Wanted: A Solar Bargain

PURDUE **CHEMICAL**

ENGINEERING**IMPACT**

WINTER 2009

Safety, Sustainability, Community, People
True sustainability multifaceted, interdependent

Rays of Hope
Profs poised to make solar energy more affordable

Speeding Toward Discovery
New, efficient method to study catalysis

up front

On My Mind

Welcome to *Chemical Engineering Impact* magazine. This edition revolves around sustainability, but it maintains the components you are accustomed to reading about our faculty, alumni, students, and staff.

In November 2008, I attended the American Institute of Chemical Engineers (AIChE) annual meeting in Philadelphia. This was a special event, celebrating a century of achievements. I am proud to say that ChE faculty and alumni were represented in each of the categories specially developed to recognize "individuals who have contributed to the profession and society in a variety of times and ways." These included: 50 Eminent Engineers of the Foundation Age, 25 Industrial Executives, 100 Engineers of the Modern Era, 30 Authors and Their Groundbreaking Books, 20 Chemical Engineers in Other Pursuits and 9 Chemical Engineers in Space. You can read more about this in "Around ChE."

In preparation for this issue of *Chemical Engineering Impact*, we sent an e-mail to all our alumni whose addresses are on record with the Purdue Alumni Association requesting news, and we were pleased with the overwhelming response! We encourage you to continue to e-mail us about the important changes in your careers at **chealumni@ecn.purdue.edu**. We will continue to include them in this magazine, and we will post all updates in our online alumni section at **engineering.purdue.edu/ChE/People/Alumni**.

If you plan to visit campus in the next six months, please pardon the mess on the first floor of the old section of Forney Hall; we have started phase three of our renovation and expect it to be complete in time for the start of classes next fall. We look forward to enjoying an exceptional space created for our exceptional people.

Hail Purdue!

AVarma

Arvind Varma
R. Games Slayter Distinguished Professor and Head

Tell Us What You Think

Share your Purdue memories, react to a story, or let us know your thoughts about a particular topic. Write to us at peimpact@purdue.edu. In doing so, you grant us permission to publish part or all of your letter in an upcoming issue. We reserve the right to edit letters for length and/or clarity.

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COLLEGE OF ENGINEERING

School of Chemical Engineering

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ChE Impact is published by the Purdue University School of Chemical Engineering for alumni, faculty, students, corporate partners, and friends. We welcome your comments. Please send them to the address at right.

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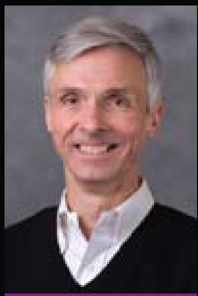

Ladisch


Sampson


Weekman

100 Years of Purdue ChE Accomplishments Highlighted

During the 2008 centennial year of the American Institute of Chemical Engineers, several ChE alumni as well as current and former faculty were recognized.

Henry Rushton (ChE faculty member, 1955-71; AIChE president, 1957) was named one of the 50 Eminent Chemical Engineers of the Foundation Age.

Paul Oreffice (BS ’49), former chief executive officer, Dow Chemical Co., was named one of the Top 25 Industrial Executives.

Three of the 30 Groundbreaking ChE Books were written by Purdue faculty during their tenure with ChE: *Process Systems Analysis and Control* by **D.R. Coughanowr** and **L.B. Koppell**, *Chemical Engineering Thermodynamics* by **J.M. Smith** and **H.C. Van Ness**, and *Chemical Process Industries* by **R. Norris Shreve**.

Mary Ellen Weber (BS ’84), an astronaut, is listed among the 9 Chemical Engineers in Space.

Henry T. Sampson (BS ’56), coinventor of gamma-electric cell technology used in cell phones, is listed among the 20 Chemical Engineers in Other Pursuits.

Faculty member **Sangtae Kim** was named one of the 100 Chemical Engineers of the Modern Era, along with former faculty member **Nicholas A. Peppas** (1976-2002), and school alumni **Kristi Anseth** (BS ’92), **Mike Ladisch** (MS ’74, PhD ’77), and **Vern Weekman** (BS ’53, PhD ’63).

Cristina Farmus

ChE Industrial Advisory Council (left to right): Arvind Varma, Peter Kraemer, Tim Schuetter, Mark Evans, Deb Grubbe, Phil Armstrong, Linda Davis, Jeff Hemmer, Dick Grabham, Tom Degnan, Rick Roberts, Mark Tibbitts, Shekar Shetty, Randy Smiley.

Industrial Advisory Council Takes On Six Strategic Areas

Faculty, staff, and students rely on the partnership, advice, and input of the Purdue Chemical Engineering Industrial Advisory Council (IAC)—the former New Directions Committee. IAC was founded in 1988 by senior executives from major chemical companies to ensure that Purdue ChE remains a premier source of highly qualified chemical engineers who can meet industry needs. IAC members also have provided crucial financial support that has brought key curriculum innovations, enhancement for experimental facilities and instructional computing facilities, and startup support for young faculty members.

During October 2008, on-campus IAC meetings explored curriculum issues in ChE and ABET accreditation as well as research, global engineering, building renovation, and development.

Members also expanded their involvement with ChE by joining these subcommittees:

- **Undergraduate Recruiting**, whose goal is to improve the quality and diversity of the undergraduate student population in chemical engineering.
- **Undergraduate Curriculum**, which will continuously evaluate and improve the content and delivery of the undergraduate curriculum.
- **Global Programs**, to best prepare chemical engineering students for global careers.
- **Research Collaboration**, to facilitate research partnerships among IAC member companies and the school.
- **Development**, to support the fundraising efforts by identifying, cultivating, soliciting, and fostering relationships with school alumni and friends.
- **Marketing and Communications**, to continuously improve the quality, reach, and impact of marketing and communications for the school.

