Next Generation of Biofuels on Path to Mainstream Uses

Bruce Dale is an evangelist when it comes to the topic of bioenergy and biofuels. “Remarkable progress is being made,” says Dale. “But we have to stay the distance. We have to make this work.” Dale, CHEMS professor and associate director of the Office of Biobased Technologies, is an internationally known expert on the sustainable conversion of plant matter to biofuels. Dale is also one of the leaders of the Great Lakes Bioenergy Research Center (GLBRC), a partnership between Michigan State University and the University of Wisconsin-Madison, funded by the U.S. Department of Energy, to conduct basic research aimed at solving some of the most complex problems in converting natural materials to energy.

Dale has worked in the field of bioenergy for more than 30 years. For many of those years the cost of producing biofuels far outweighed the cost of using petroleum, even imported petroleum. “It’s a different era now,” says Dale. “Some biofuels are becoming mainstream and alternatives to petroleum are undergoing rapid development.”

At his lab, called the Biomass Conversion Research Laboratory, Dale has 22 people working on biofuel projects, including grad students, undergrads, senior scientists, and visiting researchers. Much of the work is now focused on cellulosic biofuels, which are plant matter that is not part of the food chain. Cellulosic ethanol is identical in composition and performance to ethanol derived from corn or sugar cane.

These second-generation biofuels, colloquially called “grassoline,” can be made from dozens of sources – from wood residues, such as sawdust and construction debris, to agricultural residues, such as cornstalks and wheat straw. Another source is energy crops, such as fast growing grasses and woody materials that are grown expressly to serve as feedstock for grassoline. Most of these crops can grow on marginal lands that would not otherwise be used as farmland.

Cyber-Enabled Research Looks at Cellular Communication

Communication is what makes the world go round. Humans communicate with each other every minute of every day. In addition, all the cells in your body communicate with each other. You might say they have been “tweeting” for ages! And those cellular communications can have an effect on health.

Christina Chan, the George W. Bissell Professor in the Department of Chemical Engineering, is working to unlock the secrets of what affects cellular communication and how it might help to fight diseases, such as Alzheimer’s, cancer, and diabetes. In collaboration with Michael Feig in the MSU Biochemistry Department and Amadeu Sum at the Colorado School of Mines, Chan is researching how saturated fatty acids can bind to proteins within the cell and on cell membranes to regulate signaling or communication. “This is the first time that we have proof of how this works,” says Chan, whose research on the
Recalling the adage — is the glass half full or half empty — we definitely see the glass as half full — or even fuller. The world, the United States, and especially Michigan have a multitude of problems, and the Department of Chemical Engineering and Materials Science is helping in significant ways to address these problems. It is a very exciting time to be part of the department, not only for our faculty and staff, but also for our graduate and undergraduate students.

Because the department has a significant role in solving the pressing problems of today, our enrollment of undergraduate and graduate students as well as posdocs and researchers is up. We have hired new faculty and our faculty members continue to win prestigious awards and show leadership in critical areas.

Our department research themes are: energy and sustainability, nanotechnology and materials, and biotechnology and medicine. This past year we had $1,07 million in research expenditures, an all-time high. In addition, as part of the American Recovery and Reinvestment Act (ARRA), faculty in the department, as of mid-November, have obtained more than $1.2 million in new research grants from a variety of federal funding agencies. These funds are targeted for projects that can show significant results in the near future. Other ongoing research also maintains excellent funding.

Many of our undergraduate students have won scholarships and some are pursuing international research and community development projects. This newsletter highlights the accomplishments of some of these students. Best of all, our undergraduates are highly sought after by industry. In keeping with our goal to continually improve our program, we have added a course in biomass conversion to keep students abreast of new technologies in the ever-expanding bioenergy field.

The department welcomes Wei Lai as the latest member of our faculty. He received his PhD from the California Institute of Technology and completed a post doctoral appointment at the Massachusetts Institute of Technology before coming to MSU this fall. His research interests include advanced materials for electrochemical devices (fuel cells, batteries, super-capacitors, etc.) and impedance spectroscopy, which will be a good fit with the research being done by other faculty members.

