Fall 2008

Chemistry & Biochemistry Newsletter

Department of Chemistry & Biochemistry, South Dakota State University

In 2010, the Avera Health and Science Center will be the new home of SDSU's Department of Chemistry and Biochemistry.

Inside

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South Dakota State University

Chemistry & Biochemistry

Fall 2008

Greetings from the Department! A new semester is well under way, and we have never been busier.

Our graduate research and education programs continue to grow to meet the needs of the South Dakota, the region and the nation. The doctoral program currently enrolls 41 students which is its largest enrollment since it was reinstated in 1989. Our research focus areas continue to emphasize environmental/green chemistry, applied bio-photonics with an emphasis on biological control and analysis, and chemical education and are maturing rapidly. We will graduate four of these degree candidates this December, making it the largest graduating doctoral class since the program was restarted. We also began a nonthesis MS of chemistry with an emphasis on chemical education specifically to meet the needs of regional teachers to improve their content knowledge in order to achieve "highly-qualified teacher" status. This program is unique because the majority of the classes are offered via the web and requires only two, two-week on-campus summer courses to better serve the needs of teachers. It was approved only approved by the Board of Regents in May, 2008 yet we have nine students enrolled in the first cohort that began in September. You can find out more about this program inside.

The undergraduate program continues to grow. The process of implementing the new CLS instructional model is well underway and you can read about that on page 3. There are currently 65 chemistry majors enrolled, and the biochemistry major which began in 2006 continues to expand with 24 majors declared.

And of course, the construction of the addition to the Shepard Hall facility and the renovation of new Shepard Hall are well underway. The work began in May 2008 with the demolition of the pharmacy annex and has progressed to where they are finally starting to raise steel to construct walls. A pictorial timeline begins on page 8 to give you an indication of what has taken place so far—and how far we have to go. Teaching and conducting research within such a large project has its challenges (it's 48°F in the hallway as I am writing this, I know, we just measured it!), but we know that that the outcome will be worth it, for our teaching and research activities.

And there are many other things going this year in addition to the building:

- we are conducting searches for a new director of the CLS program because Deb Pravecek has indicated that she will be transitioning to retirement over the next two years) and two new faculty members dedicated to the CLS program, and a new faculty member to continue to build the chemical education group;
- the self-study for the CLS accreditation process that will take place in late 2009 is underway, and;
- we will begin a self-study for our institutional program review in early 2010.

A lot to do in a short time, but we are all energized by all the good things that are in motion. I look forward to reporting back next spring.

Have a Happy Holiday season. Stay in touch!

PlainGreen Conference 2008

Julee Driver, Jeremy Kroon, Tunde Dioszegi, Doug Raynie, Lisette Tenlep, Victor Essel, Ganesh Degam, and Kan Shen attended the inaugural Plain Green conference in Sioux Falls, SD.

PlainGreen 2008 was the inaugural conference dedicated to education and advocacy for sustainability in all its forms throughout the upper Midwest. The Conference was held September 24-26 in Sioux Falls. Prior to the conference, a call for nominations was held to recognize sustainability efforts in three categories. The Green Chemistry research group of Prof. Doug Raynie was awarded the grand prize in the "Plain Resolve" category. This category called for entries in environmental research that can build awareness about sustainability and address an environmental and/or socio-environmental problem.

The Green Chemistry Laboratory includes team leader Doug Raynie and team members Julee Driver, Lisette Tenlep, Jeremy Kroon, Tunde Dioszegi, Ganesh Degam, Victor Essel, and Kan Shen. Their research is meant to address three human needs including social, economic, and environmental needs. The team is active in outreach and educational activities in the area of Green Chemistry. This includes the development of curricular material and an assessment of how exposure to green chemistry may positively influence a student's views on social responsibility. Their laboratory research involves such diverse areas as the environmental fate and transport of manmade chemicals, biofuels and biomaterials, green solvent processes, and methods to assess the "greenness" of a chemical procedure. It is their belief that sustainability and green chemistry are not distinct processes, but rather a way of thinking about how to approach the performance of research, scholarly endeavors, creative expression, and everyday living that must pervade our habits, mannerisms, and lifestyles.