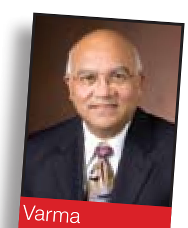
During their time on campus, IAC members visited the newly created Fundamentals Laboratory on the ground floor of Forney Hall (pictured) and talked with faculty, undergraduates, and graduate students.

Corporations represented in the IAC are 3M, Abbott Laboratories, Air Liquide, Air Products, Anheuser-Busch, BP, Chevron Phillips, The Dow Chemical Co., DuPont, Eastman Chemical, Eli Lilly, ExxonMobil, Lubrizol, LyondellBasell, National Starch & Chemical Co., Pfizer Global, Procter & Gamble, Shell, and UOP.

Awards and Honors

Basaran

Ho



Varma

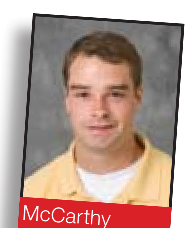
Faculty

Osman Basaran was elected a fellow of the American Physical Society.

Nancy Ho received an Outstanding Alumni Award from the Purdue College of Science.

Arvind Varma was elected a fellow of the American Institute of Chemical Engineers.

Kasat



McCarthy

Student

Rahul Kasat won the AIChE Separations Division Graduate Student Research Award for 2008.

Robert McCarthy received a National Defense Science and Engineering Graduate (NDSEG) Fellowship.

Safety, Sustainability, Community, People

True sustainability is multifaceted, interdependent

Sustainability is a term we often hear—sustainability of the planet, sustainability of our communities and our lifestyles. The sustainability of the business I work for, BP, is important to me. To me, there are three key ingredients to sustainability: safety, people, and interdependence.

Starting with interdependence, I cannot help but consider the sustainability of our business without considering how our sustainability impacts local communities, other businesses, our consumers, our workers, and their families. The reverse also is true; the sustainability of the community impacts our business.

The BP Whiting Business Unit (WBU) is one of the largest employers in Northwest Indiana, with 1,760 employees and over 1,000 contractors on any given day. Beyond jobs, the WBU also contributes significantly to the Lake County tax base and is a major supporter of community programs that enhance local quality of life through the Lake Area United Way.

Economically stable local communities and institutions that offer sound infrastructures and education help sustain WBU by providing BP with a diverse and skilled pool of workers.

Every day, the WBU relies on sound practices that maintain our safety and reliability in producing energy. Our people and the value we place on safety are key to these practices.

Our skilled people are the foundation of everything we do and the reason we have operated and will operate for the long term. The local community and Purdue Calumet are key partners in keeping this foundation strong. For example, we have 47 Purdue Calumet/Purdue West Lafayette engineering alumni; Purdue students work on senior design projects at the refinery; the Water Institute collaborates with us; and our business unit leader and Engineering Authority have been on the Purdue Engineering Advisory Board.

Photos courtesy of Deborah Grubbe

Deborah L. Grubbe (BSCHE '77)

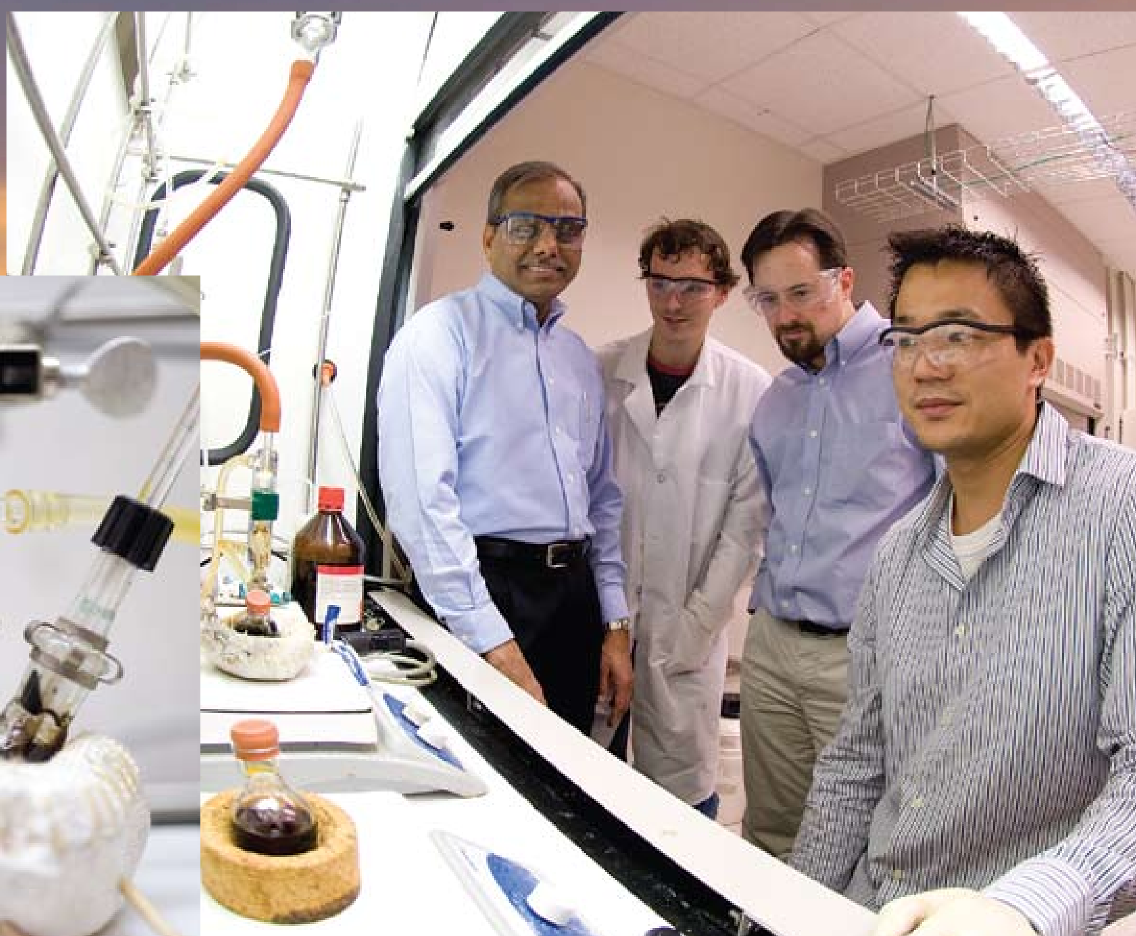
Unquestionably, another foundation to our sustainability is safety. It results in, and is a result of, confident employees who go home each day having left the refinery safer. Safety for us means equipment is well run and maintained, and that incidents that have the potential to injure people, damage equipment, disrupt production, or negatively affect the environment are prevented. Our bottom line: Safe operations are sustainable operations.

