Chemical Engineering

Winter 2008

Catalyst

UNIVERSITY OF WASHINGTON
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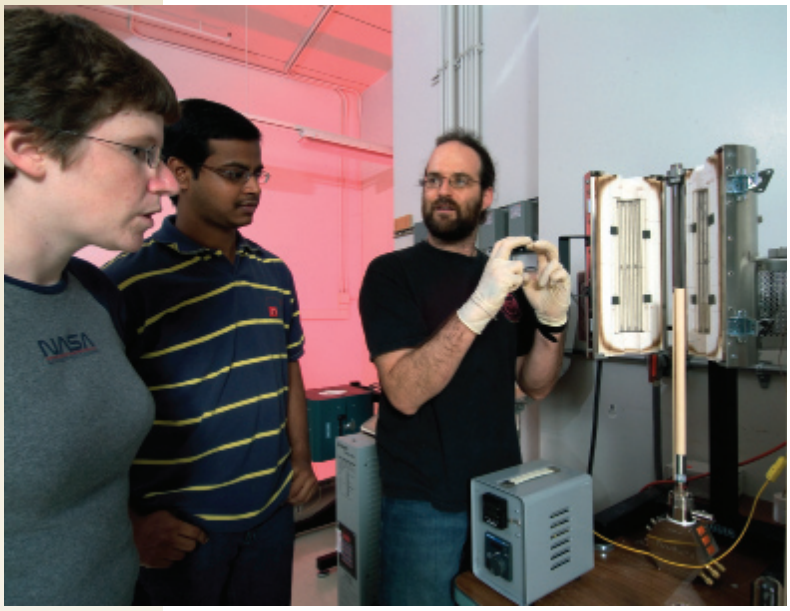
A Community of Innovators



Stuart Adler (right), associate professor of chemical engineering, discusses the operation of a fuel cell with graduate students Jamie Wilson (left) and Dinesh Baskar (center). Adler's research team uses harmonics to test electrochemical devices.

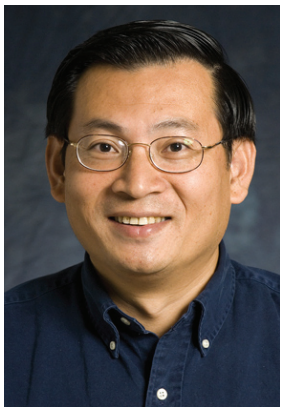
Adler's team develops new technique to test electrochemical devices

Electrochemical devices are a pervasive but often unheralded part of modern technology. Rechargeable batteries, for example, are widely used in electronic devices. Fuel cells may some day revolutionize our energy infrastructure.

Tremendous effort goes into improving these devices—better catalysts, new materials, improved microstructures. Because of the limits of current diagnostics, however, innovators often don't fully understand what factors limit performance, and so must shoot in the dark when seeking new approaches.

That may be changing, thanks to a new technique developed by Stuart Adler, associate professor of chemical engineering, along with Daniel Schwartz, Boeing-Sutter Professor of Chemical Engineering, and students Shawn Huff and Jamie Wilson. *Continued on page 5*

Jiang's research holds promise for variety of anti-fouling applications



Shaoyi Jiang

Barnacles on ship hulls may seem more picturesque than problematic, but not if you're the U.S. Navy and those marine hitchhikers slow down your aircraft carriers and add more than $30 million to annual fuel costs.

That's why the Office of Naval Research is funding work to develop new anti-fouling coatings in the labs of Shaoyi Jiang, professor of chemical engineering and adjunct professor of bioengineering.

Current anti-fouling mechanisms in the marine industry are based on heavy metals like tin and copper, which poison anything that attaches to a ship hull. Environmental damage caused by leaching of heavy metals has spurred the search for alternatives.

A similar problem exists in miniature within the human body, affecting everything from contact lenses and endotracheal tubes to artificial joints and implanted heart valves. Proteins sticking to the surfaces of biomedical devices cause millions of contact lens infections every year and require heart patients with implants to take anti-clotting drugs. *Continued on page 4*

In this issue

Eric Stuve

Have an idea for the next *Catalyst* or our Web site at www.cheme.washington.edu? Let us know. Send e-mail to dept@cheme.washington.edu.

