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Chemistry & Biochemistry Newsletter

Chemistry & Biochemistry

Spring 2013

Chemistry & Biochemistry Newsletter

Department of Chemistry & Biochemistry, South Dakota State University

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The Avera Health and Science Center officially became the home of the SDSU's Department of Chemistry and Biochemistry September 9, 2010.

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South Dakota State University

Chemistry & Biochemistry

Spring 2013



Hello from the department!

The 2012/2013 academic year has drawn to a close. The general consensus in the department is that the year flew by faster than any other one that people can recall. I agree, but I think it's a reflection of the fact that the faculty, staff and students accomplished so much that there wasn't much time left to pay attention to the changing calendar! This newsletter highlights some of those accomplishments. And those accomplishments are being recognized not only here at SDSU, but regionally and nationally as well.

Dr. Pat Tille was granted tenure and promoted to associate professor. She also received the Omicron Sigma National President's award for her significant contributions to the American Society of Clinical Laboratory Science (ASCLS) (p. 6). MLS instructor Brendon Sato received the SD ASCLS Key to the Future award for his emergence as a leader in the society. MLS instructor Stacie Lansink was elected to the board of directors of the South Dakota ASCLS. MLS junior Amanda Graves was also appointed to the board of directors, the only student to be so recognized.

Dr. Jihong Cole-Dai headed south for the winter—to Antarctica! He took grad student Kari Peterson with to collect ice core samples to be used in a NSF-funded study of 70,000 years of the Earth's climate history (p. 2). Dr. Shalini Low-Nam, a postdoctoral research fellow working in Dr. Adam Hoppe's lab received a prestigious two-year, NIH Ruth L. Kirschstein fellowship to allow her to continue her research under the mentorship of Dr. Hoppe (p. 4). Dr. Ron Hirko was the spring 2013 featured author by blue-door publishing in recognition of the lab manuals that he writes for CHEM 106L, CHEM 112L and CHEM 114L that we use in the department (p. 3). Two chemistry Ph.D. students were awarded U.S. Department of Education GAANN Fellowships that will support their remainder of their education (p. 5). Two other chemistry Ph.D. candidates won Sigma Xi research awards (p. 7). There's more, but you'll have to read the newsletter yourself to learn about them.

And last, but certainly not least, we graduated a great group of chemistry, biochemistry and MLS majors. We also graduated the largest number of Ph.D. candidates that the program ever has. We will miss all these students but wish them the best as they begin the next phase of their education and professional careers.

Your donations and gifts are very important to helping the department help these students realize their educational dreams, and I hope that these accomplishments give you some measure of the return that those investments will provide. Please remember that you can designate a gift specifically to the department and contribute to these types of activities. If you are interested in seeing how you can join us, or if there is a way that we can help you realize your vision of giving back to the department and SDSU please don't hesitate to contact me.

Summer is a time to slow down and relax so please take advantage of the season. We'll be back next fall.

Stay in touch!

Jim Rice

SDSU scientists help retrieve ice core from West Antarctica

A slice of ice from 17,500 years ago can help scientists figure out how the Earth came out of the Ice Age and how climate change can happen in the future, according to SDSU Professor Jihong Cole-Dai of the chemistry and biochemistry department. He and graduate student, Kari Peterson, spent nearly a month in Antarctica during Christmas break as part of the West Antarctica Ice Sheet Divide Ice Core project.

The main goal of the ice core project, Cole-Dai said “was to get an ice core more than two miles deep to give us nearly 70,000 years of history of the Earth’s climate.”

The National Science Foundation-funded project, which began eight years ago, involves more than 20 universities and national laboratories. The SDSU Ice Core and Environment Chemistry Lab, headed by Cole-Dai, has been a part of the project since 2006.

It took eight years to build the field camp and to collect the original ice core, because the harsh Antarctica conditions allow only a 60-day window each year in which to work. That task was completed in January 2012.

“This year was significant because of the completion of additional field work,” Cole-Dai said. Scientists wanted more ice to do further work on specific time periods. To do so, the team retrieved additional ice from five spots along the original ice core hole, while also leaving the lower portion of the hole intact.