We hope you share in our excitement of all that is happening in the department. We look forward to 2010 and the coming years for all that can be accomplished and the significant role our department will play.

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Cyber-Enabled Research (continued from page 1)

subject will be published soon. Hyun Ju Cho, a ChE PhD student, is working with Chan on the research, as is Nicoli Priezjev and Neil Wright, professors in the MSU Department of Mechanical Engineering.

Chan’s work was funded this fall by a Cyber-Enabled Discovery and Innovation (CDI) Type II grant from the National Science Foundation. The four-year grant for more than $1.27 million will help further this research. “New funding allows us to gain better understanding of transmembrane IRE1 — endoplasmic reticulum transmembrane protein kinase/endo-ribonuclease — which is activated in response to the Unfolded Protein Response (UPR),” says Chan. Thus UPR is induced in response to cells that are under stress. Various stimuli have been shown to induce UPR, such as hypoxia, glucose deprivation and more recently, even high-fat diet. The function of UPR is to control errors in communication by activating signaling pathways, such as IRE1, which helps to restore normal cell function. Chan also received federal funding from the National Institutes of Health and the National Institute of General Medical Sciences that provides additional support for the research, especially in purchasing needed equipment and hiring additional staff.

This study is the first to develop a multi-scale model to integrate the various domains of the transmembrane protein to understand how palmitate activates the protein. “Among fatty acids, saturated fatty acids, such as palmitate, are typically the most cytotoxic and have been shown to cause cell death in many types of cells,” says Chan. “We have studied saturated fat and understand what it does in the body. It often acts as fuel for the body’s activities, but it does more,” says Chan. “Saturated fats can also induce signals inside the cells and affect signaling.”

The project will provide insight into the general understanding of transmembrane protein kinases and will rely on computation analysis of biophysical events as well as integrating tools from biology, chemistry, physics, and engineering. “This approach will provide us with insight that will complement and aid in the interpretation and analysis of macroscopic measurements of cellular function, signaling, and toxicity,” says Chan. “Eventually we hope to design strategies to control or prevent cell damage and modulate cell signaling induced by fatty acids.”

Another project under Chan’s supervision is the work of a group of graduate students and postdocs who are using information and data in the literature to create molecular models that show the network of communication within a cell. The models will show how a normal cell communicates versus one that is compromised or has metastasized. “If we can reconstruct the communication, we may be able to understand what is going wrong in the pathway,” says Chan.

For Chan, the research is exciting. “It isn’t an area people were looking at. The interactions likely involve more than just this protein (IRE1), but this is one of the main ones.” For more information, visit http://www.egr.msu.edu/changroup/  

— Jane L. DePriest
Next Generation of Biofuels (continued from page 1)

“lulose,” says Dale. The ammonia fiber expansion (AFEX) pretreatment process uses ammonia to make the breakdown of cellulose and hemicellulose in plants five times more efficient than when conventional enzymes alone are used. Cellulosic material pretreated with the AFEX process doesn’t have to be washed or detoxified, as with cellulose pretreated by acid.

All of the biofuels research is done with an eye toward quickly scaling conversion technologies up to refinery scales. Large-scale plants based on new technologies from bioenergy research are opening all the time, according to Dale. One example is a new facility in Madison, Pa., operated by Coskata, Inc., a leading developer of next generation biofuels. The facility will produce ethanol from numerous feedstocks, including wood biomass, agricultural waste, sustainable energy crops, and construction waste. Some of the ethanol that is being produced at the facility has been delivered to the General Motors Milford Proving Grounds in Milford, Mich., for early testing. In addition, a plant to the General Motors Milford Proving Grounds in Michigan will turn wood chips into ethanol is being built in the Upper Peninsula of Michigan.

To help facilitate the transfer of the research to working plants, the Office of Biobased Technologies (OBT) collaborates with MBI International, a wholly owned subsidiary of the MSU Foundation, to scale-up and commercialize the AFEX pretreatment technology, making it more attractive to companies that will invest millions of dollars in production plants.

