# CHEMICAL ENGINEERING

UNIVERSITY of WASHINGTON

# Catalyst



#### IN THIS ISSUE

Page 2 Message from the Chair

Page 3 Faculty Honors

Page 4 Distinguished Alum Announced

Page 5 Alums Come to Campus to Recount Career Experiences

Page 7 ChemE Senior Rocks!



#### **ChemE's Entrepreneurial Spirit**

On a bright September morning in Benson Hall, a meeting was held to discuss the state of ChemE today and how to better prepare students for tomorrow. At the annual Advisory Board Meeting, members sat down with alums, investors, and campus experts to consider a growing employment option for chemical engineers. Increasingly, ChemE students, faculty, and graduates are using their education and research experiences to launch technology companies.

One group of ChemE student entrepreneurs is working to make cooking healthier. To reduce the Perfluorocompound emissions from traditional non-stick cookware, student group OmniOff is developing a new class of non-stick surfaces. "We utilize material science innovations to create non-toxic, non-stick cookware that is 100% stainless steel with no coatings, making it 100% compatible with the health-conscious cookware market," said Kathryn Cogert, team CEO.

The student venture started in the fall of 2011, when undergraduates Mike Siedlik, Nick Wang, Grant Williamson, and Cogert enrolled in the new Special Projects in Chemical Engineering Design course. "Instead of the traditional process design, the undergraduate members of OmniOff are learning how to do product design, a skill that is in increasing demand," Cogert said. "The class has taught me how one can successfully create one's own job, a skill that is very worthwhile in today's uncertain times."



OmniOff's (from left) Mike Siedlik, Nick Wang, Grant Williamson, and Kathryn Cogert won first place at the SEBA and Foster Business School's Center for Innovation & Entrepreneurship Science and Technology Showcase.

See Entrepreneurs, pg. 2

#### **New Seminar Features Up-and-Coming Scholars**



DYSSS Speaker Darren Lipomi was voted as best presentation by graduate students. He holds his prize—an iPad 2.

A new ChemE seminar puts early-career scholars in the spotlight. The Distinguished Young Scholars Seminar Series, launched in 2011, features presentations by postdoctorates and graduate students.

Assistant professors Danilo Pozzo and Jim Pfaendtner saw the need for such a series. "We noticed that there weren't programs that offer the top young scholars in chemical engineering the opportunity to showcase their research in front of an audience," said Pfaendtner. "It's an opportunity for our graduate students to see what the best of the best look like and to serve the discipline of chemical engineering at the national level by showcasing top talent."

ChemE graduate students selected the eight speakers from a pool of 85 national applicants, based on research accomplishments, nominating letters, and interest in the proposed seminar topic. "The students,

staff, and faculty put together such a great and unique event," said Darren Lipomi, a DYSSS speaker, postdoctoral fellow at Stanford University, and soon-to-be professor at UC San Diego.

The series will return this summer. For more information, visit www.cheme.washington.edu/events/dysss2011.html.

# *Message from the* **CHAIR**

#### **NNOVATION.**

What does a U.S. chemical engineer do? The Bureau of Labor Statistics (BLS) says the top two employment categories are "R&D" and "Basic Chemicals Manufacturing". The same BLS dataset includes 2020 projections for ChemE employment in 35 differ-



Daniel Schwartz

ent categories. The largest growth in jobs is expected to be in "R&D", with a projected +22% increase, while the greatest projected decline, 15%, is expected in "Basic Chemicals Manufacturing". Thanks to R&D outcomes, new manufacturing capacity is extraordinarily automated and productive, and that impacts manufacturing employment. Here in Benson Hall, the faculty, students, alumni, and advisory board have noticed the employment trends and are taking proactive steps to better prepare students for the career changes and challenges ahead.

At the annual advisory board meeting, members discussed the employment landscape and its impact on students and graduates (see cover). One response by the department has been to implement extensive laboratory and classroom reforms, including a formal nanoscience and molecular engineering degree option and a more flexible class schedule to allow student co-ops. In addition, over half our undergraduate students work on R&D projects in our faculty's research laboratories.

