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Chemistry & Biochemistry Newsletter

Chemistry & Biochemistry

Spring 2008

Chemistry & Biochemistry Newsletter

Department of Chemistry & Biochemistry, South Dakota State University

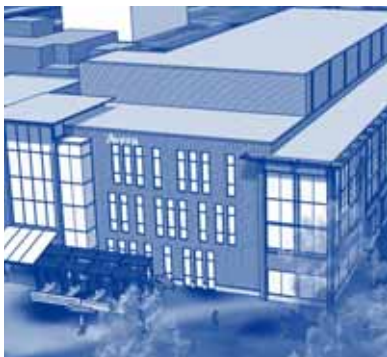
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In 2010, the Avera Health and Science Center will be the new home of SDSU's Department of Chemistry and Biochemistry.

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Department of Chemistry and Biochemistry

Box 2202
South Dakota State University
Brookings, SD 57007-0896

(605) 688-5151

Visit our Web site at:
www.chembiochem.sdstate.edu

South Dakota State University

Chemistry & Biochemistry

Spring 2008

What an Incredibly Exciting Year!



As you can see from the stories inside, we have graduated students who will be making very real contributions to society based on their knowledge of chemistry, biochemistry and the clinical laboratory sciences (CLS). We have a large and well-qualified cohort of students entering their CLS internships. Several of our faculty members have received recognition for their work with graduate and undergraduate students, and the number and value of the scholarships we award to current and incoming students continues to grow and we have had two major programmatic changes approved recently by the Board of Regents.

Beginning this fall, the CLS program will pursue institutional accreditation under Deb Pravecek's leadership in order to allow us to expand the program to meet a growing regional and national need for clinical laboratory scientists. This will be a major undertaking, it will add two new faculty to the department, and it has given us the ability to more than double the number of students we are able to serve in the short term and triple the number over the longer term. We were able to get a discipline fee approved by the Board of Regents to fund the program modification, so we will be able to "do it right."

Under the direction of Matt Miller, we proposed and had approved the addition of a nonthesis chemical education specialization to our existing MS in Chemistry. This program modification does not eliminate the traditional, thesis-based MS; instead it allows us to meet the growing regional and national need for high school chemistry teachers that achieve "highly qualified" status under the "No Child Left Behind Act." The program grew out of a grant that Matt had to determine what was really needed to strengthen the content knowledge of high school chemistry teachers in the region. The new program is a content knowledge-based degree that has specific outcomes that tie incorporating content knowledge into their curriculum in order to successfully complete the degree requirements. The proposed curriculum mirrors the content for the thesis-based MS but it is almost entirely delivered via an internet instructional model to accommodate the place-bound nature of most high school chemistry teachers. However, teachers will be on campus for 2 3-weeks each of the two summer sessions during their studies to work with departmental faculty to develop laboratory experiences that they will be able to take back to their schools and incorporate into their classrooms. The first cohort will be enrolled this fall.

The building and renovation plans are complete and underway. I am writing this on June 5, and Pharmacy has completely moved out of the Shepard Hall annex to a newly remodeled intramural building ("the Barn") and the Power and Heat Lab at the back of Pharmacy lot was torn down this morning. Sometime within the next two to three weeks the Pharmacy annex will be demolished and the project will be officially underway. We hope to have web cams placed in the next week or two so that you can check in to see how the project is progressing. When they are on-line we will let you know.

On that note, we would like to try to start sending out announcements (such as the web cam URL), this newsletter, etc. via e-mail. If you have an e-mail that you would like to share with us, please send it to natalie.garry@sdstate.edu and we will add you to our list-serve. This list allows us to communicate what is going on in the department more regularly, and it will also save us some money on postage. I promise that your address won't be shared.

Have a great summer. There will be a lot more changes when I write again next fall.

Stay in touch!

Photodynamic Therapy Offers New Approach to Cancer

Three simple tools — visible light, a non-toxic chemical “photosensitizer,” and oxygen — add up to one powerful new treatment against cancer.

That approach, called photodynamic therapy, or PDT, is a focus of research in South Dakota State University’s Department of Chemistry and Biochemistry.

“Individually, the photosensitizer, visible light, and oxygen are not toxic, but we combine them,” said SDSU assistant professor Youngjae You, a specialist in organic and medicinal chemistry. “When we combine them, we can damage cancer cells.”

PDT is an emerging treatment that has been successfully used in treating surface cancers and also against macular degeneration in the eye.