Because of his expertise in biofuels, Dale is often part of the public discussion on this topic. He recently debated Tim Searchinger, from Princeton University, who is known for his opposition to biofuels, at a forum in D. C. Dale also is a leading expert on life cycle analysis (LCA), an accounting tool used to determine the environmental impacts of biofuel production and use. Dale was a keynote speaker recently at a workshop on biofuel LCA sponsored by Argonne National Laboratory (near Chicago).

Dales urges researchers and consumers not to get distracted or lose sight of the key issue: reducing our dependence on petroleum. “We have to overcome the problems we may encounter with biofuels and not throw up our hands when we encounter an obstacle,” says Dale. “There are no silver bullets. No one thing will be the solution to the problem of oil dependence. There will be many different solutions. It took us a century to get addicted to oil, and it will take decades to substantially reduce our dependence on petroleum, but it is something we have to do.”

— Jane L. De Priest

New Bioenergy Course Inspires Students

The ongoing research at MSU in bioenergy and biofuels, much of which is led by CHEM professor Bruce Dale (see article page 1), has sparked interest in the subject among students. Now the CHEM department has teamed up with the Department of Biosystems and Agricultural Engineering to offer CHEM/BIO 468 Biomass Conversion Engineering. CHEM faculty David Hodge and Dennis Miller are the lead instructors for the course.

“The students are enthusiastic about renewable energy,” says Hodge, who taught the first weeks of the course in the fall 2009 semester, focusing on chemical, enzymatic, and microbial conversions. “They say this is why they went into chemical engineering and that they want to work in this area after graduation.”

The course reviews the chemical, biochemical, and thermochemical technologies used for the conversion of plant biomass fractions into value-added chemicals, transportation fuels, and stationary power. There is an emphasis on conversion chemistry including reaction stoichiometry, kinetics, yields, and processing requirements. Miller’s presentations focused on biodiesel production. BE assistant professor Chris Saffron talked about thermochemical conversion, while BE assistant professor Wei Liao discussed anaerobic digestion and algae cultivation and conversion.

“We want students to understand the processes and technologies available for the conversion of plant biomass into fuels, chemicals, steam, and electricity and how to apply that knowledge to process design,” says Hodge. “We are showing at a fundamental level what is required to get to a biofuel.” In addition, students identify current challenges and bottlenecks to the deployment of biofuel technologies, and see what these types of processes would look like in a processing facility.

As a follow-up to the biomass conversions course, a course in life cycle analysis, economics, and policy issues associated with bioenergy processes (BE 469) is scheduled for the spring 2010 semester.

A Beach Adventure with a Mission

Gabrielle (Gabby) Kleber, a CH junior from Clarkston, Mich., spent this past summer on beaches around the world, including Hawaii, Australia, Singapore, the Maldives, England, and Iceland. However, it was not a glamorous summer boondoggle. This was serious research that combined Kleber’s enthusiasm for the outdoors and her concern for the environment. She studied and collected data for the often overlooked issue of marine debris.

“I first learned about the overwhelming amount of trash in our oceans that also washes up on beaches in an issue of Discover magazine,” says Kleber, who has a concentration in environmental engineering and a minor in environmental studies. “I was appalled to learn that there are millions of tons of trash floating in our oceans. I developed a strong interest in this environmental concern.”

At about the same time, Kleber discovered that the Circumnavigators Club Foundation provides grants to enable outstanding college students at participating universities to undertake around-the-world travel-study projects. The ongoing research at MSU in bioenergy and biofuels, much of which is led by CHEM professor Bruce Dale (see article page 1), has sparked interest in the subject among students. Now the CHEM department has teamed up with the Department of Biosystems and Agricultural Engineering to offer CHEM/BIO 468 Biomass Conversion Engineering. CHEM faculty David Hodge and Dennis Miller are the lead instructors for the course.

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Federal Stimulus Funding

As of November 15, four members of the CHEMS faculty have received stimulus funding from various federal agencies.