“That in itself was quite a challenge and accomplishment,” Cole-Dai said. His former postdoctoral researcher, David Ferris, was part of the drilling team. Ferris became part of the project through the SDSU Ice Core and Environment Chemistry Lab during his doctoral work.

To accomplish this task, engineers had to design a special bit and drilling apparatus that used an actuator to push off to the side of the original borehole, explained Tony Wendricks, project coordinator for the Ice Drilling Design and Operations group at the University of Wisconsin, Madison. Ferris has worked on the ice drilling team for three years and on the core handling team for one year.

“It’s a tricky thing — to maintain the parent hole,” said Wendricks.

“It’s never been done anywhere in the world,” Cole-Dai said. “You have a tool hanging at the end of a two-mile-long rope or cable and you want it to do very precise things, to move one degree in the direction you want and to bring the ice out.”

When the drillers brought up cylinders of ice, they handed them over to the core-processing team, Cole-Dai said. He



A trip to Antarctica was part of Christmas break for South Dakota State University scientists working on the West Antarctica Ice Sheet Divide Ice Core project. Dave Ferris (on left), a former SDSU postdoctoral researcher, was on the ice drilling crew, while professor Jihong Cole-Dai of the SDSU Chemistry and Biochemistry Department, and his graduate student, Kari Peterson, helped process the replicate core.

and Peterson were on the team that took measurements and logged the information regarding the cores from the designated time periods. Then they packaged the ice cylinders to transport to the National Ice Core Laboratory in Denver.

Once the cores have been processed in Denver, each university lab will get its slice of the ice for analysis, which will likely take a year, Cole-Dai said. His SDSU team will work on a section of ice from 17,500 years ago that offers clues as to why the Earth began to emerge from the Ice Age.

At that point in history, Cole-Dai said, “something big happened — a large volcanic eruption or a number of them.” Others speculate that it might have been an object from outer space that struck the Earth.

“We want to gather more information from the ice and hopefully it will lead to better ideas, or support some of the ideas and disprove some of the others,” Cole-Dai said.

For this research, Cole-Dai’s team collaborates with a lab at the University of California, San Diego. SDSU analyzes the trace chemicals, while the California lab does the isotope measurements. Cole-Dai has three doctoral students working in his lab; two of them have been to Antarctica.

Researchers found fluoride, which is commonly associated with a volcanic eruption, in a previous ice core, explained

Peterson. However, the levels were higher than those expected from an eruption. For her dissertation, Peterson will analyze the fluoride levels in the replicate core to confirm the original results.

In addition, Peterson took samples from a snow pit more than 8 feet deep to look for signs of two volcanic eruptions a couple of years ago, one in Indonesia and one in Africa. “The eruptions were pretty small but very powerful,” Peterson said, “so the plume may have gotten into the stratosphere.”

When this happens, Cole-Dai explained, the wind patterns can carry the volcanic material to the entire world, including both poles. Because the snow at the Western Antarctica drill site never melts, the ice contains a history of the changing atmospheric environment and of the dynamic climate. As for the location to drill the ice core in the center of West Antarctica, Cole-Dai explained, “It’s like the continental divide. Ice flows away from this point; it doesn’t get ice from other locations.”

By measuring the kinds and quantities of chemicals in the ice cores and determining how those change over time, scientists can study the events that lead to global climate change, Cole-Dai said. This will lead to a better understanding of how human activities can influence climate. By studying the Earth’s past, Cole-Dai said, “we can better predict the future.”

Pat Tille granted tenure, promoted

Dr. Pat Tille, head of the medical laboratory science program at SDSU, has been granted tenure and promoted to the rank of associate professor effective July 1, 2013. The University Tenure and Promotion Committee reviewed her credentials and recommended to President David Chicoine that she be given tenure and promoted.

Ron Hirko featured author

SDSU assistant professor Dr. Ron Hirko is one of the latest featured authors at bluedoor publishing, a provider of customized lab manuals in anatomy and physiology, biology and chemistry. He’s in his sixth edition of three out of four of his lab manuals, teaches online graduate thermodynamics and chemical kinetics, and has implemented the Vernier technology throughout the general chemistry laboratory program.

