Spring 2008

Materials Science & Engineering

Roberts Hall Review

UNIVERSITY OF WASHINGTON
COLLEGE of ENGINEERING
A Community of Innovators

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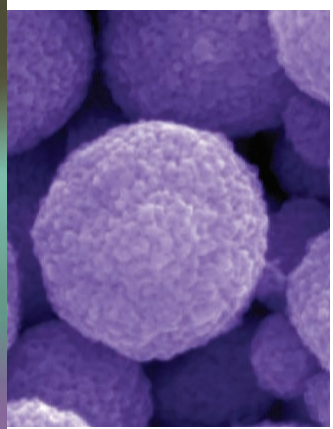
# UW MSE shines bright

*Christine Luscombe (left), Alex Jen (center) and Hong Ma (right) are part of a UW research team that won a Solar America Initiative grant from the U.S. Department of Energy to research more cost-effective solar cells.*

The U.S. Department of Energy (DOE) plans to invest $900,000 in solar energy research at the University of Washington as part of the Solar America Initiative (SAI), which aims to make solar energy cost-competitive with conventional sources of electricity by 2015.

"We plan to use interfacial engineering to improve the efficiency of polymer-based photovoltaic devices," said Alex Jen, chair of the Department of Materials Science & Engineering (MSE) and leader of the research team. "These devices will make use of hybrid nanostructures that combine organic and inorganic materials." *Continued on page 7*



*An image of a single ball taken with a scanning electron microscope. The 300-nanometer sphere is large enough to scatter light. But its insides are made of tiny grains just 15 nanometers across.*

## Design doubles efficiency of dye-sensitized solar cells

A new approach is able to create a dramatic improvement in cheap solar cells now being developed in laboratories.

By using a popcorn-ball design—tiny kernels clumped into much larger porous spheres—researchers at the University of Washington are able to manipulate light and more than double the efficiency of converting solar energy to electricity. The findings were presented on April 10 in New Orleans at the national meeting of the American Chemical Society.

"We think this can lead to a significant breakthrough in dye-sensitized solar cells," said lead author Guozhong Cao, a professor of materials science and engineering.

Dye-sensitized solar cells, first popularized in a scientific article in 1991, are more flexible, easier to manufacture and cheaper than existing solar technologies. Researchers have tried various rough surfaces and achieved higher and higher efficiencies. Current lab prototypes can convert just over one-tenth of the incoming sun's energy into electricity. This is about half as efficient as the commercial, silicon-based cells used in rooftop panels and calculators.

The researchers did not attempt to maximize the efficiency of a dye-sensitized solar cell to match or beat these previous records. Instead, they tried to develop new approaches and compared the performance of a homogeneous rough surface with a clumping design.

One of the main quandaries in making an efficient solar cell is the size of the grains. Smaller grains have bigger surface area per volume, and thus absorb more rays. But bigger clumps, closer to

*Continued on page 5*

# Message from the Chair

*Alex Jen*

Have an idea for the next *Roberts Hall Review* or our Web site at http://depts.washington.edu/mse/? We welcome your suggestions. Please send an e-mail to Matt Vivion, our new public information specialist, at mvivion@u.washington.edu.

Welcome to the spring 2008 issue of *Roberts Hall Review*. It's been a year since our last newsletter and we have a lot of news to share with you.

MSE is shining bright in the area of solar energy research. The U.S Department of Energy is investing $900,000 on a UW project as part of the Solar America Initiative. Christine Luscombe, Hong Ma and I are part of the research team working on this project. In early 2008, Luscombe won a CAREER Award from the National Science Foundation and a Young Faculty Award from DARPA to support her research on organic polymers with photovoltaic applications. Guozhong Cao was lead author in a study that used an innovative design to improve the performance of dye-sensitized solar cells. To provide a truly widespread energy source, the sun's abundant energy must be captured, converted and stored in a cost-effective fashion. MSE is leading the way.

Recent honors show that our faculty is strong in many areas. Congratulations to Raj Bordia, recipient of Germany's Humboldt Research Award for senior scientists, and Kannan M. Krishnan, recipient of a Rockefeller Foundation Scholarly Residency at the Bellagio Center in Italy. And welcome Marco Rolandi, a new MSE assistant professor who will begin in the fall.