Scott Calabrese Barton, associate professor, received funding from Gibbard Research and Development Corp., which has a contract with the National Science Foundation. The grant is entitled “High-Performance, Non-Precious Metal Oxygen Reduction.” This is a Small-Business Technology Transfer Phase I project that will develop non-precious metal catalysts for oxygen electroreduction based on metal-nitrogen-carbon (MNC) center, in an effort to build greater efficiency and clean emissions in power generation systems, such as fuel cells in vehicles. The project, funded at $85,025, runs through June 2010.

Christina Chan, associate professor, was awarded a grant from the National Institutes of Health and the National Institute of General Medical Sciences. The award, entitled “Developing a Dynamic Model that Incorporates Text-Mining to Reconstruct Networks,” provides additional support to expedite an ongoing study to understand disease mechanisms and drug target identification. See article on page 1. The supplemental funding of $189,920 will be used to purchase laboratory and computer equipment as well as the hiring of additional staff to help run experiments and to train future graduate students. The funding runs through January 2011.

University Distinguished Professor Ramani Narayan received funding from the Northern Technologies International, which has an NSF contract. It also is a Small-Business Technology Transfer project entitled “Advanced Polylactide (PLA) Materials for Sheet Extrusion Applications.” The project aims to improve mechanical and thermal properties of PLA resins with the goal of broadening their commercial potential. Funded at $46,865, this project runs through mid-August 2010.

Professor R. Mark Worden received funding from the National Institute of Environmental Health for a project entitled “Biomimetic Microsystem for High Throughput Evaluation of Engineered Nanomaterials.” The overall goal of the project is to develop a toxicity testing platform for engineered nanomaterials (ENM) that includes measurement of allergic airway disease, in vitro measurement of T cell activation, high throughput measurement of ENM interactions, and prediction of ENM’s molecular properties. The $890,364 grant runs through July 2011.

New Faculty

Wei Lai joined the department this fall as an assistant professor. Lai has a BS (’98) and MS (’01) from the University of Science and Technology of China, as well as an MS (’04) and PhD (’07) both in materials science from the California Institute of Technology. Before coming to MSU, Lai was teaching and doing research as a guest lecturer and postdoc associate at the Massachusetts Institute of Technology. His research interests include advanced materials for electrochemical devices (fuel cells, batteries, super-capacitors, etc.) and impedance spectroscopy.

Editorial Board

Sachin Patil, visiting assistant professor, recently joined the editorial board of BMC Neurology, an open access, peer-reviewed journal that covers all aspects of the prevention, diagnosis and management of neurological disorders, as well as related molecular genetics, pathophysiology, and epidemiology. Sachin holds a PhD degree (’07) from the MSU Department of Chemical Engineering and Materials Science. His research work is focused on understanding molecular mechanisms underlying Alzheimer’s disease and also discovering and developing novel drugs against the disease. The invitation from BMC Neurology to join its editorial board honors his Alzheimer’s disease research work.

International Recognition

Ramani Narayan, University Distinguished Professor, was nominated and selected by the FNRS (Fonds de la Recherche Scientifique), Belgium as a research professor in the University of Mons. As part of the scientific mission, in October, Narayan gave a one-week course titled “BioPlastics – From Polymer Materials to LCA,” which was open to all scientists and students in Belgium.

Departmental Research

The CHEMS department faculty members are active in a wide range of research, collaborating with MSU researchers, as well as with more than 30 major state and federal research partners. For more information on the research, visit www.chems.msu.edu/research.

Faculty and Staff Bond
Kim K. de Groh (van den Ende) (BS ’85, MS ’87) is a senior materials research engineer with NASA Glenn Research Center in Cleveland, Ohio, who is conducting research on the durability of spacecraft materials in the space environment. De Groh had three experiments on the International Space Station (ISS) that were retrieved this summer after 1-1/2 years of space exposure, and four experiments that were on board the November shuttle mission to the space station.

Her experiments are part of the Materials International Space Station Experiment (MISSE) program. The MISSE program addresses the long-duration environmental durability of spacecraft materials and devices in the low Earth orbit environment through a series of materials spaceflight experiments. Experiments developed by principal investigators are loaded onto suitcase-like trays, called Passive Experiment Containers (PECs), and are exposed to the space environment on the exterior of the ISS. The MISSE trays are retrieved and returned to Earth, enabling post-flight experiment evaluation. De Groh’s most recent experiments, which are part of MISSE 7A and 7B, were attached to the exterior of the ISS during a spacewalk on November 23, 2009. Most of her MISSE experiments are collaborative efforts with students from Hathaway Brown School for girls.