Welcome to our latest issue of *Catalyst!* Here in Benson Hall, we've been busy on a number of exciting projects. First, our new curriculum emphasizing molecular and nanoscale phenomena is on track to start in the 2008–2009 academic year.

Shaoyi Jiang's research, featured in this issue, focuses on how to go from a scientific principle to a product, exemplified by an anti-biofouling coating that may one day keep barnacles from clustering on ship hulls and bacteria from damaging implanted heart valves. His approach to crafting precisely separated positive and negative charges is the principle. The coating is the product. This molecular-level engineering is the type of content that will be included in the new curriculum, one that will better integrate research and education.

Also featured are Stu Adler and Daniel Schwartz, chemical engineering professors who with two students developed a new technique to test electrochemical devices such as rechargeable batteries.

Schwartz is leading an interdisciplinary group of eight UW doctoral students as part of the IGERT BioEnergy program, which aims to develop local sources of renewable fuels. We're proud to list three chemical engineering students among a future crop of PhDs with passions for developing sustainable energy. Washington's bioenergy future will be brighter because of their interdisciplinary research.

The Winter 2008 Leadership Seminar Series is under way. We're fortunate to have alumni in industry, academia and government who are happy to share stories about their varied paths to success.

We hope you enjoy this *Catalyst*. Look for the another issue in fall 2008—and thanks for reading.

Jeet Bindra wins 2008 Diamond Award for Distinguished Achievement in Industry

Jeet Bindra, president of Chevron Global Refining, is the winner of the 2008 Diamond Award for Distinguished Achievement in Industry.

This award honors alumni of the UW College of Engineering who have distinguished themselves by their outstanding knowledge and significant contributions to the field of engineering in industry. The award celebrates the professional, business, academic, and personal accomplishments of the recipient.

Bindra encourages future industry leaders with key messages: "maintain the highest level of ethics and integrity, never stop learning, dream big, work hard to get there, and success follows when people come first."

Success has come to Bindra through perseverance and living his principles. Raised in poverty in India, he learned the value of hard work and sacrifice.

He earned a BS in chemical engineering from the Indian Institute of Technology, then chose to pursue a master's degree at the UW. He took out a loan for his plane ticket to Seattle and arrived in the U.S. with $8 in his pocket. He earned his MS in chemical engineering from UW in 1970.

In 1977 Bindra joined Chevron as a research engineer, beginning his 30-year career with the company. He propelled up the career ladder but hit a barrier to upper management. A colleague told him that because he looked and dressed differently and had an accent, it would be difficult to move past middle management.

"...maintain the highest level of ethics and integrity, never stop learning, dream big, work hard to get there, and success follows when people come first." **~ Jeet Bindra (MS '70)**

Bindra took this as a challenge, and through personal initiative, along with a gradual corporate cultural change, he shattered the glass ceiling to help dispel the myths about minorities and women common at that time.

Among his many career accomplishments, Bindra led an effort to negotiate the financing, design, and construction of a pipeline from the Tengiz Field in Kazahstan to the Black Sea.

Bindra is a past chairman of the board of the South Asian American Leaders of Tomorrow (SAALT), was vice chairman of the Association of Oil Pipe Lines, and now chairs the Business Leadership Council of SAALT and serves on the board of directors for GS Caltrex.

Bindra is one of five UW alumni to receive a 2008 Diamond Award. All winners will be honored at a private event on Friday, May 30 at Hotel DECA. For more information, contact Nancy Anderson, UW College of Engineering, (206) 684-2422 or na3@u.washington.edu, or visit www.engr.washington.edu and select "Diamond Awards."

IGERT program aims to create new generation of PhDs in sustainable energy, develop local sources of biofuels

Most of Washington state's biofuels come from plants grown elsewhere. But a newly launched $3 million program will team doctoral students, UW faculty and local Native American tribes to transform local forestry and agricultural waste into plant-based fuels.

"We want to create a new generation of PhD graduates in sustainable energy, and develop local sources of renewable fuels," said Dan Schwartz, professor of chemical engineering and leader of an interdisciplinary group that has received the multimillion-dollar award for graduate education from the National Science Foundation. "These students will learn to consider not only economic benefit, but the environmental and social implications of their designs."