Dr. Hirko, who holds a B.S. in chemistry from Kent State University, and a Ph.D. in physical chemistry from Utah State University, lectures in chemistry and biochemistry, coordinates the General Chemistry I and II and Survey Lab sections at SDSU, and, in addition, has 30 years of industrial technical management under his belt.



This chunk of ice has made history. A National Science Foundation-funded replicate core drilling team was able to retrieve cylinders of ice from the original ice core hole while leaving the borehole intact.

Alumni updates

Dillon Hanrahan, B.S. chemistry, will be attending the University of Arizona in Tucson to pursue a Ph.D. in organic synthesis. He’s planning on joining the biological chemistry program, which is interdisciplinary between the chemistry and biochemistry and the drug discovery and development of pharmacology and toxicology departments.

Undergrads present posters

Undergraduate Research Scholarship and Creative Activity Day (URSCAD) is a universitywide event celebrating the involvement of undergraduate students in research activity. All departments are usually represented, and students present research findings, perform musical or theatre pieces, and all activities in between. The event represents a celebration of achievement of SDSU’s undergraduate students, and the vital role they play in research output of the university.

Biochemistry student Tanya Baldwin (John Robinson, advisor), and chemistry students Erica Manadahr (Jihong Cole-Dai, advisor) and James Cassidy (Fathi Halweisch, advisor) presented posters. Manadahr presented a poster titled “Fluorometric Measurement of trace level Ammonia in an Ice Core Melter” while Cassidy, along with Microbiology student Gabriel Sexton, presented “Synthesis and antimicrobial evaluation of 4’,5,7-trihydroxy-3’-prenylflavone.” Baldwin’s poster, “Experimental Determination of the Förster Critical Distance (RO),” was judged best poster.

Biochemist earns prestigious NIH research fellowship

It looks like a neon light show—pink, blue and magenta squiggles dancing in the darkness. These aren't just pretty pictures, but protein receptors interacting within the membrane of a living cell. And to SDSU cell biologist Shalini Low-Nam, they are an incredible sight and possibly an important step in understanding how diseases such as cancer affect the cells.

“This is something that could not be done five or 10 years ago because the tools to do it did not exist,” said Low-Nam, a post-doctoral research associate in the chemistry and biochemistry department. It was the unique tools available in assistant professor Adam Hoppe's laboratory that drew Low-Nam to SDSU in October 2011 after completing her doctorate in biomedical sciences at the University of New Mexico.

In recognition of her potential as a researcher, Low-Nam has earned the prestigious National Institutes of Health Ruth L. Kirschstein National Research Service Award, which will support her work for the next two years. “This fellowship recognizes her potential as a future leading scientist,” said Hoppe. “I'm incredibly fortunate to have her in my lab.”

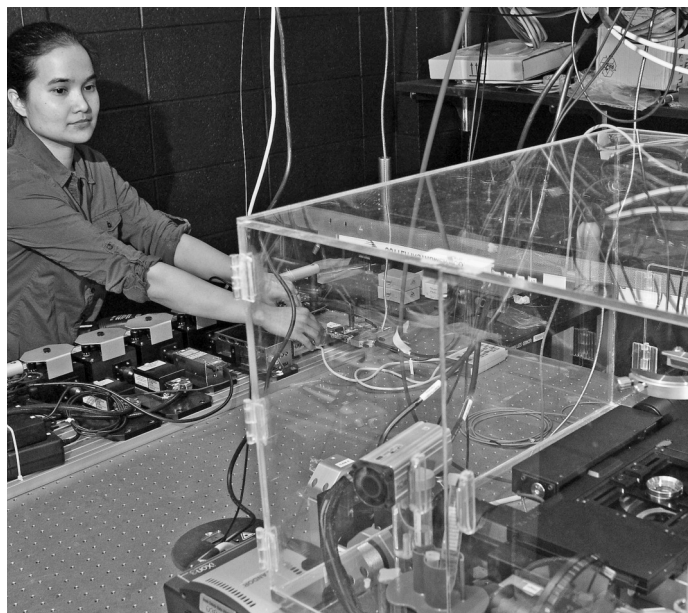
Low-Nam's work will focus on a protein receptor called the macrophage colony stimulating factor or MCSF receptor, which controls the growth and development of the macrophage, a type of white blood cell.