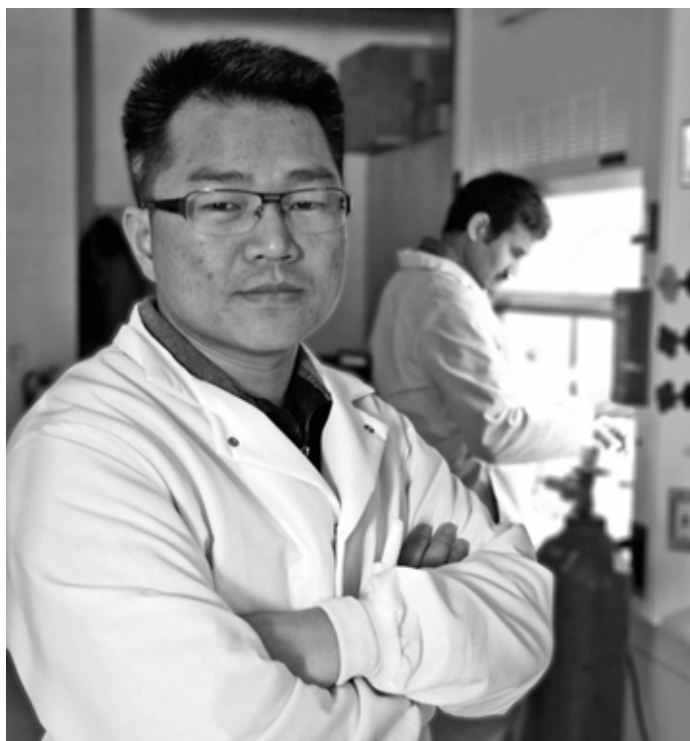
Dr. You said PDT uses light of the near infrared range that is still at least partly within the range visible to the eye — about 650 to 800 nanometers, the units by which scientists ordinarily measure wavelengths of light. Visible light measures from about 400 to about 700 nanometers.

This is how the treatment works: A physician shines light of the appropriate wavelength at a targeted area where molecules of the photosensitizer have been placed. The photosensitizer molecules absorb light energy and as a result become excited and need to release energy in order to become more stable again.

One of the ways the excited photosensitizer molecules do that is by transferring energy to oxygen. In turn, the oxygen becomes excited — it becomes what scientists call single state instead of triple state — and as a result, can oxidize lipids, proteins, and nucleic acids to make cells die.

To improve efficiency of the treatment, medicine needs photosensitizers that can help the treatment hone in on specific disease and molecular targets. Part of Dr. You’s research is focused on developing new photosensitizers.

“In our case, we are trying to target mitochondria. Each cell has mitochondria, and the mitochondria are very important to cells’ producing energy. If we damage mitochondria, we can kill cells,” Dr. You said.



Dr. Youngjae You with research assistant Srinath Pashikanti.

Furthermore, Dr. You said, targeting the mitochondria can lead to a very orderly kind of planned cell death called apoptosis — essentially cell suicide — that is less difficult for the body to deal with than another kind of cell death called necrosis.

Mitochondria are crucial in that process of orderly cell death, and Dr. You’s research so far shows that even low concentrations of photosensitizer, when targeted to the mitochondria, may cause apoptosis.

That’s desirable because even though the photosensitizer is not toxic, it still is an outside material foreign to the body, Dr. You said. Designing photosensitizers specific to mitochondria may make photodynamic therapy even more effective in treating cancer.

“In PDT, current photosensitizers are like a shotgun. What we are trying to develop is more like a cruise missile,” Dr. You said.

Chemistry Professor Recognized by Peers as Member of the Year

SDSU Assistant Professor of Chemistry 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 will travel 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.

According to the organization's national website, the ASCLS Member of the Year Award is sponsored each year to recognize a member of their organization who has contributed significantly to the field of clinical laboratory science and to the Society and who has, by outstanding example, inspired others.

At SDSU, Pravecek currently coordinates the beginning chemistry laboratory program as well as the upper level courses in chemistry and Techniques of Clinical Laboratories.

The South Dakota chapter of the ASCLS is a member of the American Society for Clinical Laboratory Science.



Deborah Pravecek

Their mission is to promote the profession of clinical laboratory science and to provide beneficial services to those who practice it.

Committed to bringing professional voice, value and vision to each of its 127 grass-root members, the South Dakota branch is composed of members from educational institutions, hospitals, clinics, and industry. Members collaborate with other health care professionals

to provide critical testing information for the diagnosis, prevention and treatment of disease.

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

Department Head Joins NSF Committee



The head of SDSU's Department of Chemistry and Biochemistry, Dr. James Rice, has been appointed to serve on the National Science Foundation's (NSF) advisory committee for cyber-infrastructure (ACCI). Rice also directs the South Dakota EPSCoR (Experimental Program to Stimulate Competitive Research) program.