The judge for the "Plain Resolve" category was Distinguished Professor of Ecology Dr. Carter Johnson of SDSU. He described the SDSU entry as a refreshing and progressive contrast to the chemistry of the past, where thousands of products were introduced to the world marketplace without adequate hazard testing. He was particularly impressed by two components of the project. First, that it was strongly student oriented and educational. He stated Dr. Raynie, the project leader, should be complimented for guiding the project and involving so many graduate students. Second, the project provides many examples of how their green chemistry approach can be applied. He was especially interested in their graphics explaining alternative pre-processing methods to improve the process of converting warm-season grasses such as switch grass and cord grass to liquid fuels such as ethanol. This issue fits well with the project's overall goal of blending social, economic, and environmental needs.

Dioszegi attends International ACS Green Chemistry Summer School

Graduate student Tunde Dioszegi was accepted into the highly competitive sixth International American Chemistry Society Green Chemistry Summer School held at the Colorado School of Mines in Golden on July 9-17.

Dioszegi is a first-year graduate student from Romania and is the fourth SDSU student to be accepted into the competitive summer program during the last four years said SDSU Green Chemistry Group founder and adviser Doug Raynie.

The school offers short courses taught by internationally acclaimed lecturers and postgraduate students from the Americas.

The Green Chemistry Summer School encourages students to engage in discussions on the role of science and technology in solving global sustainability problems such as advancing renewable resources, promoting life cycle analysis, finding energy sources and building sustainable buildings.

SDSU seeks Clinical Laboratory Science/ Medical Tech accreditation

SDSU's clinical laboratory science (CLS)/medical technology program is pursuing accreditation to meet a growing national need for clinical laboratory scientists, according to James Rice, head of chemistry at SDSU.

Currently SDSU's CLS program is a 3+1 program, which means that CLS majors take three years of coursework at SDSU and spend one additional year interning at an accredited hospital-based school of medical technology/ clinical laboratory science. If the National Accrediting Agency for Clinical Laboratory Sciences grants the accreditation, all four years of study will be granted through a Bachelor of Science degree from SDSU.

Clinical laboratory scientists perform hospital lab work in a variety of areas, including microbiology, chemistry, hematology, immunology and blood banking.

Rice said that SDSU accreditation is a matter of necessity. "There's a severe nationwide shortage of clinical lab professionals," he warned. "Last year there were only 5,000 graduates to fill 12,000 positions nationwide because there aren't enough accredited programs."

Deborah Pravecek, assistant professor of chemistry at SDSU has spearheaded the accreditation effort at State. Pravecek said that South Dakota has only two accredited hospital schools to serve the state—Sanford Health in Sioux Falls and Rapid City Regional in Rapid City. Now the two accredited programs graduate a total of 16 students a year, enough to staff only their own laboratories. With limited internship slots, SDSU is unable to expand its program unless it becomes accredited.

"Under the new program, SDSU will hold the accreditation," Pravecek said. SDSU would be responsible for the CLS majors' classroom education, while participating hospitals would provide hands-on experience. "As a result, we will be able to actively recruit majors into the program because we will be able to use any hospital, not just those with an accredited school for the internships," she continued.

Both Pravecek and Rice feel that SDSU's accreditation would benefit South Dakota's growing health care industry.

"Because of the limited number of programs in South Dakota, many SDSU students are forced to go out-of-state to complete their clinical training. When the students leave, they frequently relocate permanently," Pravecek lamented.

SDSU Assistant Professor of chemistry Deb Pravecek, is spearheading the effort to get accreditation for the school's clinical laboratory science/medical technology major for fall 2008 classes.

The new accreditation would not only keep those students in the state, but also attract out-of-state students to SDSU and the state medical workforce, said Rice.

Pravecek named South Dakota's ASCLS Member of the Year

Deborah Pravecek was named the 2007 Member of the Year for the South Dakota chapter of the American Society for Clinical Laboratory Science (ASCLS). She traveled to Washington, D.C., this summer to compete with her counterparts from across the country for the title of National Member of the Year of the organization.

The ASCLS Member of the Year Award recognizes a member who has contributed significantly to the field of clinical laboratory science and to the Society and who has, by outstanding example, inspired others.

"It's an honor to be recognized by your peers for your contributions to the Society," said Pravecek.

You awarded grant from Board of Regents

Assistant professor Youngjae You received a competitive research grant from the South Dakota Board of Regents.

Dr. You, assistant professor of Organic/Medicinal Chemistry was awarded funding for his work in "Novel Drug Delivery Strategy: Visible/Near IR-controlled Drug Release."