Macrophages serve as one of the body's defense mechanisms, Low-Nam explained. For her study, a lab tech takes bone marrow from mice and then allows them to mature into macrophages because they are a good model for human macrophages.

“Macrophages go in and out of the blood to search out bacteria and viruses that require removal,” she said. When found, they eat and digest the bacteria removing them from the body.

This transdisciplinary research is aimed at understanding the biochemical pathways in cells, Hoppe explained. Low-Nam will integrate ideas from chemistry, mathematics, physics and optics. “She's an expert on this,” said Hoppe, “and an up-and-coming leader in the field.”

During her doctoral program, Low-Nam worked with single particle tracking, which looks at the motion of individual particles or molecules within the cell and its environment. She will combine this with other fluorescence-based strategies that allow her to tag specific proteins with substances and make them glow.



Lasers activate the fluorescent tags on the protein receptors in a cell, explains SDSU cell biologist Shalini Low-Nam. The one-of-a-kind microscope in assistant professor Adam Hoppe's laboratory in the chemistry and biochemistry department allows her to study how proteins interact within the membrane of a white blood cell called a macrophage.

The lasers on Hoppe's microscope then light up the fluorescent tags on the protein receptors, so she can see how they interact with one another and the cell membrane. This one-of-a-kind microscope lets her view as many as four different molecules at once, Low-Nam explained.

Low-Nam wants to determine how the interactions between the MCSF receptor and other proteins are influenced and regulated by the cell membrane.

“Imagine the membrane as a mosaic of components — proteins, lipids and sugar — that allow the cell to function,” Low-Nam said. “The cell communicates outside to inside through the proteins that span the membrane.”

After tagging each protein with a different fluorescent color, Low-Nam uses the microscope to take sequential images of how proteins cluster on the cell surface in a process called signaling. Eventually, the membrane will fold inward and pinch a section into the macrophage to remove the proteins from the surface. As she watches the neon light show, she takes measurements of what's happening, noting the curve of the membrane and the interaction of the proteins.

Biologists visualize this signaling as a linear sequence, Low-Nam explained, but this has not been verified because no one has ever recorded this happening.

“Is this characteristic of the process or just one of many ways this can occur?” Low-Nam asked. “What signals the cell to take in specific proteins?” These are questions she seeks to answer.

“By understanding how these dynamics occur in normal macrophages, we can try to decouple what happens in the case of disease,” Low-Nam said. When a genetic abnormality or mutation affects the MCSF receptor, it changes the cell’s behavior. “This interference allows disease to get a hold of the cell,” she explained.

Because this is basic research, no specific disease has been targeted, Low-Nam said, emphasizing that her work analyzes the fundamental mechanism of cell growth at a molecular level.

However, the receptor she is studying has been implicated in acute leukemia because it regulates cell growth, Low-Nam said. “Cancer is uncontrolled growth of cells.”

If all goes well, one day her observations of these neon proteins dancing in the night may give scientists the information they need to combat leukemia and other diseases.

GAANN Chemistry Doctoral Fellowship reaches capacity

A doctoral fellowship program in the department of chemistry and biochemistry reached its capacity this fall with the arrival of Dennis Gibson (Leesville, La.).

That makes eight students in the program, which is funded by a three-year, \$525,600 federal grant. The Graduate Assistantships in Areas of National Need (GAANN) program seeks to recruit graduate students who are highly qualified for graduate study and demonstrate financial need into disciplines where there are needs for more doctoral-trained individuals in the workforce.

The program’s primary focus is to award grants to women, Native Americans, Hispanic Americans and students from other groups who are underrepresented in the chemical sciences.

The department received the award in 2010. The fellows in that first cohort — Patrick Lee, Rapid City; Angelica Reyes, Chino, Cal.; Brandon Scott, Slippery Rock, Penn.; and Sonia de la Torre-Melendez, Trujillo Alto, Puerto Rico — arrived for the start of classes in the fall.