Strong safety values that are carried out by good people result in good business practices, safe operations, and sustainable business. Our sustainable business, in turn, helps sustain the community and vice versa. It all comes full circle—safety, sustainability, community, and people.

Whiting and the local communities hold a special place in my heart. My summer internship with Amoco in 1976 helped me decide to pursue site operations and engineering. After all these years, I, too, have come full circle. I am able to pay back the people at the Whiting Business Unit and through them help Purdue and the state of Indiana. ■ **Deborah L. Grubbe** *(BSChE '77, PE, CEng), vice president of safety change management, BP Products North America, Inc.*

Rays of Hope

Profs poised to make solar energy more affordable



Photos by Vincent Walter

Professor Rakesh Agrawal (left to right), graduate student Grayson Ford, Professor Hugh Hillhouse, and graduate student Qijie Guo view the synthesis of nanocrystal inks in their work aimed at developing thin-film photovoltaic devices—solar cells. Their devices could one day replace the much larger, more expensive crystalline silicon-based devices used today. **Inset:** The nanocrystal ink being formed is black to absorb light.

By Amy Raley

Throughout the world, environmental, economic, and political events seem to be aligning with the stars—most notably the solar system's largest star—to create unprecedented urgency for new, cost-effective, "green" power. Arguably, there has never before been a time when the mission to find cost-effective ways to harness the sun's energy has seemed more environmentally necessary or more economically and politically expedient than it is today.

Global concerns about the effects on climate of fossil fuel-generated greenhouse gases combined with budget-busting gasoline and fuel-oil prices gave rise to then-Senator Barack Obama's campaign proposal to increase federal spending for clean-energy research, development, and deployment to $150 billion over 10 years.

At Purdue, leaders for the university's Solar Energy Research Group in the School of Chemical Engineering, Rakesh Agrawal and Hugh Hillhouse, say they hope that all these factors will result in robust funding for their future solar energy research from the National Science Foundation. They hope to expand their ongoing research aimed at creating an economical means of producing electricity from the sun and training the next generation of students for a solar economy of the future.

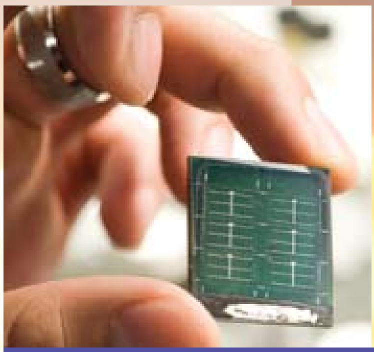
Agrawal, the Winthrop E. Stone Distinguished Professor of Chemical Engineering, says not only is now an opportune time in history to pursue solar energy answers, but that science is ready to conquer the challenges that stand in the way of making solar solutions affordable.

"Never in my life has it been better than this," Agrawal says. "These are exciting times because I think there is a need and I think scientifically and technically we have advanced enough that there are possibilities of solutions. The dream I have is to bring chemical engineering principles to bear on our problems in order to make things in large quantities, such as nano-crystalline inks (to be used in solar cells), at a very low cost."

Agrawal and Hillhouse oversee a team of graduate and undergraduate researchers that is developing novel processes and unique nanostructures to create thin-film photovoltaic devices, or solar cells. Solar cells generate electricity directly from visible light by means of the photovoltaic effect. These thin-film devices hold the promise to become a cost-effective alternative to today's crystalline silicon-based devices; the electricity produced using silicon-based devices costs about three times more than electricity produced using fossil fuels. The thin-film photovoltaics use nanocrystals created by solution-based chemistry in order to avoid the inefficient, energy-intensive vacuum co-evaporation method that is common in creating current solar cells.

"The cost of turning sunlight into electricity is too high right now; that's the big problem," says Hillhouse, associate professor of chemical engineering. "The cost lies in the chemical and material processing. And because chemical engineers have a long and distinguished history of figuring out ways to scale things up and produce things in more cost-effective ways, it is a great opportunity."

Hillhouse and Agrawal hope to secure funding for an ambitious multidisciplinary, multi-institutional research effort to "enable a fossil-fuel-free world" and educational initiatives to train "a new breed of experts" that can identify and solve the grand challenges of a future solar economy.



A completed nanocrystal ink solar cell from the Agrawal and Hillhouse lab.