"My research spans the identification, design and synthesis of small molecules for medical and biological applications," You said. His work focuses on developing new photosensitizers, an emerging cancer treatment, that is "highly selective and relatively non-toxic compared to current therapeutics."

"I'm very delighted to receive this research grant," said You. "This grant will greatly help me grow my research group. Currently, four graduate students are working on a cancer research project in my group. The grant will support the students and hire a postdoc (researcher) to facilitate our proposed research," he concluded.

The competitive grants serve to enhance research capabilities and capacities of state universities and increase the role of university research in South Dakota's economic development.

Youngjae You

"These awards will strengthen SDSU's efforts in pharmaceutical sciences," said Vice President for Research Kevin Kephart. "This growing field of study at SDSU has recently included a new Ph.D. program and the addition of new faculty that will develop strong research programs," he continued. "This added strength will attract students from around the world and will lead to new partnerships with industry."

Since 2004, South Dakota has awarded university faculty grants to support individual research projects. The grants, which total nearly $500,000, are part of the state's prolonged efforts to become a recognized leader in research and technology development. Six grants were awarded in 2008 to provide funding for one year of research. The grants' ultimate purpose is to fund research that has commercial potential and will bring new programs and resources to state universities.

Recent Faculty Publications

Jihong Cole-Dai

Anomalous sulfur isotope compositions of volcanic sulfate over the last millennium in Antarctic ice cores, Mélanie Baroni, Joël Savarino, Jihong Cole-Dai, Vinai K. Rai, Mark H. Thiemens, *Journal of Geophysical Research-Atmospheres*, Vol. 113, D20112, doi:10.1029/2008JD010185, 2008.

Glaciochemical evidence in an East Antarctica ice core of a recent (A.D. 1450-1850) neoglacial episode, Yuansheng Li, Jihong Cole-Dai, and Liya Zhou, *Journal of Geophysical Research-Atmospheres*, in press, 2008.

Brian A. Logue

Logue B.A., Maserek W.K., Rockwood G.A., Keebaugh M., and Baskin S.I. (2008) Analysis of the cyanide metabolite, 2-amino-2-thiazoline-4-carboxylic acid, in plasma and its feasibility as a retrospective marker of cyanide exposure, *Toxicology Mechanisms and Methods*, accepted.

Where are you?

What are you doing?

We gladly publish updates on our alum's careers and lives — if we receive them. It's a great way for all of us to keep in touch!

If you would like to share something about yourself and what you are doing, please send us a note and we will include it in the next issue. You can FAX to us at (605) 688-6364, e-mail us at James.Rice@sdstate.edu, and mail is always welcome.

New Grad Students

Samuel Awuah

Samuel is a Ghanaian whose ambition is to do active industrial research in Ghana and Africa. His research interest is Organic and Medicinal Chemistry and his advisor is Dr. You. Samuel's hobbies include reading biographies and autobiographies of influential and successful people and playing soccer. He thinks "it's exciting to be in the chemistry family of SDSU," and that "indeed, I can go anywhere from here."

Ganesh Degam

Ganesh Degam is from southern India and has received a M.Sc. in Analytical Chemistry from JNTU India. He is going to work with Dr. Raynie and is interested in Green Chemistry. Ganesh loves playing cricket.

Victor Essel

I am from Ghana and graduated from KNUST, Ghana, with a bachelor's degree in biochemistry. I'm currently a graduate student majoring in analytical chemistry and hope to get done in exactly four years. I'm glad to be here.

Surya Gopal

I'm from India and am pursuing my doctoral studies in Analytical Chemistry division, working with Dr. Logue's group. My ambition is to achieve something in life which would be useful to mankind. I strongly believe that helping people in need is the only way of fulfilling the meaning of life. My hobbies are listening to music, photography etc. I find South Dakota to be very colorful and am very much interested in its culture and heritage.

James Lokken

My hometown is Eau Claire, Wisconsin, and I graduated from the University of Wisconsin Stout. My advisor is Dr. Halaweish and my major is Applied Science with concentration in Biotechnology and Chemistry Minor. I'm working toward a Master's in Bio-Organic Chemistry and my project will be to analyze how various natural compounds affect the activity of the enzyme cyto-chrome p450 3A4, and how these interactions can affect the metabolism of certain pharmaceutical compounds.