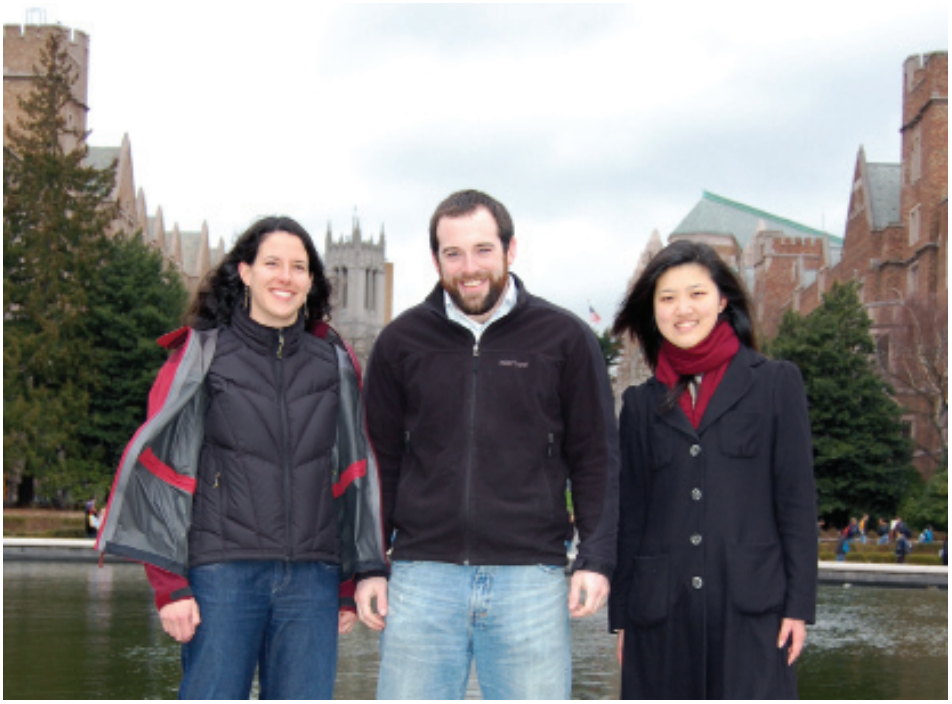
The IGERT award, for Integrative Graduate Education and Research Training, funds six interdisciplinary doctoral students each year for five years. Program partners include the UW College of Engineering, the College of Forest Resources and the American Indian Studies Program.

Another major emphasis of the grant is working with Native American communities in Washington. Native Americans are underrepresented in doctoral programs and the project will recruit students from those communities. Partners include the Yakama Nation in southern Washington and the Quinault Indian Nation on the Olympic Peninsula.

This year the group received additional funding from the UW, enabling it to accept eight graduate students who began classes in January. Students can major in any of the participating colleges.

Sara York, one of three chemical engineering students in the BioEnergy IGERT program, was drawn to the interdisciplinary approach.

"When you think of PhD programs, one stereotype is that they force you to overspecialize, constricting your learning and expertise to a pinpoint focus that might not be valued in the real world," York said. "This is a fantastic opportunity to maintain a broader perspective."



(Left to right) Sara York, Kurt Spies and Valerie Lieu are three chemical engineering doctoral students participating in the BioEnergy IGERT program. The program also includes students of forest resources, materials science and mechanical engineering.

Biofuels, energy sources from plants, are popular because they're often domestically produced, renewable, and close to "carbon-neutral"—meaning the plants take in the same quantity of CO_2 while growing that they release when converted into fuels and burned.

Biodiesel and ethanol are generally made from plants such as corn or soy imported from other states, or tropical oils imported from other nations. The new BioEnergy IGERT program will try to identify local alternatives.

A major emphasis will be forestry waste, the branches and debris that normally get burned or left behind, and residue from paper mills. Students will also look at agricultural waste such as leftovers from apple and wheat crops.

Transforming these wastes into liquid fuel for a gas tank is not easy.