UW is an international crossroads for materials research and development now that Japan's National Institute of Materials Science has opened its first-ever Overseas Operation Office in the UW Roosevelt Commons Building. Fumio Ohuchi will direct the center and MSE will play a big part.

Recently, the UW College of Engineering cosponsored the "Nanophotonics for Breakfast" series of programs for interested business and civic leaders throughout the area. We are on the threshold of some exciting new technology. There is no better place than the Pacific Northwest to make the next breakthroughs.

We hope you enjoy this issue of *Roberts Hall Review*. Look for the next issue in late 2008.

## "Nanophotonics for Breakfast" connects community to leading researchers

The recent "Nanophotonics for Breakfast" series brought local business and civic leaders up to speed on breakthrough technologies that may soon revolutionize many aspects of modern life.

Designed for the interested layperson, the six-part breakfast series featured leading nanophotonics experts from academia and industry.

What does nanophotonics mean? Imagine solar cells that provide cheap, clean power wherever it is needed; solid-state lighting systems that are much more efficient and versatile than current light bulbs; flexible electronic displays that allow cell phones the size of credit cards, and computer screens as thin and flexible as a sheet of heavy paper; computers that connect to the Internet at the speed of light; and new medical devices that give doctors the power to detect and treat diseases in novel ways.

Matt O'Donnell, dean of the College of Engineering, served as emcee for all of the morning programs, held at the Rainier Club in downtown Seattle.

If you missed one of the six sessions, view them for free online at http://depts.washington.edu/nanophot.

***"Solid State Lighting and Displays"***
Business perspective: Rick LeFaivre and Christopher Somogyi. Research perspective: Paul Burrows, Pacific Northwest National Laboratory.

***"Biophotonics"***
Business perspective: Perry Fell of NanoString. Research perspective: Paras Prasad, professor of chemistry, physics, medicine and electrical engineering, SUNY Buffalo.

***"Lasers and Biosensors"***
Industry perspective: William P. Krug, Phantom Works and The Boeing Company. Research perspective: Axel Scherer, professor of electrical engineering, applied physics and physics, California Institute of Technology.

***"Plastic Solar Cells?" Challenges and Opportunities***
Business perspective: Thomas J. (Tom) Starrs, managing director for Solar, PPM Energy. Research perspective: David Ginger, UW assistant professor of chemistry.

***"Organic Silicon Computing"***
Business perspective: Cary Gunn, chief technology officer for Luxtera and Genalyte. Research perspective: Michael Hochberg, UW assistant professor of electrical engineering.

***"Nanophotonics in Telecommunications"***
Alex Jen, chair of UW Materials Science & Engineering, director of Institute for Advanced Materials and Technology, and Larry Dalton, UW professor of Chemistry, director of Center on Materials and Devices for Information Technology Research.

# New NIMS office makes UW a crossroads for materials research

Japan's National Institute of Materials Science (NIMS) opened an Overseas Operation Office in April 2008 at the University of Washington's Roosevelt Commons Building, establishing the University as an international crossroads for materials research and development.

"This is the first-ever attempt for a Japanese national laboratory, such as NIMS, to establish an office outside of Japan," said Fumio Ohuchi, professor of materials science and engineering and director of the office. "This office will act as a showcase model for international collaboration."

Several UW departments will contribute expertise to the collaborative research center, including Materials Science & Engineering (MSE), Chemistry, the School of Medicine and the Center for Nanotechnology.

Ohuchi said that MSE's first projects will include research on thermoelectric materials and development of a "simple, compact, robust and maintenance-free module for tunable infrared wavelength conversion devices."

The Overseas Operation Office was made possible by a grant from Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT). In September 2007, MEXT selected NIMS as one of a handful of Japanese institutes eligible to receive grants under Japan's World Premier International (WPI) Research Center Initiative.

> ***"This office will act as a showcase model for international collaboration."***
>
> Fumio Ohuchi, UW professor of materials science and engineering

NIMS was selected for its proposed "International Center for Materials Nanoarchitectonics" (MANA), which will capitalize on one of Japan's fortes—materials development—to solve emerging issues related to the environment, energy and more.

"In the framework of MANA projects, we will promote complementary research collaboration between NIMS and UW in interdisciplinary research fields, such as medical, marine, environmental, earth and space science and engineering," said Ohuchi. "Fostering the development of students and young researchers through mutual exchange programs is another important objective."