The Board commended these efforts, and also met with ChemE alumni who have used their degrees to start companies (see pg. 2-3). These alumni innovators discussed elements of chemical engineering that made them adaptable problem solvers.

Over the past year, I have

worked with a small group of ChemE undergraduates, the Foster Business School entrepreneurship program, and a local investment group to develop *Continued on back cover* 

#### ChemE Entrepreneurial Spirit (Continued from pg. 1)

The team placed at two UW business competitions this year, and is improving their prototype in the hopes of being able to incorporate.

OmniOff has had help outside the classroom. Keeler Investments Group, LLC, a family-funded and managed investment group, guides fledgling innovators. Keeler Partner Shelley Whelan works with early-stage investments, and helped OmniOff as they prepared for business competitions.

Keeler has also worked with the ChemE alum company Modumetal. "Our investment in Modumetal introduced us to the exciting things coming out of Dr. Schwartz's lab and we fostered a closer relationship with his department," Whelan said.

Co-founded by John Whitaker (PhD '03) in 2007, Modumetal produces a nanolaminated alloy stronger and lighter than steel. "Modumetal's structure gives it unique performance advantages in both



These metallic toadstool structures make the OmniOff surface non-stick. Each toadstools is about 1/10 the size of a human hair, pictured above the toadstool structures.

strength and corrosion resistance," said Whitaker. The sustainable manufacturing process uses electricity as the direct input form of energy, which Whitaker sees as a major shift in how metals are manufactured. "It affords inherent efficiencies and reduces demand for metal raw materials."

"When I was first exposed to nanolaminated materials at the UW, I never imagined where it would take me," he said. "I believe well-trained chemical engineers have a mindset that is uniquely suited to commercializing molecular-scale innovations."

The company has foundational patients, customers from Fortune-500 companies, and is working to scale up production. "Modumetal's vision is a big one: to revolution-ize manufacturing. To change and improve the way things are made," he said.

Also in 2007, Jeff Nelson (PhD '07) founded MicraMetal (formerly Ionographics) with funding from a NSF Phase I Small Business Innovation Research grant.



MicraMetal's direct writing plating prints on a specified area, instead of the entire metal plate. The plated metal above are measured in micrometers.

The company offers a patented direct write plating (DWP) process—depositing dense precious metals only where needed, reducing the need for large plating baths.

Nelson's graduate work helped prepare him to start MicraMetal. "The experience of writing papers, preparing presentations, failed experiments, unexpected results, and

going through longer periods of time working on specific problems—all of these experiences can help the technology entrepreneur." MicraMetal is currently looking for funding to help advance the technology, expand to new markets and sell the DWP machine tools.

## It's the ChemE way.

CEO Karl Schmidt (BS '96) launched Mirador Biomedical from the ashes of a former startup. Economic downturn and clinical trial complications ended a neuromodulation company, but started a biomedical one.

Founded in 2009, Mirador makes pressure measuring biomedical devices, saving time, money, and lives by giving fast pressure readings. "Our devices provide definitive, quick information," said Schmidt. "Once the needle is in place, the physician gets the pressure immediately."

The devices are used in several medical procedures like catheter insertion, preventing strokes by indicating when an artery is punctured, and in juvenile spinal taps. The device shortens the time a baby or child undergoes a spinal tap by giving instant pressure readings instead of the physician waiting for the fluid level to creep up.

"We incorporate technology into devices that are kinda dumb. Making them smarter, by providing information that you wouldn't normally get," Schmidt said. Mirador's devices are used locally at UW Medicine, Seattle Children's Hospital, and Harborview Medical Center.

Schmidt found his ChemE degree a useful tool in product innovation. "A ChemE degree gives you a solid background in problem solving skills. It helps you identify problems and solutions without a road map."

Carbon Cultures, UW graduate student team Jenny Knoth, Ken Faires, and J.D. Tovey, III, developed technology to turn forestry refuse into

biochar, a soil-enhancer.

"Originally, we were working to increase value of biomass in the energy market but it became clear that biochar was more valuable when buried," said Knoth. "When worked into to a variety of soils biochar increases soil productivity." The effects are two fold: removing forestry waste while producing an agricultural tool.