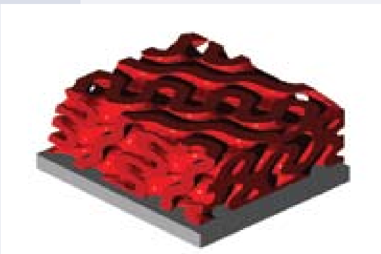
Their educational goal is to instruct future researchers, teachers, leaders, and entre-preneurs so they have an "interdisciplinary, systems-level understanding of the complexities and constraints" of the evolving energy economy and they understand the art of sun-to-electricity and sun-to-liquid-fuel solutions. The researchers also intend to develop and deploy new educa-tional materials and models on the Web in order to make a broad educational impact.

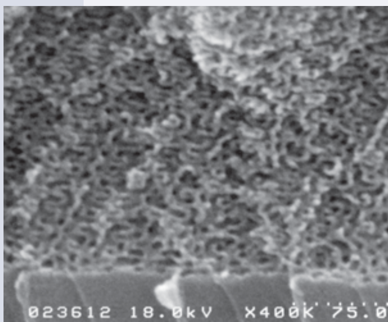
The research will use systems analysis to create a system model of an optimized solar economy in which all interactions and opportunities are revealed. In addition, the researchers intend to develop new concepts for capturing, converting, and storing solar energy that will yield cost-effective manu-facturing processes. Those processes will reduce the cost of electricity from solar cells and increase the efficiency of solar-energy harvesting and conversion to liquid fuels.

continued on next page

A potentially revolutionary approach

In addition to the collaborative research Hillhouse and Agrawal conduct, Hillhouse is working with post-doctoral assistants, graduate students, and undergraduates to develop prototype solar cells based on nanotechnology that he and his team patented in 2006. The technology, purchased from Purdue by investors, gave birth to NanoG, a corporation for which Hillhouse serves as chief scientific advisor.





The patent is on a new fabrication technology used to form a nonconventional solar cell that Hillhouse says holds the potential to revolutionize solar energy by making it far less expensive to harness.

"We've come up with a way to grow and template interconnected wires that are smaller in diameter than anybody's ever made before—about four nanometers in diameter," Hillhouse explains. "This invention—the capacity to make coatings composed of a network of unique and special nanoscopic wires—is a key step in the development of a new generation of higher efficiency solar cells that may dramatically reduce the cost of electricity from sunlight."

The structures actually form spontaneously in seconds when conditions are right—they self-assemble, Hillhouse says. "This quick and easy process has the potential to be very inexpensive," he says. "Currently, we're focused on making a prototype solar cell that is more efficient, such that it merits commercial-scale production and can justify large-scale investment. We are hoping to have a prototype within a year."

Hillhouse proudly points to the students who have helped him every step of the way: "NanoG is something that has only come after a lot of hard work and a lot of student involvement. There are at least three PhD students who share rights on the invention. All the students who work with me are intellectual partners in every sense of the word. The investors bought the patent from Purdue, and the students who worked on the project got a check." ■

Standing outside this glove-box system's oxygen-free, water-free, dust-free environment, students fabricate double-gyroid thin films for use in solar cells. **Above:** A double-gyroid film is represented in red. At 30 atoms wide, it is not visible to the naked eye. The gray image shows a greatly magnified cross section of a double-gyroid thin film.

A Love for Research with a Dream to Teach

Undergraduate is undaunted by challenges of research

Before collecting his bachelor's degree in chemical engineering this May, David Hanna of Carmel, Ind., is dividing his attention between his last undergraduate tasks and applying to graduate schools.

"I've started applications to about six or seven schools where I plan to continue to pursue chemical engineering," he says. "A PhD is the goal. I'd like to do a post-doc and continue in academia."

Hanna, who has a 3.99 GPA, says he's attracted to research and teaching in equal measure. "I'd get to be with students and inspire kids. Professors also advise how research is done; they lead, manage, and delegate. Their whole goal is to motivate people, and I can see myself fitting into that role."

Since spring 2008, Hanna has been studying hydrogen generation for fuel cells by combustion wave propagation in magnesium/water mixtures under school head, Arvind Varma. "I really like the research that I'm doing," he says. "The other day, walking home, I was thinking about what we were doing, and I had an idea of a modification. It was just a random thought, but it was neat to think that just a simple idea could really change the world. That's what's neat about research. It's just simple problem analysis, and a simple idea could change the world."

Hanna's passion for research isn't diminished by its practicalities and pitfalls. "You can spend a couple of hours in the lab and make a couple of mistakes and have lost that time," he concedes. "Failure is inevitable in research, but you have to learn to convert your frustration into motivation." ■ **A.R.**

Enormous Possibilities in a Nanoscopic World

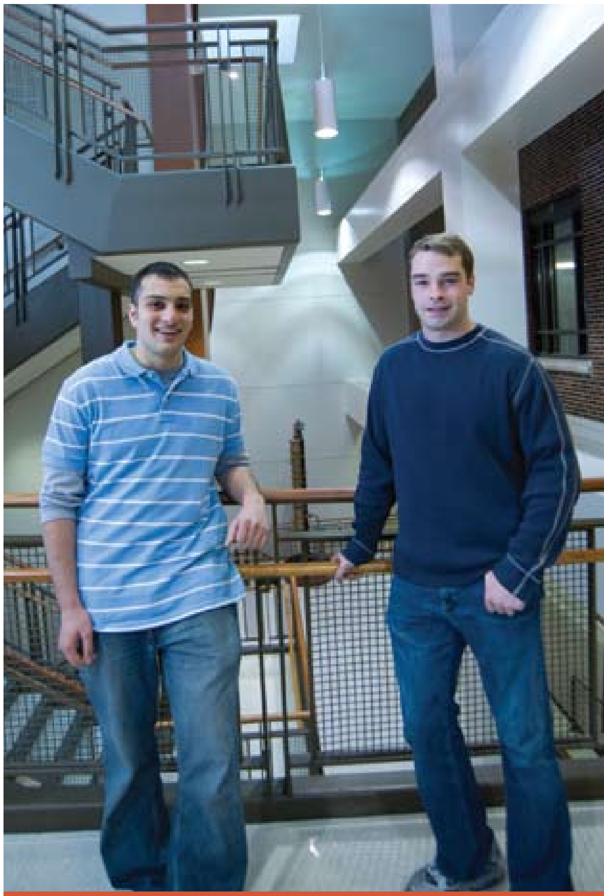
Affordable solar electricity among graduate student's goals

Robert McCarthy hopes to play a role in solar-electricity production that revolutionizes the industry.