Kenji Kitamura, MANA principal investigator and co-director of the office, said that the Seattle office will look at current research trends in the U.S. and seek government funding from organizations such as the Department of Defense and the National Science Foundation. The office will also function as a liaison for foreign personnel and other universities in the U.S. "These are necessary steps for real globalization of NIMS research activities," Kitamura said.

Ohuchi said that strong partnership between NIMS and UW will facilitate collaboration with U.S. companies, "with the ultimate goal of launching joint-venture companies as a spin-off of our research efforts."

For more information about the Overseas Operation Office, contact Ohuchi at ohuchi@u.washington.edu.

# Micron invests additional $775,000 in materials exploration laboratory

Micron invested an additional $775,000 in the Micron Laboratory for Combinatorial Materials Exploration at UW in February.

The funds will help the lab pursue its goal to test new combinations of materials for use in smaller and smaller microchips.

A total of $575,000 will go toward equipment and $200,000 will help support the work of Fumio Ohuchi, lab director and UW professor of materials science and engineering, and his collaborators.

The lab opened on March 19, 2007. Boise-based Micron Technology Inc., manufacturer of memory chips and image sensors, and the Micron Foundation helped launch the innovative new lab with more than $400,000 in equipment and $500,000 in cash.

The computer chip industry is facing a predicament: as chips get smaller they are reaching a physical limit. Today's semiconductor devices are made of parts containing just a few hundred atoms of silicon and other materials. As consumers demand even faster and smaller devices, nanoscale effects will change how these materials behave.


*Scott DeBoer (left), Micron's director of process development, and Fumio Ohuchi (right), UW professor of materials science and engineering, outside of the lab.*

"Silicon is still an absolutely good material for the active area, where the electrons travel," Ohuchi said. "The supporting material, the surrounding scaffold, will have to change as we push the technical limit. Smaller devices require new combinations of materials."

The Micron lab's machines automate materials testing by creating a wafer, called a materials library, whose properties change gradually. By layering these wafers, a single test can evaluate all possible combinations of important factors—such as manufacturing process, material composition and atomic structure—to see which produce the best attributes. The word "combinatorial" in the lab's name refers to this system for combining different materials.

The lab is part of Micron's efforts to advance education, primarily in science and engineering, by establishing strategic partnerships with premier research universities.

"By collaborating with the UW on combinatorial materials, we have a unique opportunity to enhance advanced research activities that continue to drive material development efforts and digital technology innovation," said Scott DeBoer, Micron's director of process development.

## Welcome Marco Rolandi, new assistant professor

*Marco Rolandi*

Marco Rolandi will join the MSE faculty in fall 2008 as an assistant professor, bringing the department his finely-tuned curiosity in nanoscale phenomena.

Rolandi comes to UW from the Lawrence Berkeley National Laboratory and the University of California, Berkeley, where he has worked as a postdoctoral research fellow since 2005. He earned his doctorate in applied physics at Stanford University in 2005 and his master's degree in physics at Queen Mary and Westfield College, University of London, in 2000.

"The quest for smaller electronic components has aroused increased interest in transport phenomena at the nanoscale," Rolandi said. "To enable further scientific endeavors, we must improve the processes that allow us to precisely control the position, size and shape of nanomaterials. My research will focus on schemes to reliably fabricate novel materials for the investigation of nanoscale phenomena."

In addition to pursuing his research, Rolandi looks forward to teaching both undergraduate and graduate students.

Rolandi would like to develop a new class on nanotechnology for UW undergraduates. He is also interested in developing a class for UW graduate students on graphic design for the modern research environment, where he says "the need for conveying large amounts of information in a short timeframe has increased the popularity of visual media."

Rolandi won the 2000 Granville Prize for outstanding academic achievement, awarded to the top physics graduate of University of London. He also won the 2000 Westfield Trust Prize for outstanding academic achievement, awarded to the top physics graduate of Queen Mary and Westfield College.

A native of Savona, Italy, Rolandi was the 1000-meter K4 flatwater Kayaking Junior Italian Champion in 1994. He looks forward to paddling in the lakes of the Pacific Northwest.

## Boeing engineers honor K.B. Das with award for showing them the way

In his more than 40 years as an engineer and manager for Boeing, K. Bhagwan "Bud" Das used his expertise in advanced materials and processing to help the company build their product line.

