra ecosystems comes from experiments conducted in the most common vegetation type in the region: moist acidic tundra. She has focused work on this community and the second most common: moist non-acidic tundra, which occurs on landscapes that have been more recently deglaciated or receive less deposition. Her work and that of others has shown that soil pH is highly correlated with species diversity and particular combinations of species across



Alaskan research station

landscape gradients in the region, and that moist non-acidic tundra has higher pH, greater species diversity, more graminoids and fewer shrub species than moist acidic tundra.

In this time and age where weather patterns and how the ecosystem is affected is such an important topic, it is easy to understand the necessity of this type of research. Her findings will enlighten us on the influence of these new forces.

Dr. Laura Gough was recently appointed to the editorial board of *Ecology* and *Ecological Monographs*. These are the leading journals in the general field of ecology published by the Ecological Society of America. This is a considerable honor and is a credit to her dedication to research and education.

To see more of Dr. Gough's research, visit [www.uta.edu/biology/gough/](http://www.uta.edu/biology/gough/).

# Research Centers in the College of Science

## Center for Renewable Energy Science and Technology (CREST)

There are more than 13,000 major research centers in various universities in the United States, not including laboratories of individual faculty members, many of which have the word “Center” in their organizational name. What are the advantages to having research centers on a university campus? Centers can rapidly respond to critical technology needs of a nation and its economy. In contrast to the single scholarly discipline characteristic of an individual faculty member’s research, centers feature interdisciplinary and cross-disciplinary topics and even facilitate coordination of disparate fields. By collaborating under the center umbrella and pooling complementary resources and expertise, faculty considerably enhance their chances of securing extramural funding. The College of Science has many successful centers operating under its aegis, some of which cut across college boundaries. We will feature one center in each issue of this magazine.

More than 20 scientists and engineers in the Colleges of Science and Engineering at the University of Texas at Arlington are performing collaborative research and development under the umbrella of the recently established Center for Renewable Energy Science and Technology (CREST). Energy has been listed as humanity’s number one problem for the next 50 years by several agencies. The fact that it surpasses other issues such as water, food, environment, poverty, terrorism, war, disease, education, democracy, and population, underscores the criticality of energy in almost everything that a society does. The U. S. Department of Energy projects (<http://www.eia.doe.gov/oiaf/ieo>) that the world’s total energy consumption will rise by 54% between 2001 and 2025.

This projected increase may be underestimated due to the rapid economic development in heavily populated countries like India and China. To meet our future energy needs, we must develop alternative energy sources because (a) the fossil fuel reserve will not be sufficient to meet the demand beyond 2050; and (b) an over-reliance on fossil fuels (many of them are located in politically unstable regions in the Middle East, Central Asia, Africa, and Latin America) has both environmental and political implications as highlighted in recent events.

Recognizing the importance of this critical problem, many individual faculty members on campus have been active on various aspects of energy research and development, and these activities are supported by various funding agencies. However,

CREST has the overarching goal of bringing together these dispersed activities under one organizational umbrella. It coordinates the research and development efforts of various faculty members on campus and will lead to focused multidisciplinary research teams pursuing a common theme within the energy framework. It also provides a centralized facility with state-of-the-art instrumentation to enable cutting-edge energy research and development. Examples of major activities in energy research and development currently under the CREST umbrella on campus include:

- Methods for hydrogen generation using renewable energy sources (e.g., sunlight and water)
- Materials for energy conversion and storage (e.g., carbon nanotubes, permanent magnets, advanced photocatalysts)
- Solar photovoltaic devices (e.g. organic, composite, inorganic, quantum-well, and nanoparticle solar cells)
- Arc reformation of methane and pulsed detonation energy source
- Integrated resource planning and distributed generation schemes
- Novel analytical methods for characterization of energy materials and devices
- Energy system and power grid integration
- Fuel cells
- Biomass and solar thermal energy conversion

The Center draws faculty teams from major research programs in Chemistry, Electrical Engineering, Physics, Materials Science and Engineering, Mechanical and Aerospace Engineering, Industrial and Manufacturing Systems Engineering, and the NanoFab Center. Collaborations extend beyond campus via the close ties already existing between the CREST faculty and institutions such as Sandia National Labs in Albuquerque, NM, National Renewable Energy Laboratory in Golden, CO, and SPRING (Strategic Partnership for Research in Nanotechnology) partners, including UT Austin, UT Dallas, UT Brownsville, UT Pan American, and Rice University.

Further information on CREST activities may be found on the website: <http://cos.uta.edu/crest/>

## The College of Science Fills Chemistry Welch Chair



Dr. Daniel Armstrong

Daniel Armstrong became UT Arlington's first Chemistry Welch Professor in January. The endowed chair was created with a million-dollar matching grant from the Welch Foundation in Houston in the mid-1990s. The university began raising the million dollars needed to finish funding of this chair, and the search for a suitable candidate to fill this prestigious position began in earnest a couple of years back. Professor Armstrong was identified as a candidate mainly through the efforts of an ex-faculty colleague at Texas Tech University. During his campus interview visit, Armstrong was impressed by the quality and potential of the Chemistry & Biochemistry Department at UT Arlington and the commitment shown by the university administration to create a top-notch research environment. Subsequent negotiations culminated in Armstrong accepting the appointment offer this past fall. On his move to UT Arlington, "He'll enhance our profile even more because he is a nationally renowned scholar," said Paul Paulus, Dean of the College of Science. "There will be attention to the fact that he's coming here."

Prior to his move to UT Arlington, Armstrong was a Caldwell Distinguished Professor and with the Ames National Laboratory at Iowa State University. He has over 330 publications, including twenty book chapters, one book ("Use of Ordered Media in Chemical Separations") and eight patents. He has been named by the Scientific Citation Index as one of the world's most highly cited scientists, and he has given over 350 invited seminars and colloquia worldwide. He has won numerous national and international awards, and is on the editorial board of 11 scientific journals.

Daniel Armstrong is considered the "Father" of micelle and cyclodextrin-based separations. He was the first to

develop macrocyclic antibiotics as chiral selectors, and he is the world's leading authority on the theory, mechanism, and use of enantioselective molecular interactions—all of vital importance for the drug industry. His revolutionary inventions in chiral separations have been commercialized and/or copied worldwide, and resulted in the Food and Drug Administration's issuance of new guidelines for the development of stereoisomeric drugs in 1992. Subsequently, the nature of drug development changed worldwide.

In his most recent research, Armstrong uses room temperature ionic liquids (RTILs) as a novel media for separation and analysis. This "environment-friendly" RTIL approach makes it possible to diagnose disease, determine viability and characterize virtually any sample for microbial contamination in a matter of seconds to minutes.

Due to its interdisciplinary and national importance, Dr. Armstrong's large research group's work is supported at the \$2 million per year level by several federal agencies and private companies. The students trained in his laboratories in the cutting-edge technologies developed by Armstrong are sought-after targets for employment by drug manufacturers, government research labs and academic departments.

Attracting a world-class scientist of Dr. Armstrong's stature to UT Arlington will have a tremendous impact not only on the university but also on the University of Texas System and the State of Texas. His presence and dynamic creativity will ferment collaboration between universities and industry, just as much as between universities and medical schools, and among researchers of different disciplines in various academic departments. Under his leadership, such collaborative efforts are expected to result in a quantum jump in federal research funding to the State of Texas, which currently lags behind states of comparable population such as New York and California.