CHEM-ENEWS

CHEMICAL ENGINEERING

FALL 2017

COLLEGE OF ENGINEERING



KANSAS STATE

FROM THE DEPARTMENT HEAD



2016-17 has been a year of change as well as a vear of awards. The chemical engineering department at K-State was remarkably stable during my first eight years here from 1988 to 1996. No faculty left or retired, and no new faculty joined the department. In contrast, the past five years have seen many changes, including five faculty leaving due to retirements or departures, and eight new faculty being hired.

After 15 years in the department, Mary Rezac and Peter Pfromm are moving on. This fall, Rezac will become the dean of engineering at Washington State University, while Pfromm will be a professor of chemical engineering there. They have been valuable contributors to our students and department. I wish them the best of luck, though I am confident they won't need it — as I believe they'll be great in their new positions. We will start searches this fall for additional faculty to replace Pfromm and Rezac.

This fall, two new faculty will be joining us. Brian Tande, our new associate professor, is coming from the chemical engineering department at the University of North Dakota, where he was the department head. He will be teaching our graduate course on chemical engineering mathematics, and developing a research program on novel materials for controlling infections in medicine and food processing. Andrew Duncan, our newest instructor, is coming from the University

of Kansas, where he most recently taught heat transfer. He will be teaching the process analysis and separations courses here.

Our faculty have received a number of awards recently. John Schlup received the Segebrecht Award for his teaching and service to the profession. Sigifredo Castro-Diaz received our inaugural Award for Faculty Excellence in Chemical Engineering.

One of our students, Jack Ayres, was elected K-State studentbody president. He will be busy this fall as he keeps up with design, separations and reaction engineering, while serving and representing the entire student body of K-State.

Diane Collard, who graduated from the program in May, received a National Science Foundation Graduate Research Fellowship. I am proud of her and the part our chemical engineering faculty played in helping her to realize this goal.

The 2017 graduating class was the largest in many years — 51 students took part in the May commencement. The 2017-2018 senior class is even larger, with as many as 70 students possibly graduating.

> James N. Edgar James H. Edgar Department Head



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Chemical Engineering

CHEM-E NEV

CHEMICAL ENGINEERING

FALL 2017

COLLEGE OF ENGINEERING









LEADERSHIP



EXCELLENCE



Focus on research

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Alumnus Wright shares experience

CHE honor roll

ON THE COVER

LEONARDO GARRO-MENA EVALUATES BIOLOGICAL ACTIVITY OF POLYMERIC NANOPARTICLES FOR DRUG DELIVERY UNDER SUPERVISION OF DR. URARA HASEGAWA.

ANGELICA WHITE EXPLAINS LAMINAR-FLOW WATER CANNON TO VISITORS DURING 2017 OPEN HOUSE.

CHEM-E NEWS

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. Engineering Communications

Contributing to content and photography. . KSU Foundation, K-State Communications and Marketing





HANSEN RECEIVES NSF GRANT FOR WORK ON MICROBIAL INTERACTIONS

Ryan Hansen, assistant professor of chemical engineering, and Thomas Platt, assistant professor of biology, received a \$300,000 National Science Foundation, or NSF, grant to develop a microwell array platform for high-throughput screening and discovery of microbial interactions. The award is an Early-concept Grants for Exploratory Research, or EAGER, proposal — a NSF funding mechanism in support of exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches.

This project will develop a new analytical tool to rapidly and simultaneously screen thousands of interactions among different species of bacteria in order to identify those critical in shaping plant health. Uncovering these interactions will aid in efforts to make engineered bacterial communities for improved food production, plant pathogen protection and environmental decontamination efforts.

"We anticipate our platform will greatly accelerate the pace at which new



FROM LEFT, NILOY BARUA, LOGAN MCGINLEY, AUDREY ANDERSON, MOHAMMADAL MASIGOL, NILOUFAR FATTAHI, ANDRE VAN DER VLIES AND RYAN HANSEI

"We anticipate our platform will greatly accelerate the pace at which new bacterial interactions are discovered."

bacterial interactions are discovered," Hansen said. "We are developing a tool that will be highly adaptable and useful for discovery in any microbial system, in any microbiology laboratory."