As a professor for MSE, Das uses his wealth of experience to build the next generation of experts on advanced materials, including composites.

Das directs a four-course certification program on aircraft composites jointly offered by Boeing and UW for Boeing engineers. In March, a group of his students honored their no-nonsense professor with a lucite award inscribed with "Best teacher, showing us the way." They also gave laser pointers to Das and Jeff Satterwhite, his teaching assistant.

"The laser pointer was a nice surprise but I'm most grateful for the award the students gave me," said Das, an MSE professor since 1978 who earned his PhD in metallurgical engineering from UW in 1971. "I treasure these things because they show that my students truly appreciate their teacher."

The group recently completed Das' class on aircraft composites manufacturing, the second course in the Aircraft Composite Materials & Manufacturing Certificate Program (ACMM). ACMM is a partnership between The Boeing Company Learning, Training and Development (LTD) Group and UW Educational Outreach.

*K. Bhagwan "Bud" Das*

After Das retired from Boeing in 2003, the LTD Group asked him to develop and deliver a certification program on aircraft composites for their engineers. Courses began in late 2005.

Michael Richey, Associate Technical Fellow and LTD Program Manager, said that "Bud's dedication and leadership in the development and delivery of this certificate program is exemplary. This program represents the best of university–corporate partnerships."

Das teaches the first two classes in the series, one on materials and the other on manufacturing, himself. Students have the option to choose between remaining courses on tooling or repair to meet the three-course requirement for a certificate.

"As a working engineer coming from UW and MSE, it's comforting to still have the opportunity to further develop my skills in composite technologies," said student Mary Katherine Langlais.

Emily West, program manager for UW Educational Outreach, said Das regularly devotes extra time to students and has encouraged many to go on to graduate school. "I have been truly impressed with his concern for his students' success," West said.

Student Justin Strow said Das "engaged each student and challenged us in each course."

Jerome Hodges, the student who presented the gifts for the group, said his professor "personally assumed responsibility to give us a broad and deep technical background on all aspects of composites airplane manufacturing."

But is he going to use the laser pointer? "Certainly," Das said. "It's such an upgrade from the metallic pointer I've been using all of these years!"

# Raj Bordia receives Germany's prestigious Humboldt Research Award

Raj Bordia, UW professor of materials science and engineering (MSE), was awarded a Humboldt Research Award for senior scientists in March 2008 by Germany's Alexander von Humboldt Foundation.

The international honor, one of the most prestigious given by Germany, recognizes Bordia's career-long accomplishments in materials science and engineering.

The 60,000-euro (approximately, $90,000) Humboldt Research Award will fund Bordia's research on composite particles and multilayered systems of semiconducting oxides. With collaborators in Germany, his research will focus on processing, characterization and performance of these systems. Target applications are in the areas of photovoltaics for clean energy and photocatalysis for clean water and air.

Humboldt Research Awards for senior scientists are presented each year to as many as 100 top international researchers in engineering, humanities and social sciences, and the natural and physical sciences.


*Helmut Schwarz (left), president of the Alexander von Humboldt Foundation, presents a Humboldt Research Award to Raj Bordia (right) at an awards ceremony on April 4 in Bamberg, Germany.*

The awards are given to scientists and scholars whose work has had a significant impact on their own disciplines and who are expected to continue producing cutting-edge achievements in the future.

The awards enable academics to conduct research at German research institutions for one year, which may be divided into smaller blocks. Recipients are nominated by leading German scholars and have five years to use the award.

Bordia was nominated by research collaborators Peter Greil, a professor at Friedrich-Alexander-Universität, Erlangen-Nürnberg and Ralf Riedel, a professor at Technical University, Darmstadt.

"Research on developing technologies for clean energy and clean water are critically important for sustainable development," Bordia said. "I will use this award to develop a network of collaborations on these topics with leading research groups in Germany."

Bordia's internationally recognized research is at the intersection of materials science and mechanics and is focused on fundamental and applied studies in the processing and properties of complex material systems. He has made pioneering contributions on the processing of multilayered and composite materials.

A dedicated teacher and mentor, Bordia received the Marsha Landolt Distinguished Graduate Mentor award from UW in 1997. He joined the UW faculty in 1991 and served as chair of MSE from 1998 to 2005.