A 4.0 chemical engineering graduate and 2007 engineering valedictorian at Washington University in St. Louis, McCarthy came to Purdue in fall 2008 to pursue his PhD. He has joined the NanoG team of Hugh Hillhouse, associate professor of chemical engineering. The team is creating a prototype solar cell that will use Hillhouse's patented, self-assembling porous nanostructure film in the generation of solar electricity at a cost that's dramatically lower than that of today's solar cells.

"I'm working on electrodepositing a semiconductor into the pores of the nanostructure," McCarthy says of the nanostructure film that gave rise to the NanoG limited liability company now backed by private investors. "So far it's going pretty well; we're past the early stages, and hopefully we'll actually start making some solar cells. But there's still a lot of work that needs to be done before we can start."

Studying on a National Defense Science and Engineering Graduate Fellowship and the Purdue Graduate School Ross Fellowship, McCarthy says he is open to all sorts of possibilities for his long-term future. "I have always thought about being a professor and being in academics, but so far I'm not sure," he says. "I enjoy helping students learn. I tutored students as an undergrad, and I enjoy when I can help a student who is struggling to understand something." ■ **A.R.**



Vincent Walter

ChE students David Hanna and Robert McCarthy

Speeding Toward Discovery

Chemical engineers employ new, efficient method to study catalysis

A catalyst is a substance that speeds up or steers a reaction without itself becoming consumed. Catalysts are the specialty of W. Nicholas Delgass, the Maxine Spencer Nichols Professor of Chemical Engineering, who leads the catalyst design group in the School of Chemical Engineering. You could call him a catalyst in the advancement of the science of catalysis, but the pun would be slightly off-base; this scientist, unlike a chemical catalyst, is indeed consumed by his work.

Delgass and his team have been successful in attracting major funding for the pursuit of their scientific passion, including two three-year grants from the Basic Energy Sciences Catalysis Sciences program for Catalyst Design by Discovery Informatics within the Department of Energy. The first was for $2.2 million and the second was for $2.4 million. The six-year program will be up for renewal in September 2009. They also have worked with ExxonMobil for the past four years, receiving $297,000 from the company in the most recent year.

In his work leading the catalyst design group, Delgass collaborates with fellow chemical engineers: Jim Caruthers, Fabio Ribiero, and Venkat Venkatasubramanian, professors; Kendall Thomson, associate professor; and Chelsey Baertsch, assistant professor. The group is investigating an exciting new methodology for studying catalytic reactions called "discovery informatics."

"Discovery informatics is a framework that enables management of complexity, accumulation of knowledge, systematic testing of hypotheses by interaction with experiments, and the efficient search for new materials with desired performance characteristics," Delgass says.

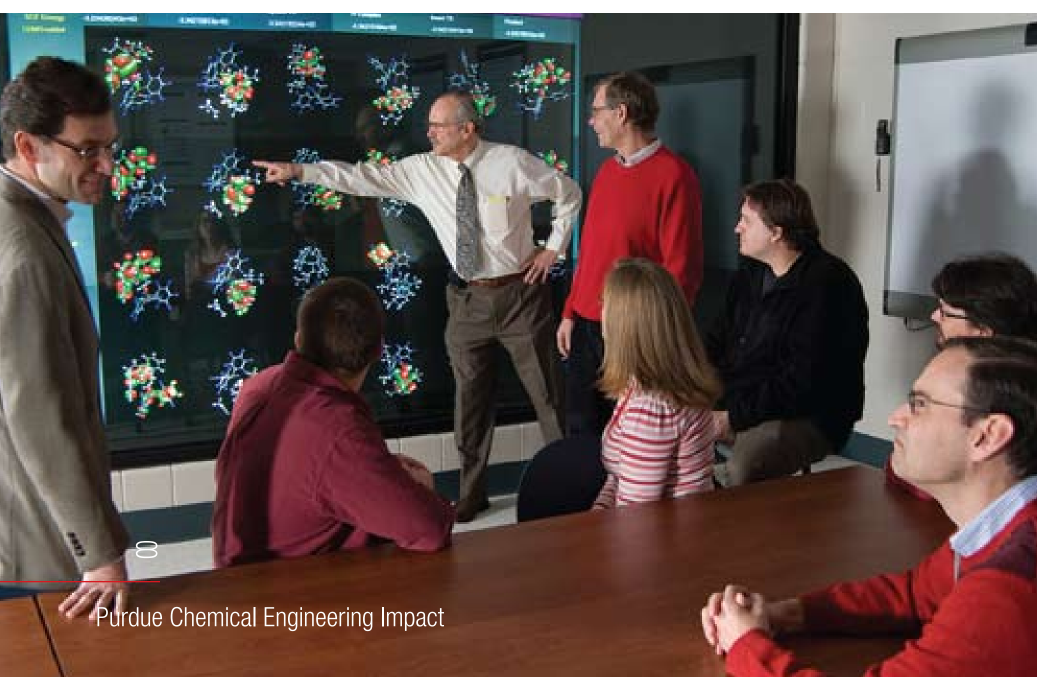
The ultimate goal is to make catalysis a predictive science. Currently, designing a new catalytic reaction or improving a known one is essentially accomplished by trial and error. The group aims to improve these "best-guess" odds. One step is to find higher level descriptors for the materials uses in a given reaction. "A descriptor must have a quantitative value, and it must carry enough information so that I can make the catalyst," Delgass says.