To support the project, part of the research funds have been used to purchase a Mightex Polygon400 patterned illumination tool, which attaches to an upright fluorescent microscope in Hansen's lab. The tool is capable of patterning light at submicron resolution and can be used for a variety of cutting-edge applications in the nanosciences.

The project establishes a new and highly interdisciplinary research collaboration, combining a team of chemical engineers with a team of microbial ecologists from K-State biosciences division. Currently, one undergraduate, one graduate student, and a post-doc are working on this project.

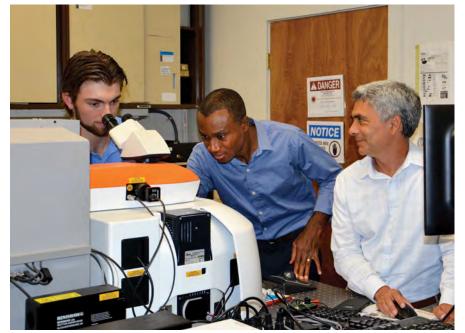
ANTI-CORROSION COATINGS FOCUS OF AMAMA'S SUMMER RESEARCH FOR THE AIR FORCE

Placidus Amama, assistant professor of chemical engineering, received the Air Force Summer Faculty Fellowship Award for the third time. He spent eight weeks with his graduate student, Brian Everhart, at the Materials and Manufacturing Directorate, Wright-Patterson Air Force Research Laboratory in Ohio, continuing the work he began in 2016 on development of an alternative anti-corrosion coating.

The Air Force spends billions of dollars each year combating corrosion, and is interested in developing new and efficient technologies for protecting the surface of aluminum and related aerospace-relevant aluminum alloys.

A major disadvantage of most traditional protective coatings is their tendency to modify or diminish the physical properties of the metals being protected. Amama's project takes advantage of recent advances in nanotechnology that provide new opportunities to overcome this challenge through development of an ultrathin protective coating using graphene, a very thin layer of carbon.

Graphene is conductive, lightweight, impermeable to gases and salts, extremely transparent and in particular, does not significantly change the properties of the underlying metal. Amama's research activities in 2016 and 2017 have led to development of an electrochemical deposition technique that coats thin graphene sheets on aluminum from graphene flakes exfoliated electrochemically. Anti-corrosion properties of the graphene coatings were studied by exposing samples to different corrosive environments and surfaces being characterized by microscopic techniques.



TEAM AT WORK AT AIR FORCE RESEARCH LAB



FROM LEFT, PLACIDUS AMAMA AND BRIAN EVERHAR

K-State Chemical Engineering CHEM-E NEWS • Fall 2017

TANDE TO FOCUS ON FOOD SAFETY, BIOSECURITY



Brian Tande joins the CHE department this fall as an associate professor. Tande received his B.S. from the University of Minnesota in 1998 and his Ph.D. from the University of Delaware in 2002, both in chemical engineering.

He comes to K-State after spending the past 11 years at the University of North Dakota (UND), where he served as the chemical engineering department chair for the past four years. While at UND, Tande also served as director of the Jodsaas Center for Engineering Leadership and Entrepreneurship, as well as founding director of UND's Grand Challenge Scholars Program, for which he successfully gained approval from

the National Academy of Engineering. Prior to UND, he spent several years in research and management roles in the plastics and composites industry.

His research at K-State will focus on development of materials for infectioncontrol applications in healthcare and food safety, building upon his previous work in ultraviolet disinfection. This work resulted in commercialization of a patented coating technology now in use by hospitals nationwide. What drew him to K-State was the ability to work with materials researchers in engineering and to develop new interdisciplinary collaborations across campus.

"My hope is to contribute to the ongoing work on campus in the areas of food safety and biosecurity," he said. "The facilities and infrastructure here at K-State are excellent and provide the ideal environment for my research."

Tande is also excited about the courses he will be teaching at K-State. In the

fall, he will be taking over Engineering Analysis I. In the spring, he will be developing a new course in chemical product design, incorporating his previous experience developing and commercializing new products.

"Many chemical engineering students will find themselves designing new chemical products, rather than working in a traditional process engineering role. This class will teach students the Stage-Gate process used by many large companies to develop new products, including specialty chemicals, formulated products like coatings and composites, and chemical devices," he said.