"Most of the biofuels today are made by extracting the simple sugars or oils from stuff we can eat, like corn or soy," Schwartz said. "The alternative is cellulosic products, like wood or agricultural waste, which we can't eat, but have repeating sugars embedded in their structures. These complex sugars are much more difficult to extract."

Students in the program will work on this type of challenge. They will also consider social and environmental impacts. How much energy does it take to harvest and process the resource? Where does it go when it's burned as fuel? Is it reducing the food supply? Are there social benefits?

"We want appropriate energy technologies," Schwartz said. "Whenever you hear someone present an energy solution and say, 'This is the solution,' you know it's wrong because there is no one solution for every situation."

Leadership Seminar Series showcases versatility of alumni


Karen Fleckner

The Winter 2008 Leadership Seminar Series served as a reminder that chemical engineering alumni are an "extremely versatile bunch," said Eric Stuve, chair of Chemical Engineering.

The series provided a forum for alumni with leadership positions in industry, academia and government to share their experiences in discussions with students.

Speakers this quarter included hedge fund analyst Mark Lawrence (BS '94), intellectual property lawyer Jim McClain (BS '61), and entrepreneurs such as Karen Fleckner (BS '99), founder of Nu Element, Inc. Visit www.cheme.washington.edu for a complete list.

"I often think of us as 'infrastructure' people but there is more to being a chemical engineer than that," Stuve said. "Our focus on rates and processes carries over well into a variety of fields."

"We welcome interest from alumni who would like to participate in future series," Stuve said. "Advanced public speaking skills are not required. Chemical engineers turn raw materials into valuable materials—all students really want are the stories."

Pozzo adds expertise in bioengineering, nanotechnology


Danilo Pozzo

Danilo Pozzo joined Chemical Engineering as an assistant professor in September of 2007.

Pozzo's research lies at the interface of nanotechnology and biotechnology. "I am particularly interested in hybrid nanostructured materials where there is a strong interplay between synthetic and biological components," Pozzo said.

A current major thrust in his research has centered on polymer networks and self-assembled nanomaterials. These materials, natural or synthetic, have a number of applications in biotechnology, medicine, and nanotechnology as well as in everyday consumer products.

Pozzo earned his BS in 2001 from the University of Puerto Rico, Mayagüez, and his MS and PhD (2006) in chemical engineering at Carnegie Mellon University. Prior to coming to UW he worked as a postdoctoral scientist at the National Institute of Standards and Technology (NIST).

"His work in nanoscale colloidal surface chemistry lies at the heart of our department's effort to integrate molecular and nanoscale phenomena at all levels of chemical engineering," Stuve said. "He will play a key role as we reform the curriculum of chemical engineering around a new paradigm of molecular and nanoscale principles."

ANTI-FOULING *(continued from page 1)*

The zwitterionic coatings developed in Jiang's lab are promising for many applications that require biofouling resistance. Many biomedical materials in current use are based on poly(ethylene glycol) (PEG), which is less stable in complex environments.

Jiang's team manipulates surface micro-environments at the molecular level to create coatings that interfere with protein binding. In these zwitterionic coatings, ions alternate perfectly between positive and negative charges. This perfection in the protein's charges makes it impossible for naturally occurring proteins—whether algae, bacteria or blood cells—to bind to the surface.

Jiang sees his work as a cycle, from molecular principles to product development. "We start with molecular-level understanding and design. Once we find a candidate material, we synthesize and characterize it. Then we perform biological studies, and develop products for specific applications.

> ***"Once we get a principle—such as the perfection of positive and negative charges as an anti-fouling mechanism—then products follow."*** ~ Shaoyi Jiang

"Our work is focused on designing a principle rather than specific products," he explained. "Once we get a principle—such as the perfection of positive and negative charges as an anti-fouling mechanism—then products follow."

"Applications are very important—that's the real challenge," Jiang said, "because you have to meet requirements in the real world" such as a recent ban on tin-based marine coatings and U.S. Navy requirements that replacement coatings be environmentally benign and stable for 10 to 12 years.

Jiang considers collaboration across disciplines a strong point at the UW. "Otherwise," he said, "this work would go nowhere." He cites UWEB, a National Science Foundation engineering research center, as a good example.