Systems involved in a catalytic reaction are very complicated, so the next huge piece of the catalysis puzzle will involve building the so-called "forward model" to act as a kind of bridge between descriptors and the performance outcome. "It's a huge job. No one person can do it," says Delgass, who explains that a team of chemical engineers in consultation with chemists, computer scientists, and others will develop a forward model. They then will run the reactions using catalysts consistent with the model.

If the performance is as hoped, all the necessary information is already in the model. If the model is wrong, they will use the new data to revise the model, which becomes a continuous "knowledge archive." Computers use the new forward model to predict the best catalysts, which will be run next. The model-building process itself contributes to the fundamental science of catalysis.

This scientific streamlined method of extracting knowledge from data will speed the discovery of new materials and will play a crucial role as engineers tackle some of the grand challenges facing our environment and our economy. Delgass and Ribeiro are using discovery informatics in collaboration with Rakesh Agrawal, the Winthrop E. Stone Distinguished Professor of Chemical Engineering, in his quest to turn nature's leftovers—grass clippings, farm waste, and forest debris—into fuel.

The process, called H_2Bioil, will use solar or nuclear power to produce hydrogen that, in turn, will remove the oxygen from the biomass to make diesel fuel. There is little literature on the process, called hydrodeoxygenation (HDO), to date, Delgass says. He plans to contribute to the knowledge base by applying the new methods he and his team are perfecting at Purdue. "Discovery informatics will be used to discover new HDO catalysts," he says with excitement. "There's enough sustainable biomass, under proper conditions, to fill the entire transportation fuel need of the nation." ■ **Gina Vozenilek**



As members of his catalyst design group observe, W. Nicholas Delgass points to one in a series of molecular orbital structures for catalysts that the group is studying. Visual comparison of the structures gives insight into the chemical features that characterize reactivity.

Vincent Walter

Cristina Farmus, Andrea Sills, Bev Johnson, and Amy Hayden enjoy their Business Office work, each other, and occasionally some snowy fun

Putting the Wheels on ChE

Efficiency and love of work make ChE Business Office staff award-winners

Purdue chemical engineering is more than its students, professors, and researchers; it's also the men and women in the background who keep the school's machinery humming. For every student hunched over books and every professor starting a lecture, there are people like Cristina Farmus and her staff. Farmus was until recently the business manager and is now the administrative director for the School of Chemical Engineering. Her staff play a critical role in the school's success.

The Business Office, which recently won the inaugural College of Engineering Best Team Award, is composed of account clerks Amy Hayden and Bev Johnson, and new business manager Andrea Sills. Farmus describes her team as "beyond outstanding." The team's responsibilities include managing finances in excess of $12 million a year, which entails payroll, purchasing, research expenses, reimbursements, travel, proposal preparation, human resources, and more.

Farmus says the Business Office is the school's middle ground. "Sometimes you're pulled in different directions. On one side, business services tells you to follow the rules, and on the other side, the researcher says you have to be flexible in order to help." The staff often help faculty, students, and staff understand the business side of their grants. When they see unusual requests, it's their job to ask, "How will this benefit your research or work?"

That can be challenging. "None of us has technical expertise," Farmus says. "Many times we get so involved in details that we forget the big picture. Then, later, we read an article about a prestigious award a faculty member received or about some great research that is going to get funded. We have to step back and remind ourselves of our goal: to help the people of chemical engineering achieve their best through excellent customer service, knowledgeable solutions, and a positive attitude."

Research expenses have grown 79 percent in five years—from $4.3 million in 2002-03 to $7.7 million in 2007-08. "This growth demands a great deal of management, but the chemical engineering Business Office has handled it without an increase in staff," Farmus says. She adds that specialization and low turnover have contributed to the office's efficiency. "We know each other's backgrounds; we're a small office and we have good interaction. If Amy has a lot of work to do, Bev will step in and help her and the other way around. We do what it takes to get the job done on time."

As administrative director, Farmus handles all of the school's nonacademic issues, "so the professors can spend their time in academics, research, and strategic planning. Right now, we're focusing on marketing. We know that we're doing an excellent job in research and education, so we want the world to know how well we're doing."

Her staff say they love their work. "I enjoy the people I work with the most," says Hayden. Johnson says she appreciates the professors and graduate students. Sills says, "Working with these people and seeing the other side of a university has been a really great experience."

With wheels like Cristina Farmus, Amy Hayden, Bev Johnson, and Andrea Sills, it's easy to see why Purdue ChE is going places. ■ **Joseph Fowler**

Dave Mason, Image Source Photography

2008 Purdue Outstanding Chemical Engineers (left to right): Gary Poehlein, Roberta Gleiter, and Antonios Mikos

Outstanding Chemical Engineers

ChE alums help redefine the word 'outstanding'

Purdue chemical engineering has a tradition of recognizing alumni who have achieved distinction as leaders in their careers and who have shaped the chemical engineering profession. Over the years, only 119 of the school's 9,000 alumni have been named Outstanding Chemical Engineers. The 2008 OChE event took place in October; profiles of the honorees are below.

Gary Poehlein (BSChE '58, MSChE '63, PhD '66) retired in 2002 after a distinguished career of service to academe, industry, and his local communities.