In recognition of de Groh’s research contributions to the space program and her student mentoring and outreach efforts, she was inducted into the Ohio Women’s Hall of Fame in August 2009. Established in 1978 by the Women’s Programs at the Ohio Department of Job and Family Services, the Ohio Women’s Hall of Fame provides public recognition of the contributions Ohio women have made to the growth and progress of Ohio, the nation, and the world. De Groh was one of 13 women inducted at the ceremony at the Ohio Statehouse.

Baldwin Carr (BS ’50), who died as a Chinese prisoner during the Korean War, received posthumously the nation’s oldest military decoration — the Purple Heart combat medal — in a campus ceremony on September 29. U.S. Rep. Mike Rogers presided over the ceremony at Demonstration Hall. Carr’s brother, Gordon Carr, accepted the Purple Heart on behalf of his brother and the family.

The Purple Heart acknowledges the bravery and sacrifice of First Lt. Baldwin Ronald Carr, who was taken prisoner by the Chinese on April 25, 1951, and died in captivity just four months later, on Sept. 1. His body has never been returned to his family.

Carr graduated from Lansing’s Sexton High School in 1946 and from MSU in 1950 with a BS in chemical engineering. He was commissioned out of the MSU R.O.T.C. as a Second Lieutenant in 1950, and was assigned in 1951 to the 6th Medium Tank Battalion of the 1st Calvary Division.

“Baldwin Carr made the ultimate sacrifice to defend our nation and stand up for freedom, giving his life from the depth of his own faith and his belief in what the United States of America stands for in our world,” Rogers said. “It is with the utmost honor and gratitude that I join with Gordon Carr and members of the MSU Department of Military Science and the R.O.T.C. members to remember Lt. Baldwin Carr. We all represent a grateful nation in honoring his service and his sacrifice.”

Michael Druzinski (BS ’03) has passed the Michigan bar exam and is now an attorney at Reising Ethington, PC. Headquartered in Troy, Mich., the firm specializes in intellectual property law and will celebrate 145 years in business in 2010.

While Druzinski’s practice focuses on all aspects of intellectual property law, he primarily prepares and prosecutes patent applications for innovations in the chemical, electrochemical, metallurgical, and mechanical arts. His particular field of expertise revolves around next generation alternative energy technologies, including fuel cells, lithium ion batteries, and hydrogen storage and delivery systems.

Alumni and friends gathered at Shanty Creek Resort on the Cedar River Golf Course in Bellaire, Mich., for a summer golf outing. The event was hosted by D. John Ogren (BS ’65). Later, a dinner was held at Shanty Creek where more alumni gathered. Martin Hawley, CHEMS department chair, gave an update on happenings in the department and informed alums about other current events at the college and the university.
**Student Bond**

**Humanitarian Project in Peru**

Austin Melcher, a ChE junior, was part of an interdisciplinary MSU team involved in a community engagement program in the Peruvian Andes during the summer of 2009. The idea behind the program is to have small teams of MSU students engage in community-based research and development projects under the guidance of appropriate MSU faculty and the supervision of local nongovernmental organizations (NGOs) and municipal entities that understand the needs of underserved communities in the Andean highlands of Peru.

Two key projects for this program included the development and installation of a solar water heater at a hospital and the creation of a domestic solar water heater that was used as a teaching aid to show families how they could create this kind of equipment in their own homes. Most homes do not have hot water for bathing and laundry and there are many water quality issues.

"When I saw the flyer for this project in November or December of 2008, I thought it would be a way to make a difference and increase my knowledge of alternative technology, both of which are my focuses," says Melcher. The most eye-opening part of the trip for Melcher and the other students on the team was getting materials for the project. "We could order some materials from a hardware store, but often times the order did not come in, so we learned to use what we had." Also, the tools were unsophisticated. "We were cutting aluminum with scissors. After using electric laser cutters for projects at MSU, this is a very time-consuming way to get a project done," says Melcher who believes the summer project was a way to make a difference and increase his knowledge of alternative technology.