Jiang is working toward commercializing innovations coming out of his lab. He credits the University's Technology Transfer Office for it's assistance in commercialization.

Among his honors are the 2006 UW Technology Gap Innovation Fund Award and the NSF CAREER Award in 2001.

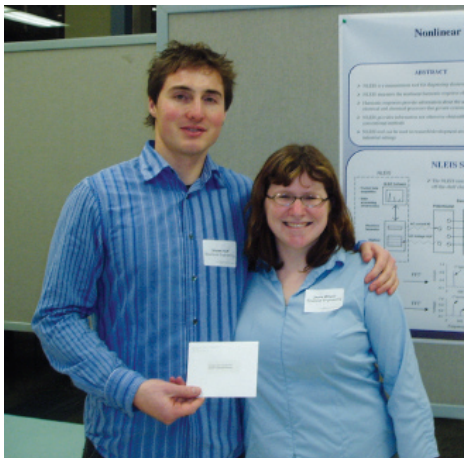
Jiang earned a PhD from Cornell (1993), was a postdoctoral fellow at the University of California, Berkeley (1993–94), and a research fellow at the California Institute of Technology (1994–96). He earned his MS and BS in China.

Graduate students earn Best Innovation Award in UW Business Plan Competition

While Associate Professor Stu Adler and his wife Sarah prepared for the birth of their first child, graduate students Shawn Huff and Jamie Wilson contemplated a birth of their own—a company based upon NLEIS technology for fuel cells they developed with Adler and Dan Schwartz *(see story on page 1)*. Huff (MS '07) and Wilson (PhD '07) are co-authors on the patent.

Eager to explore entrepreneurship, Huff and Wilson took their idea to the UW Technology Transfer Office. There they were given office space, introduced to people in the community, and told about opportunities in the UW Business School that could help them in their quest.

The two enrolled in a business venture course. The class, comprised of students from engineering and business and supported by Pacific Northwest National Laboratories, focused on fuel cells as one of two technologies of commercial interest.



Graduate students Shawn Huff (left) and Jamie Wilson won Best Innovation Award in the UW Business Plan Competition.

"The course allowed us to do most of the early work to commercialize our technology," Wilson said. While enrolled, they entered the Science & Engineering Business Association poster competition and won first place.

Encouraged, the duo entered the highly competitive University of Washington Business Plan Competition. The event culminated in an opportunity to pitch their business plan to venture capital representatives from several companies.

OVP Venture Partners was so impressed with their technology that they awarded Huff and Wilson an honorary Best Innovation Award and a check for $5,000.

"Stu supported us 100 percent, and he was having a baby at the same time!" Wilson said. Adler and his wife are now the proud parents of a baby boy.

Although they decided the time wasn't ripe for commercialization, Huff and Wilson gained invaluable experience.

Huff will work for a small company commercializing emerging electrochemical products. Wilson is interested in academia or possibly a research position with an industrial company.

ADLER *(continued from page 1)*

This technique—nonlinear electrochemical impedance spectroscopy (NLEIS)—improves on existing impedance methods that have been in use for 40 years, but which only measure the linear response of an electrochemical device.

That's like listening to a musical instrument through a filter that emits only the pure tone, instead of the full harmonic range that allows us to distinguish, for example, an oboe from a piano.

NLEIS detects additional harmonic frequencies, providing a wealth of information that "lets us tell more definitively what's going on in the electrode," Adler explained.

How does it work?

First, the researchers develop hypotheses as to what might be limiting the efficiency of the devices. Then, for each hypothesis, they calculate the expected harmonic behavior. Next, they introduce a "sinusoidal perturbation" into the reaction—a sine wave that disturbs the current.

They compare the resulting voltage harmonics to their calculations. If one of the models is a good match for the data, it's likely that they've identified the limiting factor.

"New approaches (to fuel cells) are often based on hypotheses about what the limiting factor is," explained Adler. "We are trying to narrow the list of possibilities, or suggest approaches that people might not have thought about."