The committee provides perspective and advice to NSF on the agency's plans and strategies to develop and support a nationwide cyberinfrastructure.

"Cyberinfrastructure is particularly important for South Dakota," said Rice. "We may be remote as a consequence of our geography, but with well developed state cyberinfrastructure, we will not be isolated."

Rice will join scientists from other academic and business institutions on the NSF committee like Clemson University, Stanford University, Yale University, Oxford University in England, Sun Microsystems, Fred Hutchinson Cancer Research Center in Washington, and Google.

The appointment gives South Dakota a voice in national cyberinfrastructure development initiatives.

"We have to be engaged in the development and applications of the nation's next generation broadband Internet to fully take advantage of the DUSEL project and to provide the infrastructure for our universities to generate the knowledge that is driving the 21st century economic development," Rice concluded.

Retired SDSU Dean Honored for Distance Education Alliance

David Hilderbrand, a key developer of the Great Plains Interactive Distance Education Alliance (Great Plains IDEA) was recognized during the Second Annual Friend of Great Plains IDEA award luncheon on Tuesday, April 8, in Kansas City, Mo.

Dr. Hilderbrand, is retired dean of the graduate school at South Dakota State University and former head of the Department of Chemistry and Biochemistry, was honored for his significant contributions to the development and operation of the Great Plains IDEA. The alliance is celebrating 14 years of collaboration.

“The Great Plains IDEA is nationally recognized as a leader in academic collaboration. These individuals were pioneers in conceptualizing and establishing the alliance. It is fitting to recognize them for their vision and work,” said Laurie Steinberg Nicholas, Chair of the Great Plains IDEA Board and dean of the College of Family & Consumer Sciences at SDSU.

A hundred representatives from 11 U.S. universities in 11 states attended the Great Plains IDEA meeting this year, April 7-9, in Kansas City.

Miller Receives Edward Patrick Hogan Award



SDSU's spring commencement ceremonies were held May 3 in Frost Arena. A total of 1,457 students completed requirements for graduation and 996 took part.

During the ceremonies, Matthew L. Miller, assistant professor of chemistry and biochemistry, received the Edward Patrick Hogan award for excellence in teaching. Miller began at SDSU in 2001 and has become

known for integrating scholarship about the abstract concepts in the world of matter into his teaching. Students say he arrives excited about chemistry and spreads his positive energy throughout the classroom.



David Hilderbrand

The Great Plains IDEA, led by human sciences colleges at Colorado State University, Iowa State, Kansas State, Michigan State, Montana State, North Dakota State, Oklahoma State, South Dakota State, Texas Tech, Missouri-Columbia, and Nebraska, “has successfully created several shared, distance education degree programs at the graduate and undergraduate levels,” said Nicholas.

“Through distance education, students from around the country are connected with faculty from across the nation and have the opportunity to be admitted to one institution, while taking online courses from any participating institution,” said Virginia Motley, Great Plains IDEA founding board member and dean of the College of Human Ecology at Kansas State.

The participating institutions formed the alliance in 1994 to offer postsecondary degree programs that are greater in reach and significance than any single institution could field alone.

“By partnering, the Great Plains IDEA enriches the experiences of faculty and students while managing institutional resources in highly efficient ways,” said Motley.

Freshman Chemistry Major Honored

A total of 188 freshman students were initiated into the SDSU Chapter of Alpha Lambda Delta Honor Society March 30 including Chemistry major Jennifer Chase.

Founded in spring 1924, Alpha Lambda Delta is a national honor society that recognizes and encourages academic excellence among first year students. Membership in is open to full-time freshmen who earn a scholastic average of 3.5 or better during their first semester at SDSU.

Alpha Lambda Delta members “are challenged to maintain high scholarship and make a meaningful contribution to society.”

2008 Chemistry and Biochemistry Graduates

Bachelor of Science – Chemistry

Malissa Eng (B.S. Chem, May '08), Major in Chemistry.
(Attending Law School)

Erna Ibrisevic (B.S. Chem, May '08), Major in Chemistry,
Minor in Business. (Currently looking for a job)

Daphne Moutsoglou (B.S. Chem, May '08), Major in
Chemistry and Microbiology. (M.D./Ph.D. at University
of Colorado, Denver)

Carrie Ostraat (B.S. Chem, May '08), Major in Chemistry.
(Teaching High School Chemistry in Iowa)

Alexander Simpson (B.S. Chem, May '08), Major in
Chemistry, Minor in Religion. (Looking for job in research
or pharmaceutical industry)

Cory Smith (B.S. Chem, May '08), Major in Chemistry.
(Working for Cargill in Nebraska)

Derek Timm (B.S. Chem, May '08), Major in Chemistry.
(Internship at Sanford Cardiovascular Research Institute)

Ryan Foll (B.S. Chem, December '07), Major in Chemistry.
(Attend Pharmacy School)

Bachelor of Science – CLS

Lori Bauer Rixe (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Work at Holy Trinity Hospital, Graceville, Minn.)