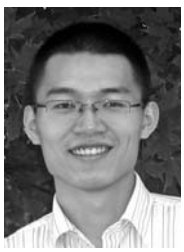
In my spare time, I enjoy the outdoors, exercise, and playing my drum set.

Joielisa Tyler

Joielisa is a native of Tuskegee, Ala. She was an IGERT Fellow for the 2006-2007 school year and received her B.S. in Chemistry from Tuskegee University. Currently she is pursuing a Ph.D. in Organic Chemistry under the advisory of Dr. Fathi Halaweish. Her current project focuses on the synthesis of lobeline analogues as possible drug candidates for smoking cessation.

Gregory Nkepang

I am from Cameroon and graduated from the University of Buea, Cameroon, M.Sc. degree in Organic Chemistry. I am working with Dr. You's research group. The faculty-student relationship is quite close and I find studies in this department quite exciting. As graduate students we are taught not only to do the research but also to pass down the knowledge acquired to other people through our TA assignments and presentations. In my spare time I enjoy reading novels.



Kan Shen

My hometown is Jiaxing in Zhejiang Province, on the east coast of China. I got my B.S. at Sichuan University which is in the west of China, and is famous for food and pandas. I love movies, soccer, and basketball. I know it's very cold here and maybe I can learn to ski. I am looking forward to it! At SDSU, I'm working in Dr. Raynie's research group in analytical chemistry. "America is quite different from China. I'm working hard to learn English, and I hope I can make a lot of friends."

Native American traditional tea has health benefits

Department research shows that a Native American tea used in traditional medicine can help knock out upper respiratory infections. In addition the tea is rich in antioxidants that help protect against cancer and other illnesses.

Professor Fathi Halaweish in SDSU's Department of Chemistry and Biochemistry said those are among the findings from his analysis of a native tea used by communities of the Sisseton-Wahpeton Sioux Tribe of the Lake Traverse Reservation in northeastern South Dakota. Though the tea can be consumed routinely, it is also used specifically to treat sore throats.

"I have tried it personally. It does heal your sore throat," Halaweish said.

"It contains some compounds that specifically target the bacteria that are part of the upper sore throat infection," the chemist affirmed. "Our research supports the long history the Native American people have for using the plant in this way."

Currently the work is funded by the Big Coulee District of the Sisseton-Wahpeton Sioux Tribe, Halaweish said.

Halaweish focuses part of his research on discovering new drugs by isolating organic compounds from natural sources. Plants have formed the basis for treatment of diseases in traditional medicine for thousands of years and continue to play a major role in the primary health care of about 80 percent of the world's inhabitants, he notes.

"We are looking at the potential of this Native American medicine as a nutraceutical product," Halaweish said. That means the Native American medicine would not be marketed as a drug, but as a food product that could have medicinal or health benefits.

Halaweish subjected the tea to tests to detect any anti-biotic, anti-cancer and anti-diabetic properties. In addition he performed toxicity studies on the cell culture to verify that the herbal tea and the compounds it contains are safe to consume.

Halaweish said he'll be pleased if the tea proves to be a product that tribal members can produce and market commercially.

"I'm very happy that this will work for the Native American communities, that we can be a part of their vision for marketing some of their Native American plants," he said. "This is part of our mission as a land-grant institution, to help out communities in our state."

Sisseton-Wahpeton Sioux Tribe community members also use other plants for medicinal purposes said Halaweish. SDSU will continue to study the medicinal properties of herbs used by Native Americans.

Natalie Garry named SDSU August Career Service Employee

Natalie Garry, the department's senior secretary, was named SDSU's August Career Service Employee of the Month. Natalie's been in the department for seven years, starting an administrative assistant. She was nominated for her dedication and willingness to help those around her.

Letters of recommendation noted her upbeat and refreshing attitude and the department's ability to depend on her, regardless of the situation. Assistant Research Professor Doug Raynie wrote, "Natalie's position is daunting, and she approaches tasks gracefully."

Others compliment her professional and friendly manner towards students and knowledge of SDSU policies and procedures, and her work on several trips as ambassador for the department to recruit students.

Perhaps most revealing was the common thread of Natalie's efficiency and organization in keeping the office running smoothly on a day to day basis.

Natalie lives in Brookings with her husband Scott and their children Hunter and Mackenzie. She'll graduate in Feb. 2009 with a bachelor's degree in business administration from National American University. In her free time, she enjoys cross-stitch, reading, and watching her children's activities.