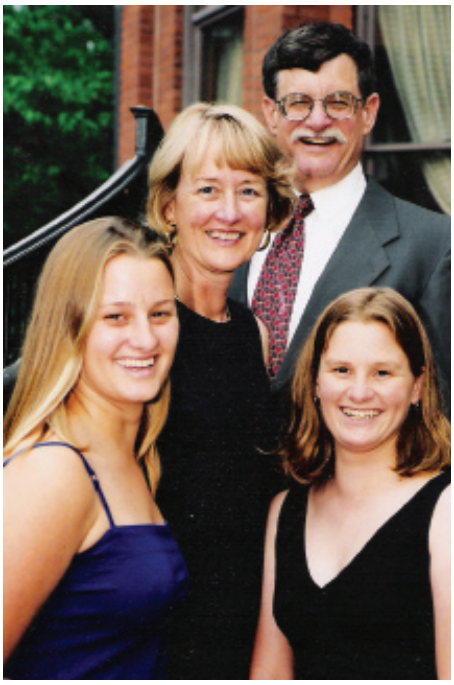
The group has applied for a patent, and Huff and Wilson won a university-wide competition for best new business idea last year *(see story above)*, but decided the timing is not ripe for commercialization.

Adler sees tremendous potential for using NLEIS as a diagnostic tool. Examples range from better understanding of fuel cell and battery performance to probing organic semiconductors to reducing corrosion of materials.

In addition to his contributions in the lab and classroom, Adler chaired a committee last year that successfully developed a strategic plan for the department. Adler has "a natural leadership quality," said Eric Stuve, chair of Chemical Engineering. "He brought everyone together to craft a wonderful plan—in record time."

Adler's honors include the Charles W. Tobias Young Investigator Award of the Electrochemical Society in 2004 and an NSF CAREER Award for 2001–2006.

They bonded in chemistry lab and now catalyze a legacy



Shelley and Jonathan Bagg with daughters Suzy (left) and Eve.

A chemistry lab lit the spark between Jon and Shelley Bagg. Shelley (née Garrett) was one of just two women in her 50-member chemical engineering class. Jon was completing an MS in chemistry and serving as lab teaching assistant. They became closer lab buddies the next year when Jon stayed on to complete credits for a BS in chemical engineering.

After they graduated in 1971 and moved to California's Bay Area, Shelley became one of the first female engineers at Chevron's Richmond refinery and Jon signed on with General Electric's Nuclear Power Division and later worked for several units of Chevron.

Fast forward 36 years through challenging engineering work, raising daughters, a career shift (Shelley), and a "failed" retirement (Jon). Shelley established a successful business offering financial planning and investment services. Jon consults on engineering design projects and enjoys part-time work at an independent bookstore.

Now they have forged a new bond with the UW by establishing the Shelley and Jonathan Bagg Endowed Scholarship in Chemical Engineering. The Students First Matching Initiative boosts their $100,000 gift with an additional $50,000.

"A scholarship enabled me to earn a degree that catapulted me to a better life," Shelley said. "We credit much of our success to our UW education, and the Students First initiative gives us the opportunity to pass this legacy on by helping deserving students obtain chemical engineering degrees."

"Expanding scholarship and fellowship offerings is critical to our educational mission," said Eric Stuve, chair of Chemical Engineering. "The Baggs' gift gives us one more incentive for drawing top students to our program. Thank you Jon and Shelley!"

"A scholarship enabled me to earn a degree that catapulted me to a better life."

~ Shelley Bagg

Creating the future through Students First endowments

Chemical Engineering has secured its lead-off Students First endowment with the generous gift of Jon and Shelley Bagg.

Students First endowments offer educational access to all talented and deserving individuals by removing financial barriers. If you would like to support Chemical Engineering students, consider making a gift to the Students First Fund.

Through June 30, 2008 every gift made to Students First will be matched at 50 percent. To learn more about Students First, contact Mahnaz Sherzoi, (206) 685-1927 or mahnaz@u.washington.edu.

Alumni News

Send your news to: dept@cheme.washington.edu

Lyle E. Busby, BS '43, MS '48, passed away on Dec. 28, 2007 at age 87. Busby grew up in the Tacoma area and served as an officer in the U.S. Navy during World War II. He later went on to work for Standard Oil of California in Richmond, California. He is survived by his wife Freda Busby and their four children.