They are in their third year of a doctoral program that typically takes 4 ½ to five years, department head Jim Rice said.

In their second year of the program are Brendan Mitchell of Canton, N.Y., Micheal Stutelberg of Woodbury, Minn., and Cyndey Johnson-Edler of Brookings.

Recipients receive stipend, school funds

Each student receives a stipend of up to \$30,000 per year based on financial need and a \$13,755 educational allowance for tuition, fees and other educational expenses.

“The fellowship removes the financial barrier that many graduate students face, particularly those from families that are not able to help pay for the cost of a graduate education,” Rice said. “Because of the stipend and education allowance, GAANN fellows are free to focus on their required coursework and the research project that is the intellectual center of their Ph.D. degree program.”

The program begins with an eight-week orientation for which all new graduate students in the department are required to participate. It not only helps orient the students to the department and its graduate program, but it also provides them with training to teach the laboratory portions of the foundational chemistry courses that the department offers in support of many other majors and programs on campus.

The department currently has 62 graduate students, 55 of whom are pursuing a doctorate. The graduate program has three research focus areas: environmental and green chemistry, the use of light to study and control biochemical processes in cells, and chemical education. During fall semester 2012, five doctoral students defended their dissertations and were awarded their Ph.D.s and two master’s degrees were completed.

Program status uncertain beyond 2013

“Graduate students teach most of our instructional lab courses,” Rice said. “They are an important part of our instructional staff, and we want to make sure they are well-prepared to provide the quality instructional experience that our program expects.”

“This fellowship is one indicator of how far SDSU and our department have come in expanding our research capacity. It shows that South Dakota’s investment in research and doctoral education is developing programs that are capable of attracting nationally competitive graduate students.”

Faculty members and professors who co-wrote the proposal and are helping to implement it include Matt Miller, Doug Raynie, Jay Shore and Fathi Halaweish.

Rice says the department will reapply for funding this year assuming the U.S. Department of Education program is renewed in the next federal budget. In 2010, SDSU was one of only six universities in the nation to receive this grant. Others included the University of Nebraska, State University of New York, Washington University, Emory University and University of Alabama.

National group honors SDSU's Medical Lab Science

The medical laboratory science program at SDSU, a program that is addressing a shortage of laboratory science professionals, was recently honored by the American Society of Clinical Laboratory Science at the state chapter meeting in Yankton.

As the state's only nationally accredited university-based medical clinical laboratory program, three faculty members and two students were recognized by the society's national organization.

Program coordinator Pat Tille, assistant professor of chemistry and biochemistry, was elected first vice president on the ASCLS South Dakota Board of Directors for 2013-14. She will then serve as president in 2014-15.

Tille also received the Omicron Sigma National President's award, which goes to an individual who has made a significant contribution to the professional society.

MLS instructor Stacie Lansink was elected as an at-large member of the board of directors.

Brendon Sato, MLS instructor, received the Key to the Future award, which is given to members who have provided service to the profession and are predicted to be key leaders within the profession in the future.

Juniors Amanda Graves and Stefan Stinnett, both medical laboratory science majors, were each awarded ASCLS scholarships. Graves is from Baltic, and Stinnett is from Knoxville, Tenn.

Graves was appointed to the ASCLS South Dakota Board of Directors as the student forum representative — the only student in the state to serve on the board. She will attend the ASCLS national meeting in Houston in July and the legislative symposium in Washington, D.C., in March 2014.

Professor Jim Rice, head of the department of chemistry and biochemistry, said the medical laboratory science program is growing due to the efforts of Tille, Lansink and Sato.

"This is a program that is really meeting state needs, particularly in the area of medical laboratory training. The fact that they have taken on leadership positions gives us an opportunity to have an even greater impact in terms of the service that we provide to the state and region.

"It's great to have two of our students recognized because it's an indication of the quality of the students we have in our program." According to Tille, the program is very popular with students because, as an applied medical degree, it opens up a variety of career opportunities.

Medical laboratory science graduates are trained in hematology, transfusion medicine, clinical chemistry, molecular diagnostics, immunology, microbiology, infectious disease testing and a



Pat Tille, assistant professor of chemistry and biochemistry, was elected first vice president of the American Society of Clinical Laboratory Science South Dakota Board of Directors for 2013-14 during the society's state chapter meeting. Tille is coordinator of the medical laboratory science program at SDSU.