He began teaching at Lehigh University in Bethlehem, Penn., in 1965, establishing new courses in polymers, pollution control, and other topics. He initiated research in emulsion polymerization and latex technology and still participates in a successful short course he established in this area that takes place at Lehigh as well as in Davos, Switzerland.

Poehlein helped form and lead the Emulsion Polymers Institute at Lehigh until 1978, when he became director of the School of Chemical Engineering at the Georgia Institute of Technology in Atlanta. During his tenure, the ChE faculty doubled, and graduate student enrollment and external funding both increased tenfold. He was later named associate vice president for research, graduate dean, vice president for interdisciplinary programs, and executive assistant to the president.

He also served on the board of Flexible Products Co., and as director of the National Science Foundation's Chemical and Transport Systems Division.

Roberta Gleiter (BSChE '60) is an engineering consultant at The Aerospace Corp., whose Global Positioning System Program Office recently honored her. She is also CEO of the Global Institute for Technology and Engineering, a non-profit organization dedicated to elevating the status of women working in technology and engineering.

With a master's degree in systems management from the University of Southern California and several certifications, Gleiter also was the first woman engineer certified as a hazardous materials manager. She has had a wide range of managerial responsibilities supporting spacecraft design/development, ground launch, and communication systems. She also helps the U.S. Air Force identify and resolve critical engineering and management problems. She oversaw the development, testing, and activation of the Fuel Vapor Scrubber System for Department of Defense payloads on the space shuttle and the joint NASA/Air Force development of a propellant handler's ensemble.

Gleiter also has served on the National Science Foundation's federal advisory committee.

Antonios Mikos (PhD '88), the J.W. Cox Professor of Bioengineering and professor of chemical and biomolecular engineering at Rice University, has contributed to a host of novel orthopedic, dental, cardiovascular, neurologic, and ophthalmologic biomaterials. His research has shown that implanted carbon nanotubes can increase density in new bone growth and that unique scaffolds can repair broken facial bones typically deemed beyond repair.

Through synthesis, processing, and evaluation of innovative biomaterials, Mikos is developing new means of tissue engineering, drug delivery, and nonviral vectors for gene therapy. As a member of the Armed Forces Institute of Regenerative Medicine university consortia, Mikos is helping to regrow severed fingers, recreate shattered bones, rebuild maimed faces, and provide genetically matched skin to burn victims. ■ **A.R.**

1950-59

- **Roy E. Hofer** (BS ‘57) has been named an “Illinois Super Lawyer” for 2009 by *Law & Politics* magazine. He is a partner in the intellectual property law firm Brinks Hofer Gilson & Lione, Chicago.
- **Robert Buckman** (BS ’59) is chairman of the board for Applied Knowledge Group, Inc., Reston, Va., and Tioga Holdings, Inc., Reston, Va.

1960-69

- **Carroll Hatcher** (BS ’61, MS ’64) retired as a senior consultant in information technology in June 2008, after 46 years with DuPont Performance Elastomers.
- **Douglas S. Doremus** (BS ’64) is teaching math at the Riverdale Christian Academy in Baton Rouge, La.
- **Joseph Alford** (BS ’66), was elected AIChE fellow and recently joined the editorial advisory board of the journal *Chemical Engineering Progress*.

1970-79

- **Michael L. Lappa** (BS ’71) retired in April 2008 as vice president of sales and marketing for Potlatch Corp., Spokane, Wash.
- **Clifford W. Browning** (BS ’72) is a patent and trademark attorney and a partner in the Indianapolis law firm Krieg DeVault LLP. In January 2008, he was appointed editor in chief of *The Trademark Reporter®*.
- **Greg Bohlmann** (BS ’77) has accepted a position with Genencor International, Palo Alto, Calif., as director of biochemicals business development.
- **Dale Kline** (BS ’79) has been named global vice president of sales and technical service for Celgard LLC, Charlotte, N.C.

1980-89

- **Ray Mentzer** (MS ’76, PhD ’80) retired in November 2008 as safety, health, environment, and security manager for ExxonMobil Development Company, Houston, Texas, after nearly 29 years of service. He has accepted an appointment with the ChE department of Texas A&M University in College Station.
- **Gregory R. Lewis** (BS ’82) was promoted in September 2008 to vice president of global risk management and chief ethics officer for The Lubrizol Corp.
- **Richard O. Brajer** (BS ’83) is president and chief executive officer of LipoScience Inc., Raleigh, N.C.
- **Jennifer Sinclair Curtis** (BS ’83) received the ChE Lectureship Award, 2008, ASEE.
- **Michael Kramer** (BS ’84) has started with Amitive, Inc., San Francisco, as vice president of global sales.
- **Shawn Cheesman** (BS ’85) was appointed general manager of the performance polymers business at Entegris, Inc., Chaska, Minn.
- **Yoon-Mo Koo** (PhD ’85) received the 2008 Hyung Dang Education Award of KIChE and was appointed academic vice president of KIChE for 2009.
- **Lisa Brannon-Peppas** (MS ’86, PhD ’88) received the 2008 ChE Practice Award of AIChE.
- **Peter Kraemer** (BS ’88) is vice president for supply, Anheuser-Busch, Inc., St. Louis, Mo.

1990-99

- **Kristi Anseth** (BS ’92), was named one of the “Brilliant 10” for 2008 by *Popular Science* magazine.
- **John B. Gustafson** (BS ’92) recently transferred to Shell Global Solutions, Malaysia, as the Asia Pacific regional manager, HSE consultancy.