Jay F. Berkman, BS '48, MS '53, passed away on Feb. 23, 2008 at age 84 in Walnut Creek, California. A resident of Lafayette, California, Berkman was born in Butte, Montana and raised in Seattle. He served in the U.S. Marine Corps for four years during World War II and worked for Chevron for 29 years. He was a member of the University of Washington President's Club. He is survived by his wife Mary, his daughter Stacey and her husband Rodney Palmer.

Richard C. Robinson, BS '59 (MS '61, PhD '65, University of Wisconsin), spent some time in academia before moving to industry. Robinson retired in 1996 from Chevron Research and Technology Company with 30 years of service. He consulted for Chevron in 2006 and 2007 on catalytic reforming and refining processes.

Sue Ellen Adams Hobart, BS '68, received the Sarge Oskar Award from the American Society of Mechanical Engineers for a lifetime of meritorious service in the field of radioactive waste engineering.

Sung T. Chung, PhD '71, was elected to the board of directors of S-Oil Corporation, a joint venture between Saudi Aramco and Korean Airlines. It is the third largest refinery in Korea, with a plan to enter the one million barrels/day refining club in 2010.

Greg Ogden, BS '86, was promoted to associate research professor at the University of Arizona's Department of Chemical and Environmental Engineering. Ogden's company, Ogden Engineering & Associates, was awarded a Phase II SBIR Project to develop hypergolic green fuels.

Nathan W. Moore, BS '02, celebrated completion of his PhD from the UC Davis Department of Chemical Engineering with a two-month adventure in the Peruvian Andes, 10,000 feet above sea level. Moore is as postdoctoral researcher in California.

Students sweep research paper competition

UW chemical engineering students swept the Pacific Northwest Regional AIChE Student Chapter Research Paper Competition with first, second and third place wins. The event, held in April 2006 at the University of Idaho in Moscow, featured competitors from the universities of Idaho and British Columbia, and Montana State, Washington State, and Oregon State universities.

First place went to John Frostad. Advisor: John Berg. Title: *Dynamic Surface Tension*. Frostad went on to capture second place in the national competition at the AIChE conference in November 2006 in San Francisco.

Second place went to Aaron Saks. Advisor: John Berg. Title: *Acoustic Detection of Mechanical Failures in Polymeric Composites.*

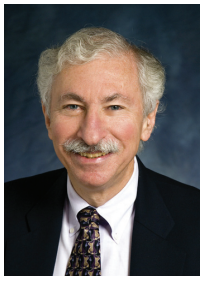
Third place went to Zudtky Wisecarver. Advisor: Daniel Schwartz. Title: *Studies of Mass Transfer in the Electrochemical Printing Process*.

Bruce Finlayson keeps on writing

Professor Emeritus Bruce Finlayson wrote *Introduction to Chemical Engineering Computing*, published in March 2006. Finlayson's book teaches professionals and students the kinds of problems they will have to solve, the types of computer programs needed to solve them and how to ensure the correct solutions. The book is available in hardcover and paperback. A Chinese version also is available.

Finlayson also co-authored *"Section 3: Mathematics"* in the eighth edition of *Perry's Chemical Engineers' Handbook,* which has equipped generations of chemical engineers with an expert source of information.

Buddy Ratner named Fellow of AAAS



Buddy Ratner

Buddy Ratner's 35-year career has focused on synthesizing, fabricating and testing biomaterials for medical devices and implants. A particular emphasis is on biomaterial surfaces where the device comes into contact with the body. More recent research aims to mimic living tissues.

Professor of bioengineering and chemical engineering and director of the UW Engineered Biomaterials (UWEB) program, Ratner was cited by the American Association for the Advancement of Science (AAAS) for pioneering research and administrative leadership in the field of biomedical engineering, particularly in biomaterials and surface analysis.

Another honor occurred in December, when biomaterials researchers from around the world gathered for a conference in Maui, Hawaii to celebrate Ratner's 60th birthday.

A student participated in a hands-on excercise at the first NUE UNIQUE workshop in June 2007.