## popcorn-ball design *(continued from page 1)*

the wavelength of visible light, cause light to ricochet within the thin light-absorbing surface so it has a higher chance of being absorbed.

"You want to have a larger surface area by making the grains smaller," Cao said. "But if you let the light bounce back and forth several times, then you have more chances to capture the energy."

Other researchers have tried mixing larger grains in with the small particles to scatter the light, but have little success in boosting efficiency. The UW group instead made only very tiny grains, about 15 nanometers across. Then they clumped these into larger agglomerations, about 300 nanometers across.

The larger balls scatter incoming rays and force light to travel a longer distance within the solar cell. The balls' complex internal structure, meanwhile, creates a surface area of about 1,000 square feet for each gram of material. This internal surface is coated with a dye that captures the light.

The researchers expected some improvement in the performance but what they saw exceeded their hopes.

"We did not expect the doubling," Cao said. "It was a happy surprise."

The overall efficiency was 2.4 percent using only small particles, which is the highest efficiency achieved for this material. With the popcorn-ball design, results presented at the April 10 conference showed an efficiency of 6.2 percent, more than double the previous performance.

"The most significant finding is the amount of increase using this unique approach," Cao said.

The experiments were performed using zinc oxide, which is less stable chemically than the more commonly used titanium oxide but easier to work with.

"We first wanted to prove the concept in an easier material. Now we are working on transferring this concept to titanium oxide," Cao said. Titanium oxide based dye-sensitized solar cells are now at 11 percent maximum efficiency. Cao hopes his strategy could push dye-sensitized solar cells' efficiency significantly over that threshold.

The research was funded by the National Science Foundation, the U.S. Department of Energy, Washington Technology Center and the Air Force Office of Scientific Research. Co-authors are postdoctoral researcher Qifeng Zhang, research associate Tammy Chou and graduate student Bryan Russo, all in MSE, and Samson Jenekhe, a UW professor of chemical engineering.

Alumnus Spotlight:

# Hira Fotedar

Hira Fotedar knows how to start from scratch.

Born and raised in Kashmir, India, Fotedar arrived at UW in 1966 to pursue his doctorate in metallurgical engineering. He was the first PhD student of Tom Stoebe, former chair of MSE.

"Since Tom and I joined UW at the same time, we had to develop the laboratory infrastructure in support of my research," Fotedar said.

Fotedar used the department's machine shop to design and build furnaces, jigs and fixtures for his own studies. "I had a few false starts, but with Tom's encouragement and mentoring, I persevered," he said.

After earning his PhD in metallurgical engineering from UW in 1971, he spent two years as a postdoctoral research fellow for the University of London's Imperial College of Science and Technology.

In 1974, the Brazilian government invited Fotedar to set up a research program on materials engineering for the Instituto de Energia Atomica at the University of Sao Paulo.

Wielding the resourcefulness he'd honed at UW, Fotedar built a nuclear materials laboratory to conduct research in support of the nation's nuclear and automotive industries during the international fuel crisis.

One of Fotedar's former students, Arnaldo Hombono Paes de Andrade, now directs the laboratory. Other students have become successful scientists, engineers and executives around the world.

In 1977, Fotedar joined the Engine Components Operation for Ohio-based Eaton Corporation in Sao Jose dos Campos, Brazil. "The business was losing money and management was considering closing it down," Fotedar said. "With hard work, focus on the customer and teamwork, we were able to make it profitable in a very short time," he said.

Fotedar held top leadership positions with Eaton Corporation for more than 28 years, retiring as vice president of corporate quality in 2005.

Fotedar now resides in Avon Lake, Ohio with his wife Patricia, a UW alumna he met while pursuing his doctorate.

While Fotedar's career has taken him around world, he said "no country can come close to the United States in freedom, work ethic, organization, infrastructure and opportunities."

Fotedar currently heads Fotedar Associates LLC, a consulting firm that provides guidance in innovation and growth to businesses. He also chairs the Work in Northeast Ohio Council (WINOC), a nonprofit group that assists small and mid-sized companies.

"I am finally learning to enjoy retirement after a very intense career," Fotedar said. "I play in several golf leagues and have improved my game a lot. I still have a long way to go, though."