Bozell is Lardy Lecture speaker

Dr. Joseph J. Bozell, associate professor of biomass chemistry in the University of Tennessee's Forest Products Center, presented the sixteenth annual lectures in The Henry A. Lardy Distinguished Lecture Series in Chemistry held in March of this year.

Bozell's first lecture was "Can biomass replace petroleum? Biobased sources of chemicals and fuels"and he later spoke on "New methodology for the conversion of renewable feedstock into chemicals and materials."

Bozell received a bachelor's degree in Chemistry from SDSU and a Ph.D. from Colorado State University in organic synthesis and organometallic chemistry. He held a postdoctoral fellowship at Princeton University where he studied the use

of chromium carbene complexes as synthetic reagents and was on the corporate research staff of Monsanto in St. Louis before joining the National Renewal Energy Lab in Golden, CO.

Bozell has been with Tennessee's Forest Products Center since 2006. He also edits the *Wiley Journal, CLEAN – Soil, Air, Water*, and has over 25 peer-reviewed publications along with numerous invited lectures, meetings and symposium presentations on the topic of chemicals from renewable materials.

SDSU offers master's degree in chemistry education

SDSU has implemented a nonthesis option for its Master of Science degree in chemical science education to help strengthen the content knowledge of area high school teachers. The chemical education specialization curriculum mirrors the thesis-based M.S. degree, but is delivered almost entirely via the Internet, said Dr. James Rice.

The new option accommodates teachers who are unable to leave the classroom for two years to earn their master's. Assistant Professor Matthew Miller proposed the new specialization to help meet South Dakota's goal to become more involved in scientific research. "We need to build a work force with scientific knowledge," he explained. "Our most important resource for this work force is the next generation coming up through our schools."

"We need to provide the best opportunities we can, and South Dakota teachers are dedicated to providing those opportunities," Miller concluded. "Our goal is to develop a deep understanding of topics important to high school courses and gain insight into application of the topics."

Most of the courses will be online but the last six lab development credits will be taught at SDSU over two consecutive summers. During these sessions, participants will work with SDSU chemistry and biochemistry faculty to develop classroom lab activities. "We intend to develop these activities based on SDSU faculty's current research," Miller said.

SDSU's ultimate goal for the new specialization is to offer current teachers the chance to bolster their knowledge at the graduate level, offer a degree that is in line with high school chemistry's content, better prepare students by strengthening their science foundation, and to help create a scientific workforce for South Dakota.

Grad students attend Green Chemistry and Engineering Conference

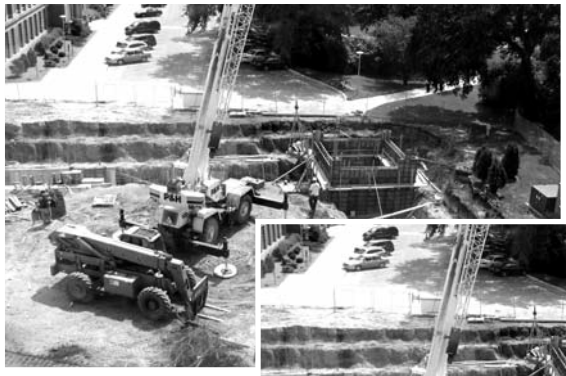
Three SDSU graduate students made presentations at the 12th annual Green Chemistry and Engineering Conference held June 24-26 in Washington, D.C. The forum drew students, professors, and researchers from around the world.

Jeremy Kroon, a second-year graduate student from Rapid City, presented "Liquid Carbon Dioxide-Based Production of Leather," Julee Driver, a fourth-year grad student from Sioux Falls, presented "A Green Chemistry Assessment for Analytical and Chemical Processes," and Lisette Ngo Tenlep, a third-year grad student from Cameroon, presented "Fractionation of Lignocellulosic Biomass Feedstocks."

The conference explored how technical advances in green chemistry and engineering can help solve some of humanity's most pressing environmental and health issues.

"The conference presenters were chosen from a highly competitive pool," says Douglas Raynie, advisor to the SDSU student Green Chemistry Group.

New Shepard Hall Update



The summer was spent on work below ground — steam tunnels and footings.

Demolition began June 16 and by June 19 the Annex was gone. It doesn't take long!

Utility addition on the north side of New Shepard.

Oops!

1,730 copies of this document were printed by the SDSU Department of Chemistry and Biochemistry at a cost of $.00 each. CH 024 6/08

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