Tande and his wife. Desiree, an associate professor of nutrition and dietetics at UND, a position she will continue working remotely and teaching online from Manhattan, have four children aged nine to 15.

DUNCAN JOINS DEPARTMENT

Andrew Duncan will join the CHE department as an instructor in the fall 2017 semester. He attended the University of Kansas (KU) where he received his B.S. in 2007 and Ph.D. in 2015, both in chemical engineering.

In graduate school, he worked in a multidisciplinary group consisting of chemical, mechanical and environmental engineers as part of the Feedstock to Tailpipe biodiesel initiative at KU. In the initiative, growth conditions, fuel production methods, fuel properties, engine performance and emissions quality were investigated for multiple biomass feedstocks.

Duncan produced and analyzed renewable diesel fuels, with the majority of his dissertation research focused on high-pressure (131 MPa) viscosity experimentation, modeling and physical-property prediction.

In addition to his research in graduate school, Duncan worked as a graduate teaching assistant for several core chemical engineering courses. He also taught the first-semester senior design course as a lecturer during the semester prior to defending his dissertation.

After receiving his Ph.D., he began teaching at KU as an instructor of record from fall 2015. He taught several juniorand senior-level courses at KU, namely **Chemical Engineering Thermodynamics** II, Chemical Engineering Laboratory I, Heat Transfer and Chemical Engineering Design II. In spring 2016, Duncan received the award for outstanding service to undergraduate education from the chemical and petroleum engineering department at KU.

He will be teaching Chemical Process Analysis and Separational Process Design at K-State in the fall.



1997 2007 2017 R. Akins J. Anthony P. Amama TW0 J. Edgar V. Berry J. Anthony L. Erickson L. Erickson S. Castro-Diaz L.T. Fan L.T. Fan A. Duncan **DECADES** L. Glasgow L. Glasgow J. Edgar S. Jiang K. Hohn U. Hasegawa P. Pfromm J. Matthews R. Hansen OF CHE J. Schlup M. Rezac K. Hohn W. Walawender J. Schlup B. Liu **FACULTY** K. Walton J. Schlup A. Suresh W. Walawender B. Tande

FACULTY EXCELLENCE IN CHEMICAL ENGINEERING

Sigifredo Castro-Diaz, CHE instructor, was named the first recipient of the Award for Faculty Excellence in Chemical Engineering. He was nominated by his students for his enthusiasm for learning, dedication to outstanding instruction and commitment to student success.

To quote one of his nominators: "The work he has put into improving the program,



increasing awareness of our work, and most importantly, helping students, goes unmatched."

This award was established by department alumni to express their appreciation for those faculty whose teaching inspired and shaped their careers, and to help the department retain its best faculty by recognizing and rewarding their superior efforts. The department would welcome contributions to this fund, as it is not yet fully endowed.

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OPEN HOUSE 2017

Mentored by Sigifredo Castro-Diaz, undergraduate and graduate students of the chemical engineering department put up strong displays and demonstrations during the 2017 Open House. The department placed second in innovation, graduate student and curriculum/careers displays, and third in technical display and atrium display/performance. Kudos to everyone who took time out of their busy schedules to represent the department.









AYRES ELECTED STUDENT BODY PRESIDENT

Jack Ayres, CHE senior, was elected K-State student-body president for 2017-18. He and his vice president, Olivia Baalman, senior in computer science, won the election in March 2017 by a margin of 52 percent to their opponents' 48 percent.

Ayres decided to attend K-State owing to his positive experiences with the university and the town of Manhattan during his high school years. He particularly credits Frank Tracz, professor of music and director of bands at K-State, as his inspiration to join the K-State family. He will graduate in spring of 2018 with a B.S. in CHE, a secondary degree in biological engineering and a minor in Spanish. After graduation, he plans to attend medical school to become a physician, and is interested in working in public health policy and administration.

He served as an intern in the Student Governing Association (SGA) during his freshman year. The experience motivated him to run for student body president, and represent his fellow students' interests and needs to K-State administration and governing bodies at all levels. Jack campaigned on a platform of three ideas — "Your Degree. Your Campus. Your Voice."