## Donor Honor Roll, January 2007 to March 2008

**Donors provide critical resources to help support faculty, students and staff meet the most pressing needs of the UW College of Engineering. Thank you for supporting the future of MSE as we prepare the next generation of engineers and bring innovative technologies to market. For more information on contributing to MSE, please contact Mahnaz Sherzoi, Development Office, (206) 685-1927 or mahnaz@u.washington.edu.**

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# Private support can move a research program from great to stellar

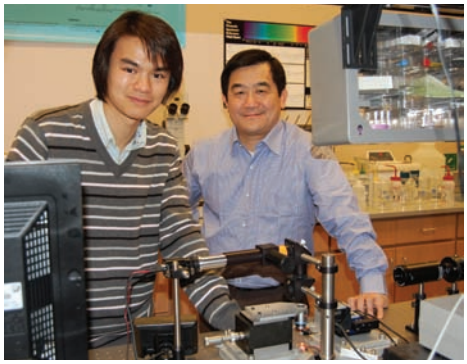
In a future that will demand increasing reliance on efficient, renewable energy sources, you may someday capture the sun's energy for your home through thin polymer solar cells painted on your roof or exterior wall, or laminated between window panes.

On the information technology front, imagine downloading a 100-MB file in one second. Such instantaneous transmissions will advance business communications, medical diagnostics, environmental monitoring, industrial processes, and national security systems.

These are just a few examples of the innovations emerging from research teams led by Alex Jen, chair of Materials Science & Engineering (MSE) and director of the UW Institute of Advanced Materials & Technology.

Jen and his graduate students are pioneers in using organic/polymer materials for electro-optics and in the fields of photonics and nanotechnology, including self-assembly of nanomaterials. Their discoveries will help transform energy generation, electronics, communications, and medical diagnostics.

Federal and industry research grants provide the core funding for such high-powered research, but come with spending strictures. Core funding can't cover the "extra mile" that transports a research team from great to stellar. This is why private support through endowed professorships and fellowships has a tremendous impact on the quality of research at the College of Engineering.



*Graduate student Hinlap (Angus) Yip (left) and Alex Jen, MSE chair (right). Yip received an endowed fellowship that allowed him to pursue his research on polymer solar cells.*

As an example, meet two key members of Jen's research team from 2007. Hinlap (Angus) Yip is working on polymer solar cells and expects to finish his doctorate in summer 2008. Taedong Kim received his PhD in June 2007 and is now an assistant professor at Hannam University in Korea.

After receiving grant-funded teaching and research assistant fellowships during their first few years at the UW, each won endowed fellowships that reward the best students for their outstanding work. "The chance to win such a fellowship was a driving force to work hard," said Yip. "It allowed me to fully concentrate on my research and opened the door for interdisciplinary collaborations."

Kim is already one of the world's top innovators in organic electro-optics. "These endowments are a great investment in the future for both corporate and individual donors," Kim said.

Jen values privately funded student support for both practical and strategic benefits. It frees up core grant funds so he has more money for lab supplies or equipment repairs.

On the strategic level, endowed fellowships provide a recruiting edge. "These endowments are critical for attracting and developing the talent needed by top programs," Jen said.

Jen is so committed to student excellence that he has personally established a fellowship. "Helping students reach their highest potential and furthering their careers pays significant returns for our research work," he said.

## Solar America Initiative *(continued from page 1)*

Christine Luscombe, assistant professor in MSE, Hong Ma, research assistant professor in MSE, John Rehr, professor of physics, and David Ginger, assistant professor of chemistry, will all work on the project.

Jen said that "multilayer, solution-processible organic tandem solar cells are the ultimate goal."

A photovoltaic device converts absorbed photons directly into electrical charges. Photovoltaic technology is being increasingly recognized as part of the solution to the nation's growing energy challenge and an essential component of future global energy production.

DOE is investing $21.7 million on 25 photovoltaic research projects at universities and companies across the nation as part of SAI. The projects were selected in November 2007.

"These projects help create a pipeline for the development of next generation solar technology," said DOE Secretary Samuel H. Bodman. "Our goal is to make solar power a more mainstream source of energy."