2000 TO PRESENT

- **Barbara Allen** (BS ’01) has recently been promoted to manufacturing manager with XTENT Inc. in Menlo Park, Calif.
- **Shantanu Bose** (PhD ’01) recently joined School Specialty, Inc. in Greenville, Wisc. as vice president of Global Sourcing and Operations.
- **Jonathan Gortat** (BS ’02) finished his MBA with Krannert in May and has joined the staff of Purdue Research Foundation–Office of Technology Commercialization as technology manager.
- **Mark Byrne** (PhD ’03) has been promoted to associate professor of chemical engineering, Department of Chemical Engineering, Auburn University. He won the 2008 Auburn Alumni Engineering Council Junior Faculty Research Award.
- **Megan L. Durr** (BS ’04) graduated from medical school at Johns Hopkins University in May 2008. Currently she is an otolaryngology—head and neck surgery—resident at University of California at San Francisco.
- **Jamey Young** (PhD ’05) joined Vanderbilt University as assistant professor of chemical and biomolecular engineering.
- **Jayme Khoo** (BS ’06) has started the MBA program with Krannert, with a marketing and operations concentration.
- **Selen Aydogan Cremaschi** (PhD ’06) became an assistant professor of chemical engineering at the University of Tulsa in fall 2008.

Send your updates to **chealumni@ecn.purdue.edu**. News from the most recent six months will be included in the next issue of *Impact*. Any other updates will be listed on the ChE alumni Web site at **engineering.purdue.edu/ChE/People/Alumni**.

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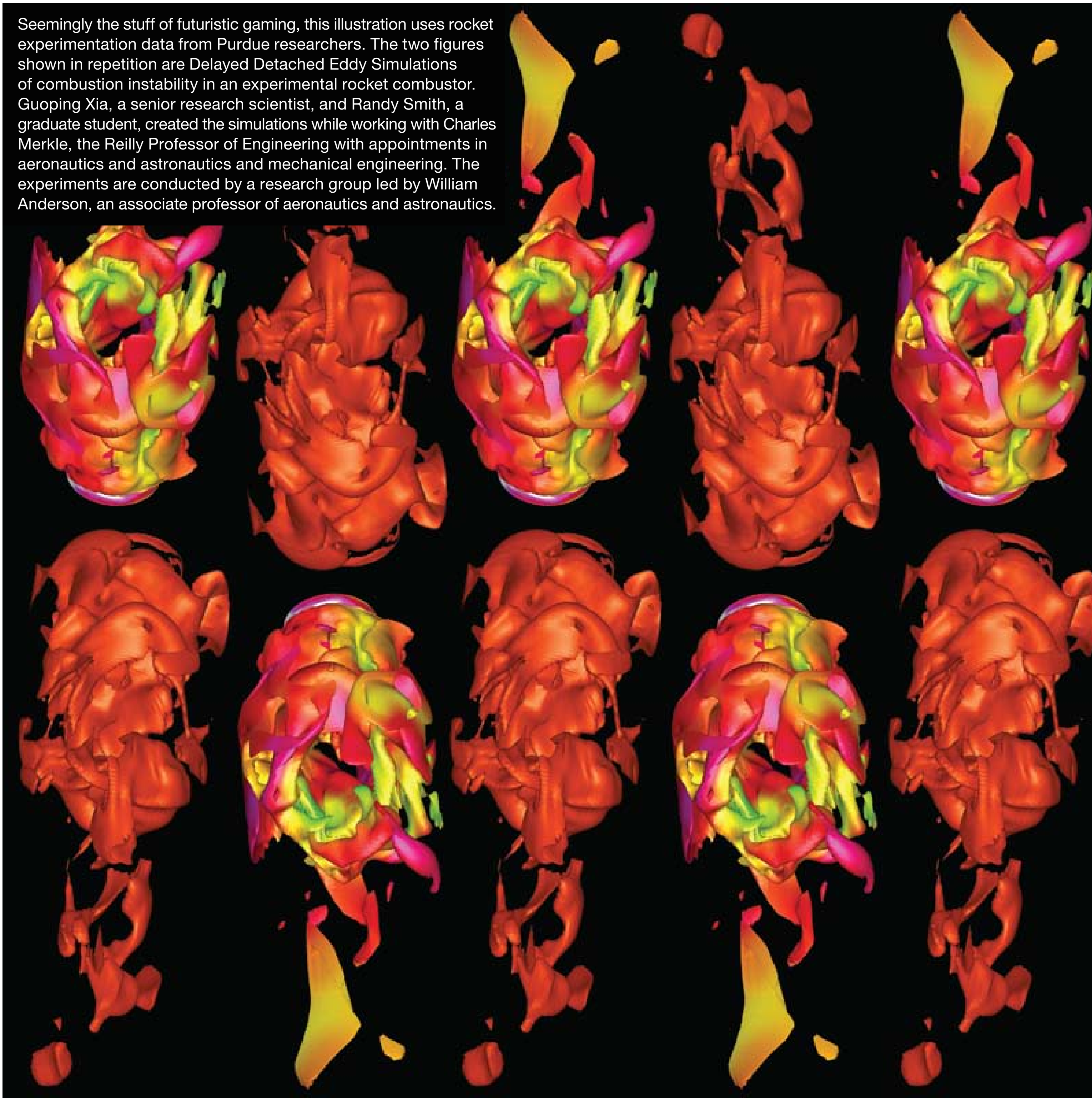

Seemingly the stuff of futuristic gaming, this illustration uses rocket experimentation data from Purdue researchers. The two figures shown in repetition are Delayed Detached Eddy Simulations of combustion instability in an experimental rocket combustor. Guoping Xia, a senior research scientist, and Randy Smith, a graduate student, created the simulations while working with Charles Merkle, the Reilly Professor of Engineering with appointments in aeronautics and astronautics and mechanical engineering. The experiments are conducted by a research group led by William Anderson, an associate professor of aeronautics and astronautics.