Juniors Stefan Stinnett and Amanda Graves, both medical laboratory science majors at SDSU, received scholarships from the American Society of Clinical Laboratory Science during the society's state chapter meeting. Graves was also named to the ASCLS South Dakota Board of Directors.

number of highly complex techniques required in the diagnosis and treatment of disease.

Tille indicated MLS majors are excellent candidates for doctoral programs, medical school, midlevel practitioners like physician assistants as well as research and development in pharmaceuticals and biotechnology companies.

"The prospects are endless," she said. "Our graduates are easily employable and salaries are increasing with the average range between \$20 and \$25 per hour. "Students in the program have demonstrated excellent skills and knowledge."

Since the program's inception in 2009, graduates have a consistent 100 percent pass rate on the National American Society of Clinical Pathology board examination and 100 percent placement in either medical laboratory facilities or advanced education in graduate programs.

Graduate Student Council aims for community voice

A new voice for graduate students is being formed.

The Graduate Student Council is writing its constitution and bylaws. It aims to be a group that can bring graduate students together to form a community.

Raj Bhandari, a Ph.D. candidate in the department of chemistry and biochemistry, is leading the push for this new group along with a group of classmates.

“There is absolutely no association for graduate students,” Bhandari said. “They are kind of left out.”

The Students’ Association is the main student government body on campus, but it is comprised of almost entirely undergraduate students. Bhandari, along with Thomas Cox, Dan Vos, Bryson Sissing and Samson Ola Akinfenwa, recognized that graduate students have very different needs from undergraduate students.

“Undergraduates just have to take a certain amount of classes and then they are done, but for us it is more about research and how to write a good paper,” Bhandari said.

According to Bhandari, communication between the different graduate colleges can sometimes be lacking, but often they have interconnected needs.

“I am in chemistry, so I might need some instruments that agricultural engineering might have, and I don’t know them and they don’t know me, but we might be able to help each other and vice versa,” Bhandari said.

Bhandari also did research on SDSU’s peer institutions and whether they have a graduate student council in some form. He found that more than 50 percent of the institutions that SDSU compares itself to did, in fact, have a graduate student



Raj Bhandari, a Ph.D. candidate and SA senator, is leading the effort to create a graduate student council at SDSU.

association, including Oklahoma State, Colorado State, Utah State and North Dakota State. “So why not us?” Bhandari said.

Bhandari hopes that the Graduate Student Council will be running by the time he graduates in May. The first step is to have the constitution and bylaws written and submitted to SA for approval, something that the group hopes to accomplish by the end of this semester.

The goals for the group go beyond just representation and communication within the graduate college. One of the larger goals is to create a graduate community, where students that might not have a chance to meet those studying different disciplines can come together for events.

“No matter (if you are) full-time, parttime or which college you are from, everyone is welcome,” said Bhandari.

The council will have a president, vice president, treasurer and secretary, much like other student groups on campus, and will focus on being a representative voice for graduate students both at SDSU and in the Brookings community.

This article was reprinted from the SDSU *Collegian*. Written by Noah Brown, News Editor. Collegian photo by Nick Goswick.

Graduating Seniors

Spring 2013

Chemistry

Nathanael Auch
Elizabeth Bosworth
Michael Collins
Kayla Erlandson
Dillon Hanrahan
Lindsey Haselhorst
Samantha Loutsch
Mitchell Popko
Mitchell Perrizo
Meredith Sauer
Bryce Wilen

Biochemistry

Tonya Baldwin
Erica Manadhar
Gina Morseth

Medical Laboratory Science

Jennie Barents
Leroy “Zak” Clemetson
Christina Fanning
Dan Hagel
Kayla Holscher
Josh Houston
Larissa Knutson
Emily Peschong
John Potts
Glen San Juan
Paula Schmidt

Grad students win awards at Sigma Xi

Two department grad students won graduate research competition awards at the recent SDSU Sigma Xi chapter banquet. Logan Sanow (Cheng Zang, advisor) won for a Ph.D. proposal titled “Bio-inspired luminescent chromophores: An analysis and application of photostability.” Raj Bhandari (Brian Logue, advisor) won for a Ph.D. paper titled “Simultaneous determination of cyanide and thiocyanate in plasma chemical ionization gas chromatography mass-spectrometry (CI-GE-MS).”