"I could not think of a more pertinent topic than marine debris to study while circling the globe," says Kleber, "I wanted to analyze the volume, composition, source, and impact of marine litter on coastal ecosystems." Her primary goal was and still is to raise global awareness of this issue. Kleber's proposal was approved by the Circumnavigators Club Foundation in November 2008. Three other proposals were funded from students at Princeton, Northwestern, and George-town; these proposals mainly concentrated on global social issues. Kleber was required to visit at least five different countries in three regions of the world, and she could not spend more than $4,500 on flights. She ended up buying an "around the world" ticket and supplemented that with some additional flights or other transportation within the various countries. She did most of the planning for the trip while completing a semester-long internship in Thailand during the winter/spring of 2009. "I planned the trip completely by myself, 100 percent." That included figuring out the logistics of where to stay and what people in each country had into that would add to her data. She often camped out or stayed with local people whom she contacted ahead of time or happened to meet.

The trip took her to less touristy beaches, some in remote locations, but everywhere there was trash that included shoes, a rifle, plastic pieces, wrappers, diapers, fishing net, bottles, and even a Barbie doll and a couch. Water bottles were the most common items she found on the beaches. At each location, Kleber selected a stretch of beach and then sorted the debris into piles of like objects. If a piece of debris had a bar code, she saved the code in order to identify the country where it came from.

In addition to the data she collected, Kleber believes that she grew as a person. "I love to travel but this experience of traveling alone and finding my way as I went and dealing with the complex logistics of the venture helped me to mature and look at things differently."

Kleber is preparing a 50-page report for the Circumnavigators Club and is working on a paper that she hopes to get published. After her MSU graduation, Kleber would like to get a master’s degree in oceanography. "The University of California at San Diego has a big project that studies the North Pacific Ocean Gyre, which contains one of the largest ecosystems on Earth, but it is in danger from a deluge of plastic trash." Kleber is the daughter of Richard and Janet Kleber.

-- Jane L. DePriest

*A Beach Adventure with a Mission* [Continued from page 3]

in the summer between their junior and senior years. The Circumnavigators Club is an international organization, founded in 1902, devoted to bringing together men and women who have gone around the world. The organization has a Michigan chapter.

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*[Image: Austin Melcher with the demonstration solar water heater and villagers from Huamachuco, Peru.]*

*[Image: Gabby Kleber is holding the flag of the Circumnavigators Club.]*
helped him become a better engineer because of the on-the-spot problem solving needed.

He gives the Peruvians with whom he worked credit for being creative, smart, and inventive. “For example, a drill press was overheating, so they used medical tubing sort of like an IV drip to cool the press. They have to adapt out of necessity.”

The semester-long program of 13 credits began in Cusco, near Machu Pichu, where students attended five weeks of classes on Andean culture and conversational Spanish. After that the community development projects lasted for about six weeks. The solar water heater project in which Melcher participated took place in the northern Andean town of Huamachuco. A similar program in Peru is planned for next summer; more details are available at http://studyabroad.msu.edu/programs/perucomengage.html.

2009-2010 Von Ehr Scholars Named

Two chemical engineering students are among four freshman students named as the 2009-2010 Von Ehr Scholars. They are Brian LaFleur, Rockwood, Mich., and Jonathon Roney, Haslett, Mich. The other scholars are Alexa Jones, Metamora, Mich. and Matthew Bach, Chelsea, Mich., who are both majoring in bioengineering.

The James Von Ehr Scholars Program was established in 2006 by James R. Von Ehr II, a 1972 computer science graduate and entrepreneur. The $1 million endowed scholarship fund benefits undergraduates of the College of Engineering.