Each idea encompasses a set of initiatives aimed at improving different aspects of the student experience at K-State.

Goals of his team include enhancing the readability of student DARS reports, improving transportation around campus by adding a drop-off lane to the Bill Snyder Family Stadium on game days and providing GPS tracking on ATA buses around town, and



working on projects such as the on-campus food pantry and multicultural student center.

Ayres believes a background in chemical engineering has benefitted him in his endeavors by enabling him to evaluate problems, and find their solutions in a strategic and systematic manner. He does acknowledge the difficult and unprecedented task of balancing his role within SGA with the demanding senior-year chemical engineering curriculum. However, he is looking forward to the challenge of managing his time and workload efficiently.

Collard receives 2017 National Science Foundation Graduate Research Fellowship

Diane Collard, who received her B.S. in chemical engineering from K-State in May, is the recipient of a 2017 National Science Foundation Graduate Fellowship. The three-year fellowship includes an annual stipend of \$34,000, plus an additional \$12,000 for tuition and fees.

Collard has been involved in many undergraduate research projects at K-State, including ways to slow down

frost formation on airplane wings and air-conditioning units, under guidance from Amy Betz, assistant professor of mechanical and nuclear engineering; and drug delivery methods for brain and skin cancer treatments, under guidance from John Schlup, CHE professor. She has been accepted into graduate school at Purdue University, where she will start her research on energetic materials for chemical rockets.



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CONGRATULATIONS CHE GRADUATES



M.S. and Ph.D. graduates December 2016

Cato, David - Erickson (M.S.)

Frye, Clint – Edgar (Ph.D.) B12P2 Improved Epitaxial Growth and Evaluation of Alpha Irradiation on Its Electrical Transport Properties

Hoffman, Timothy – Edgar (Ph.D.) Optimization and Characterization of Bulk Hexagonal Boron-Nitride Single-Crystals Grown by the Nickel-Chromium Flux Method

Nguyen, Phong – Amama and Berry (Ph.D.) Chemical Vapor Deposition Growth and Covalent Functionalization/Interfacing of 2D Nanomaterials for Electronic Applications

Padavala, Balabalaji – Edgar (Ph.D.) Epitaxy of Boron Phosphide on AIN, 4H-SiC, 3C-SiC and ZrB2 Substrates

Young, Matthew – Pfromm (Ph.D.) Studying Liquid-Phase Heterogeneous Catalysis Using the Atomic Force Microscope

Xie, Jingyi – Hohn (Ph.D.) Hydrogen Production of Bimetallic Catalysts and Local Acidity Investigation of Aluminosilicates and Mesoporous Silica via Single-Molecule Spectroscopy

Zeng, Fan – Hohn (Ph.D.) Catalytic Processes for Conversion of Natural Gas Engine Exhaust and 2,3-butanediol Conversion to 1,3-Butadiene

Zheng, Quanxing – Hohn (Ph.D.)

B.S. graduates

December 2016

Bell, Tabatha - Ash Grove Cement Karhoff, Levi – Anheuser Busch Klug, Jonah - Honeywell Massman, Ryan - U.S. Air Force O'Dea, Logan Zhang, Han

May 2017

Al-Momen, Momen Albader, Mohammed - SABIC Aldoukhi, Abdullah – SABIC Almutairy, Mohammed – SABIC Alrushaid, Sultan – SABIC Bai, Jijia Bandy, Brett – Weiss Associates Bennett, James Binmahfooz, Hasan - SABIC Blizzard, Lincoln - Koch Pipeline Company Bond, Levi Clark, Allison Collard, Diane - Purdue University, graduate school Davidson, Elena – Nitride Solutions Davis, Natalie – Avexis Dehning, Micah – Archer Daniels Midland **DeMeyers, Rachel** – Raytheon Missile Systems Dippold, Kevin