Grad students attend Pittcon Conference

Graduate students Hiran Kandala and Vinod Bathula attended the Pittcon® Conference and Expo in Philadelphia. Kandala gave an oral presentation on “Characterization of 1-Ethyl-3-methyl-imidazolium Alkylbenzenesulfonate (EMIM-ABS) Ionic Liquids.” Dr. Logue was co-author of this paper.

Kandala was also the presiding chair for two half-sessions: “Environmental: Water Analysis” and “Separation Sciences: Application to Pharmaceuticals and Others.” Bathula was the presiding chair for a session, “GC/MS Analysis.”

Recent publications

Jihong Cole-Dai

Grants

Assessment of the natural perchlorate source using perchlorate history from Greenland ice cores, NSF Award #1203533, \$267,453. (September 2012 - August 2014)

Brian Logue

Grants

"LCMSMS Analysis of 3-Mercaptopyruvate," contract with the University of Minnesota associated with DoD/NIH U01 funding, PI, \$9,564. (October 2012-January 2013).

"Rapid Field-Usable Cyanide Sensor Development for Blood and Saliva," proposal for DoD/NIH, PI, \$200,000. (September 2012-2013).

Publications

Bhandari R.K., Oda R.P., Youso S.L., Petrikovics I., Beberta V.S., Rockwood G.A., and Logue B.A. (2012) "Simultaneous determination of cyanide and thiocyanate in plasma by chemical ionization gas chromatography mass spectrometry (CI-GC-MS)." *Analytical and Bioanalytical Chemistry*, 404(8), 2287-2294 (<http://dx.doi.org/10.1007/s00216-012-6360-5>).

Vinnakota C.V., Peetha N.S., Perrizo M.G.* Ferris D.G., Oda R.P., Rockwood G.A., and Logue B.A. (2012) "Comparison of cyanide exposure markers in the biofluids of smokers and nonsmokers." *Biomarkers*, accepted, online (<http://dx.doi.org/10.3109/1354750X.2012.709880>).

Youso S.L., Rockwood G.A., and Logue B.A. (2012) "The analysis of protein-bound thiocyanate in plasma of smokers and nonsmokers as a marker of cyanide exposure." *Journal of Analytical Toxicology*, 36(4), 265-269 (<http://dx.doi.org/10.1093/JAT-11-951.R1>).

Petrikovics I., Yu J.C.C., Thompson D.E., Jayanna P., Logue B.A., Nasr J.* Bhandari R.K., Baskin S.I., Rockwood G.A. (2012) "Plasma Persistence

of 2-Aminothiazoline-4-Carboxylic Acid in Rat System Determined by Liquid Chromatography Tandem Mass Spectrometry." *Journal of Chromatography B*, 891-892, 81-84 (<http://dx.doi.org/10.1016/j.jchromb.2012.01.024>).

Kovash C.S. Jr., Hoefelmeyer J.D., Logue B.A. (2012) "TiO₂ compact layers prepared by low temperature colloidal synthesis and deposition for high performance dye-sensitized solar cells." *Electrochimica Acta*, 67, 18-23 (<http://dx.doi.org/10.1016/j.electacta.2012.01.092>).

Mitchell B.L., Billingsley B.G., and Logue B.A. (2013) "Rapid quantification of dimethyl methylphosphonate from activated carbon particles by static headspace gas chromatography mass spectrometry." *Journal of Chromatography A*, published online (<http://dx.doi.org/10.1016/j.chroma.2013.03.038>).

Jim Rice

Publications:

Chilom, G.; Baglieri, A.; Rice, J.A., 2013, "Comparative study of composite organic materials isolated from the humic acid and humin of a mineral soil," *Organic Geochemistry*, 57, 199-126, dx.doi.org/10.1016/j.orggeochem.2013.02.008.

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