Alumni Distinguished Scholars

Logan R. Matthews, a freshman in chemical engineering from Midland, Mich., is one of 17 high school graduates from throughout the country who are Michigan State University’s newest Alumni Distinguished Scholars (ADS). These scholarships are considered to be among the most competitive in the country and are valued at about $90,000 for in-state students, covering full tuition, room and board, books, and a stipend for up to eight semesters of study. These 17 students were selected from more than 1,100 high school seniors who applied to MSU and took an intensive general knowledge exam. Scholars were selected by a committee of faculty and administrators based on results of the scholarship exam, high school program and achievements, other standardized test scores, and interviews with the finalists. All of the scholars are also members of the MSU Honors College.

Their reasons for coming to MSU are myriad for these academically talented students. “I am excited about the opportunity to do research as an undergraduate,” says Matthews. Also the opportunities offered by the Honors College and the positive effects of student activities, such as the Izzone (a student section at men’s basketball games), were other contributing factors in Matthews’ decision to come to MSU. In addition to chemical engineering, his academic interests include economics and computer science.

Larian Scholarships

Eleven undergraduate CHEMS students received scholarships from the Larian Endowed Scholarship Fund this year. They are Michael Brunelle, Teresa Deluca, Anthony Grittini, Benjamin Kremkow, Adam Loyer, Megan Massa, Nathaniel McIntee-Chmielewski, Allan Morris, Jason Schneemann, Richard Sturgis, and Brett Walczak. The scholarship was established in 1976 in memory of Dr. Maurice G. Larian, professor emeritus of chemical engineering, for the benefit of outstanding CHEMS students at MSU.

Upon Professor Larian’s death in 1974, a substantial amount of money was received from many friends and former students in his memory. The endowment has grown over the years, through gifts from his wife, Sara Larian Gifford, friends, and some successful chemical engineering graduates, particularly Michael Dennos, CHE ’43.

Larian was born in Armenia and came to the United States without financial resources. He worked long hours in his student days, as he depended on his earnings and scholarships for his support while studying for his BS and MS at Iowa State University and his PhD at the University of Minnesota. He was the epitome of a scholar, a good but demanding teacher. His most memorable quality, however, was his sincere interest and concern for his students. The students, in turn, treated him with great respect.

Homecoming Court 2009-2010

Ryan Hayes, a materials science and engineering senior from Chicago, Ill., participated in MSU’s 2009 Homecoming Court. The son of Thomas and Joanne Hayes, he is an undergraduate research assistant in the College of Engineering. He is a pre-med student and a member of the Honors College. Hayes is president of the Biomedical Engineering Society and has been a member of the Izzone for four years.

Members of the Homecoming Court are required to have senior class status and were selected based on academic standards, community service, campus involvement, and exceptional “Spartan Spirit.” During Homecoming Week, the court represented the MSU student body at events including a reception with President Lou Anna K. Simon, the Homecoming parade, the Alumni Association’s Green and White Brunch and Grand Awards Ceremony, the football game, and other activities.

In addition, members will serve as student ambassadors for MSU throughout the 2009-10 school year. By attending a variety of campus, community, and statewide functions throughout the year, court members carry on the MSU tradition of Spartan pride.
KEEPING IN TOUCH

NAME

STREET ADDRESS

CITY / STATE / ZIP

IS THIS A NEW ADDRESS? □ YES □ NO

OFFICE TELEPHONE

HOME TELEPHONE

E-MAIL

GRADUATION YEAR

DEGREE

CURRENT OCCUPATION

EMPLOYER

LOCATION

News of recent accomplishments, awards, or promotions (Use separate sheet if needed):

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My/our total gift will be paid as indicated:

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☐ A pledge of the following duration (maximum 5 years): _____________________

Enclosed is my first payment of $ _____________________

Please send pledge reminders: □ Annually □ Quarterly □ Semiannually beginning: ________________

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YEAR

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Please return to: Engineering Development, MSU, 3536 Engineering Building, East Lansing, MI 48824-1226, or make your gift online at www.givingtomsu.edu.

CHEMS alum Kim K. de Groh, in center holding award, is surrounded by family and friends on the steps of the Ohio Statehouse after being inducted into the Ohio Women’s Hall of Fame. Her husband, Harry, is next to her. The two boys in ties are her sons, Henry (on the left) and Daniel (on the right). See story on page 5.

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