Everhart, Brian - K-State, graduate school

Floy, Martha – University of Wisconsin,

Garrison, Luke – Black and Veatch

Management Consulting

graduate school

Guo, Ziang - graduate school Hahn, Quentin – Burns & McDonnell Hai, Md Hay, Riley - General Mills Konrade, Kendall – Zeeco Lindsey, Andrew **Linot, Alec** – University of Wisconsin, graduate school McDonald, Lauren - Ardent Mills Meyer, Maggie – University of Kansas, medical school Minjarez-Almeida, Angel – Keane Group Oberle, Maggie – Koch Fertilizer **Pond, Austin** – Archer Daniels Midland **Priddy, Jake** – Epic Systems **Quinnett, Rachel** – Pepsico Radaha, Esther – K-State, graduate school Ronnebaum, Blake - University of Kansas, law school Root, Rachel – Pepsico Rosebaugh, Joshua – Keane Group Sheaks, Sam – Nitride Solutions Shriner, Aaron **Spicer, Aaron** – Ash Grove Cement Co. Story, Daniel Tatman, Aaron – Cargill Underwood, Troy Walker, Rachel – Anheuser-Busch Inbev Wang, Xiu – graduate school Watson, Jenna

Groff, Nolan

Conversion of 2.3-Butanediol Over **Bifunctional Catalysts**

Webb, Matthew - 3M

K-State Chemical Engineering

NEWS



Faculty news







The K-State Mentoring Fellowship, established in 1995 with a grant from the Alfred E. Sloan Foundation. helps tenure-track faculty in science and engineering fields find mentors and develop their research programs to a level to attract external funding. One of the recipients for 2016-17 was Urara Hasegawa, CHE assistant professor.



Placidus Amama, CHE assistant professor, was awarded "Best Paper Presentation" of the session at the AIChE Annual Meeting in San Francisco. Assisting him in the work were chemical engineering undergraduates Brian Everhart, Montgomery Baker-Fales and Angel Minjarez-Almeida; and chemical engineering graduate student, Haider Almkhelfe.

Placidus Amama, CHE assistant professor, was awarded a \$520,000

grant from the National Science Foundation's Faculty Early Career

Design of Efficient Carbon Nanotube-Supported Titanium Dioxide Photocatalysts for Air Purification." The study focuses on the

coupling of carbon nanotubes and titanium dioxide, with the goal

of enabling production of low-cost and large-area coatings of this

Development, or CAREER, Program for his project, "Rational

material for efficient outdoor pollution control.



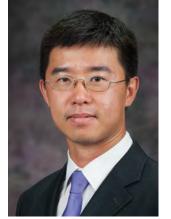
Larry Erickson, CHE professor, received the Kansas Natural Resource Council Bill Ward Award at the Fifteenth Annual Community Forum on Kansas Environmental Issues held in Prairie Village, Kansas.



ERICKSON

SCHLUP

John Schlup received a 2017 Ervin W. and Margaret Segebrecht Award established to recognize professors at K-State who provide inspiration and excellence in teaching. Eligibility for this award is restricted to professors in the departments of chemistry and chemical engineering. Some of Professor Schlup's notable accomplishments include developing the Bio-based Products and Bioenergy Graduate Certificate Program, and popular online materials science and engineering courses; serving as an ABET program evaluator; and convincing prospective students to pursue a major in chemical engineering at Kansas State University.



A group of K-State researchers, led by Peter Pfromm, CHE professor, has received a \$598,866 grant from the U.S. Department of Energy Office of Science to develop a new process to make ammonia. Bin Liu, CHE assistant professor, is also involved in the project.



2017 PROFESSIONAL PROGRESS AWARDEE WRIGHT SHARES EXPERIENCE

Jon Wright (B.S. 1999) was a recipient of the 2017 K-State College of Engineering Professional Progress Award. Jon started his professional career as operations manager at Procter & Gamble in 2000. He went on to work at the J. M. Smucker Company for three years before joining Burns & McDonnell in 2011. He is presently vice president and general manager at the food and consumer products division there. In his current role, he is focused on providing true end-to-end business consulting services that help clients manage the dynamic, fast-paced food and beverage and consumer products markets. Jon shared his professional experience and offered advice to future K-State chemical engineers.

What are your proudest professional accomplishments?

My proudest moments have been watching others succeed. The benchmark of a great team is that it enables individuals the opportunity to grow, while accomplishing more than they could have ever done by themselves.

Have there been important turning points in your career?