NUE UNIQUE brings nanotech to classroom

Collaborating on an interdisciplinary and multi-institutional effort to bring the excitement and challenge of nanotechnology into the college classroom are Professors René Overney of Chemical Engineering, Mehmet Sarikaya of Materials Science & Engineering, David Ginger of Chemistry, and Tom Griffiths of North Seattle Community College (NSCC).

In the NUE UNIQUE program, UW and NSCC are working with companies Nanosurf AG and NanoScience Inc. to provide students in engineering and natural sciences access to top-quality scanning probe microscopy in the teaching laboratory.

A special arrangement of leasing equipment and sequencing the laboratory course offerings helps offset the high equipment costs that would normally put these instruments out of reach to undergraduates.

The laboratory work will give students a substantive and broad exposure to the latest concepts in nanoscience and nanotechnology that, in turn, will lay the groundwork for careers in these areas.

Overney teaches the introductory course. Workshops are open to students from UW, community colleges and universities nationwide.

For more information, please visit http://depts.washington.edu/nanolab/NUE_UNIQUE/NUE_UNIQUE.htm.

Professors Stu Adler and Dan Schwartz chosen to edit special educational issue of *Interface*

Everyone views education from different angles, so learned Professors Stu Adler and Dan Schwartz while seeking input from many constituencies in assembling the Fall 2006 issue of *Interface,* the magazine of the Electrochemical Society (ECS).

"Instead of trying to cover all aspects of this multifaceted subject," Adler said, "we took the opportunity to provoke questions that we think are important for members of ECS to think about, while also highlighting what some members are doing in the area of electrochemical education."

The issue (Vol .15, No. 3) features the following articles: Adler, *"Education Initiatives of The Electrochemical Society"*; Professor Eric Stuve, *"Bringing Fuel Cells to the Classroom";* graduate student Jeff Nelson and postdoctoral student Kavita Jeerage (PhD '01), *"Enginearring"*; and Dan Allred (PhD '06), *"Building a Rainbow."*

Online versions of articles in *Interface* are available at www.electrochem.org.

L. Douglas Smoot and Harry Tecklenburg each win 2007 R. Wells Moulton Distinguished Alumnus Award

L. Douglas Smoot (PhD '60) and Harry Tecklenburg (MS '52) are each winners of a 2007 R. Wells Moulton Distinguished Alumnus Award. The award is given annually to an alumnus of Chemical Engineering who achieves distinction in industry, academia, government service, or public or volunteer service. Tecklenburg, who passed away in 1993, is the first person to receive the award posthumously.

Smoot is professor emeritus of chemical engineering and founding director of the Advanced Combustion Energy Research Center at Brigham Young University (BYU). He was a member of the BYU faculty from 1967 to 2006, serving as department chair (1970 to 1977) and dean of engineering (1977 to 1994). He is the author of hundreds of technical articles and four books. He received the Distinguished Faculty Award and the University's Presidential Award at BYU, Utah's first Governor's Medal for Science and Technology, and the U.S Department of Energy's Homer H. Lowery Gold Medal.

Tecklenburg's career spanned four decades (1952 to 1990) at Procter & Gamble (P&G), where he helped develop many of the company's products. He began working on detergents, then moved on to paper products (including Pampers, Bounty and Charmin). He served as P&G's senior vice president of worldwide research and development and also as head of the Norwich Division of P&G's pharmaceutical branch. He received the President of the United States award in 1990 for his work promoting the employment of people with disabilities.

Engineering Open House

9 a.m. to 3 p.m.
Friday, April 25

10 a.m. to 2 p.m.
Saturday, April 26

Explore the world of engineering and science at this annual event. From interactive computer games to robots to making liquid nitrogen ice cream, the College of Engineering offers more than 125 hands-on exhibits.

This event is free and open to students of all ages from grades K-12, prospective high school and college transfer students, teachers, and all others that are interested in learning more about engineering.

Groups and classes may register online at www.engr.washington.edu/openhouse. For more information, call (206) 543-5272 or send an e-mail to openhouse@engr.washington.edu.

Web site: www.cheme.washington.edu / Reception: (206) 543-2250

UNIVERSITY OF WASHINGTON COLLEGE of ENGINEERING *Chemical Engineering*

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