## Luscombe wins awards from NSF, DARPA

Christine Luscombe, assistant professor of materials science and engineering, won the following awards in 2008 to support her group's research on organic polymers:

**A $495,000 CAREER Award from the National Science Foundation (NSF).** Luscombe will also use the award to support science education related to her research. She will use concepts such as solar energy as topics for writing exercises in her classes for MSE undergraduates and develop an Internet-based "virtual classroom" for middle and high school students around the world.

**A $150,000 Young Faculty Award from the Defense Advanced Research Projects Agency (DARPA).** Luscombe was one of 39 researchers nationwide to win the award in 2008. "The ultimate goal is to lay the foundation for the development of future generations of superior, energy harvesting devices that are flexible, cheap, efficient and easily manufactured," Luscombe said.

## Awards and accomplishments

**Mehmet Sarikaya**, UW professor of materials science and engineering presented more than 35 invited, keynote and plenary talks in 2007 and 2008. Sarikaya discussed a variety of topics at conferences worldwide for a wide range of professional organizations. With Candan Tamerler, chair of the Department of Molecular Biology and Genetics at Istanbul Technical University (ITU), he co-edited the May 2008 special issue of the Material Research Society's MRS Bulletin on molecular biomimetics, a rapidly emerging new field at the confluence of materials, biology, information sciences and technology. He is the director of the Genetically Engineered Materials Science and Engineering Center (GEMSEC) at UW.

**Jessica Torrey** received a Humboldt Fellowship from Germany's Alexander von Humboldt Foundation.

**Dustin Frame** received the National Research Council Postdoctoral Associate Award.

**Matthew Ferguson** and **Julie Bardecker** received University Initiative Fund (UIF) fellowships in 2007.

**Fareid Ashaphan** received a Ford Fellowship for 2008-2009.

**Jonathan Gunn** received a National Institute of Health (NIH) Training Fellowship for his predoctoral degree.

**Mickael Rossol** and **Kelsi Hurley** received undergraduate research awards from the Dean of UW College of Engineering.

**Curtis Hickmott** and **Jeff Satterwhite** won 2008 SAMPE Abaris Training Scholarships.

## Krishnan named recipient of Rockefeller Foundation residency

Kannan M. Krishnan, UW professor of materials science and engineering and adjunct professor of physics, has been named the recipient of a prestigious Rockefeller Foundation Scholarly Residency at the Bellagio Center in Lake Como, Italy. Krishnan's one-month residency will begin in September 2008.

"This is a unique opportunity for me to consolidate my recent research activities at the intersection of materials, magnetism, biology and medicine, critically think through alternative possibilities for future research in biomedical nanoscience, and disseminate these ideas by writing an appropriate article on this topic," Krishnan said.

The Rockefeller Foundation chooses scholars who have demonstrated a history of significant achievement in their respective fields. Decisions are based on the quality of the proposed project, the compelling nature of the problem, the importance and potential impact of the project, and the professional qualifications and achievements of the applicant.

The Bellagio Center typically offers one-month residencies for no more than 12 scholars and scientists at a time. Individuals in any discipline—and from any part of the world —are welcome to apply for the residencies.

During this residency, Krishnan will work on a project titled "Biomedical Nanomagnetics: A Spin Through New Possibilities."

Moreover, his research, teaching and scholarship in magnetism and magnetic materials over the last two decades, have now converged in the form of a book titled "Fundamentals and Applications of Magnetic Materials," that he will work on throughout the next year on his sabbatical. This residency will help set the stage for this project as well.

Krishnan continues to be widely recognized for his research and teaching. Recent awards include a Guggenheim Fellowship (2004), the College of Engineering Outstanding Educator Award (2004), and election as a Fellow of the American Association for the Advancement of Science (2005), and appointment as a professor-at-large at the University of Western Australia (2006-2008).

## Bridge and wing team builds victory in national competition

*MSE seniors Brian Nelson (left), Conor Keenan (center) and Tyson Delos Santos test a bridge.*

The UW's chapter of the Society for the Advancement of Materials and Process Engineering (SAMPE) competed in the annual bridge and wing competition on May 20 in Long Beach, Calif. The team took 1st place for natural fiber and glass kit bridges, 2nd place for carbon non-kit bridge, and 3rd and 4th place for carbon kit bridges. "There isn't a team in the country that competes as many bridges as we do," said MSE senior and UW SAMPE president Conor Keenan. "We all had a great experience and the juniors are definitely motivated for next year."

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