Yes. Joining Burns & McDonnell in 2011 was a turning point for me. Until then, I had worked for large, publicly traded CPG companies that provided solid training on business strategy, organizational development and leadership, but within a fairly narrow business segment or function. Burns & McDonnell's employee-owned, entrepreneurial environment has enabled me to immerse myself in all facets of a growing business while pursuing my passion of solving tough problems for the industry I serve.

What have been the biggest changes you've noticed in the business/industry since you started your career?

The demand for food and beverage, and consumer products has remained very stable with a steady increase as population and consumption have grown. However, type of products and ways they are packaged, distributed and regulated has seen significant change. The industry is dynamic due to changing consumer tastes and regulations, which requires constant evolution of how we provide engineering and construction solutions to our customers.

Were there particular moments while you were at K-State that made you enthusiastic about studying chemical engineering?

The summer after my sophomore year in high school, I attended Engineering and Science Summer Institute (ESSI) at K-State. That is when I realized I wanted to be a chemical engineer and it never changed. I loved the senior year curriculum because it put all the theory I learned into practical application.

Any advice for current students in chemical engineering?

Master the theory and understand the application as soon as possible. Work experience is the best way to do this. Once you understand the industry, you can determine how to pursue your passion.

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Department of Chemical Engineering HONOR ROLL OF GIVING

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Tso Yee Fan and Deborah Haley Gordon and Joyce Goering Charlotte Gollobin Wayne and Barbara Harms Steve and Kim Hieger Art* and Georganne* Hiser Bill* and Virginia* Honstead Carl and Terri Hopkins Ed and Ming Hsu Joe* and Louise* Hyer Eric Johnson and Pam Dlabal Warren and Gisela Kennedy Scott and Karen Love Ken Martin* **Brian and Amy Mellies** Kent and Trina Nettleingham Don and Barb Riedl Ann and Donald Schaechtel Larry and Barbara Schulte Kirk and Noel Schulz Jim and Robin Siefkin **Bob and Peggy Smith** Fred and Lois Stoller **Jeff Streets** Jennifer Streets Tim and Sharon Taylor Norman and Donna Tetlow Spencer and Susan Tholstrup Patrick and Carolyn Wilburn Kerry and Donna Williams Laura and David Winks Jon and Katie Wright

* = deceased

We sincerely thank you for your generosity and support.

Every effort has been made to produce a comprehensive listing of donors for the calendar year July 1, 2016, to June 30, 2017. We apologize for any incorrect listings, misspellings or omissions, and extend our sincere thanks for our support. Questions about the donor list should be directed to Brett Larson, Senior Director of Development, College of Engineering, Kansas State University Foundation, 1800 Kimball Ave., Suite 200, Manhattan, KS 66502; 785-532-7519 or 800-432-1578.

STUDENT NEWS

Jack Ayres was selected to the 2017 National Student Congress of the Henry Clay Center for Statesmanship. The national center educates selected students in the skills of negotiation, dialogue and compromise.

Edgar Duarte was one of 10 students in the nation from 15 partner universities to be awarded a Cargill Global Scholarship.

Devon Ronsse was awarded a 2017-18 Neal Atkinson Junior Leadership Award by the K-State chapter of the Blue Key Honor Society.

Christopher Kreiser was awarded a Jon Levin Student Union General Scholarship in recognition of his contributions toward the success of the K-State Student Union.

Zachary Lock was one of 47 students selected by the Johnson Cancer Research Center at K-State for its Cancer Research Award program.

Jesus Loera was a member of a three-person team that won the Nissan Design Competition at the Society of Hispanic Professional Engineers National Conference in Seattle, Washington.

Chloe Albin and Logan Green were selected as members of the K-State Engineering Ambassadors organization for 2017.

Megan Kohman was named a Snyder Leadership Legacy Fellow for 2017-18 by the Staley School of Leadership Studies.

KANSAS STATE UNIVERSITY CHEMICAL ENGINEERING

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Revised July 7, 2015.

Let us know what you've been up to

We would like to feature alumni news in future issues of ChemE News. Please include the info below and mail to Dept. of Chemical Engineering, Kansas State University, 1005 Durland Hall, 1701A Platt St., Manhattan, KS 66506-5200; e-mail to che@ksu.edu; or fax to 785-532-7372. Thank you.