Amanda Bredeson (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Work at Buena Vista Regional Medical Center,
Storm Lake, Iowa)

Teresa Feldhacker (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Work at Orange City Community Hospital, Orange City,
Iowa)

Nicholas Gau (B.S. CLS, May '08), Major in Clinical
Laboratory Science and Biology, Minor in Chemistry.
(Work at Sanford/USD Medical Center, Sioux Falls)

Kristine Gums (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Undecided)

Lin Hamburger (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Undecided)

Danielle High Bear (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Work at Rapid City Regional Hospital, Rapid City)

Melissa Johnson (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Undecided)

Aaron Lambert (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Undecided)

Lindsay Meier (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Work at Sanford/USD Medical Center, Sioux Falls)

Scott Ratermann (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Work at Sanford/Mid-Dakota Hospital, Chamberlain)

Kacy Salter (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Work at Avera McKennan, Sioux Falls)

Carmita Sanders (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Undecided)

Jessica Solberg (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry, Biology and
Health Science. (Work at Avera McKennan, Sioux Falls)

Ann Thomas (B.S. CLS, May '08), Major in Clinical
Laboratory Science, Minor in Chemistry and Biology.
(Work at Avera McKennan, Sioux Falls)

CLS Internships

Julie Bender, Sanford Medical Center, Sioux Falls

Shelby Bush, Sanford Medical Center, Sioux Falls

Jon Berndt, St. Luke's College, Sioux Falls

Laura Christensen, St. Luke's College, Sioux Falls

April Malsam, Sanford Medical Center, Sioux Falls

Andrea May, University of North Dakota, Denver

Rosemary Price, University of North Dakota, Brookings

Jennie Riles, Sanford, Sioux Falls

Brandi Schoellerman, Rapid City Regional Hospital,
Rapid City

Tanisha Sealey, Sanford Medical Center, Sioux Falls

Amanda Settje, Mercy Medical Center, Des Moines, Iowa

Nichole Taylor, Rapid City Regional Hospital, Rapid City

Scholarships and Awards

As of May 2008

University and College Recognition

J.F. Nelson Undergraduate Awards: Jennifer Chase

Departmental Awards

CRC Press Chemistry Achievement Award: Carrie Ostraat

Phi Lambda Upsilon Award for Achievement in Organic Chemistry: Tony Temple

Analytical Chemistry Award: Mitchell Dobberpuhl

Merck Index Award: Malissa Eng

Hypercube Scholar: Carrie Ostraat

Dobberstein Research Award: Christopher Johnson

Sioux Valley Outstanding Senior Award: Carrie Ostraat and Daphne Moutsoglou

Departmental Scholarships

Eugene Burr and Ella Burr Schultz Scholarships: Kathryn Engle (returning student) and Dan Breit

Elmer and Roberta Johnson Leaders of Tomorrow: Andrew Christensen (incoming major), Edward Stenger (incoming major) and Elizabeth Bosworth (incoming major), Amy Rieck (returning students)

Olive Burke Crary and Gerald D. Crary Jr. Scholarship: Laura Sanborn

Hardin-Palmer Scholarship: Kalli Odegaard (returning student)

Herbert H. Hodgeson Award: Melissa Wesseling

Webster-Klug Award: Mitchell Perrizo

Arthur W. Dobberstein Achievement Award: Abbi Davelaar, Kayla Berger and Amanda Heeren

Hach Scientific Foundation Scholarship: Zachary Merrick and Samantha Loutsch

Guss Memorial Award: Mitchell Dobberpuhl

Oscar and Elaine Olson Scholarship: Christopher Johnson

E. R. Binnewies Memorial Award: Brian Eckrich

Raymond and Magnhild Greb Scholarship: Kevin McGuire

Henry and Annrita Scholarship: Lucas Zimney and Kyle Kirby

Joseph and Coral Bonnemenn Scholarships in Medical Technology: Kristen Carlson

Louise Guild Scholarship in Biochemistry: Jaclyn Nielsen

Philip and Eleanore Haskett Award: Stephanie McClure (awarded in Fall 2007)

Each newsletter contains information on alumni and their activities. 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.

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