Carbon Cultures' prototype blanket efficiently burns forest refuse into biochar, a useful agricultural product.

In 2011, the group re-

ceived funding through Prof. Schwartz's NSF Innovation Corps (I-Corps) grant, one of 21 groups to be awarded in its inaugural year. The group is conducting field tests to improve the prototype, and hopes to be in full-scale operations in the next year after raising additional capital.

Research developed in Prof. Shaoyi Jiang's lab launched Zwitter Technology, LLC in 2009. The company makes zwitterionic polymers, which prevent biofouling, the unwanted biomolecular absorption and microorganism attachment to surfaces like sea vessels and medical devices. Zwitterionic polymers create molecular coatings that interfere with protein binding making it impossible for proteins to bind to the surface. The company, currently funded by Small Business Innovation Research (SBIR) grant, is located on the UW campus.

#### **Faculty Honors and Awards**



Rehnberg Chair Professor **Hugh Hillhouse** earned a Department of Energy SunShot grant. Hillhouse, who was promoted to full professor this year, also won the 2011 Clemson University College of Engineering and Science Distinguished Young Alumnus Award.

Boeing-Martin Professor **Samson Jenekhe** made the Thomson Reuters' Science Watch "Top Materials Scientist of the Past Decade" list. He was the only UW professor to make the list. Jenekhe's research was also featured in a Press pack from the Royal Society of Chemistry.





Mary Lidstrom, Professor and Vice Provost for Research, was elected to the Washington State Academy of the Sciences. Lidstrom joins 24 new members appointed to the Academy this year. Academy members are selected for their distinguished and continued scientific achievements.

Boeing-Roundhill Professor **Shaoyi Jiang** was named a Fellow of the American Institute of Chemical Engineers. Fellows are elected for their significant accomplishments in engineering. Jiang was also elected as a Member of the Washington State Academy of the Sciences.





**Buddy Ratner**, Professor and Darland Endowed Chair of Technology Commercialization, was named a Fellow of the American Chemical Society. Fellowships are given to distinguished scientists, who have demonstrated outstanding accomplishments in chemistry.

Assistant Professor **Jim Pfaendtner** won a 2012 National Science Foundation CAREER Award, co-funded by NSF's Chemistry Division and Chemical, Biological, Environmental, and Thermal Division. It is among NSF's most prestigious awards given to junior faculty.



# Alumni **UPDATES**

#### **Alumni Awards and Accolades**

#### Steven Rogel to Receive CoE Diamond Award

Steven Rogel (BS '65) was named the College of Engineering Distinguished Achievement in Industry Award recipient. Rogel is a leader in the forest product industry, serving as CEO of Williamette Industries and Weyerhaeuser. He has received numerous industry awards including the Global CEO of the Year by Pulp & Paper and PPI magazines, Executive Papermaker of the Year by PaperAge magazine, and Company of the Year three times by Institutional Investor magazine. Rogel will receive the award at the 2012 Diamond Award Ceremony in May.

#### Peter Farrell Elected to National Academy of Engineering

The National Academy of Engineering named Peter Farrell (PhD '71) as one of 66 members elected this year in February. Academy members are elected for their outstanding contributions to engineering research and pioneering efforts in technology and engineering fields. Membership to the Academy is one of the highest professional honors in the field.

Farrell was recognized for his development of sleep disorder breathing treatment devices. He is the founder, chairman and chief executive officer of ResMed Inc., director of NuVasive, Inc., and non-executive chair of QRxPharma, medical equipment and treatment companies. He serves as Chair of the Executive Council of the Harvard Medical School Division of Sleep Medicine. ■



Prof. Harvey Palmer (right), the 2011 Distinguished Alumnus in Industry, received his Moulton Medal and plaque at Awards Day in 2011. He is pictured with Prof. John Berg.

#### **Evans Named Distinguished Alumnus**

In 1973, Dan Evans (BS '66) took over JH Kelly, his father-in-law's Longview, WA plumbing contractor business.

After joining JH Kelly, Evans noticed that while there were several plumbing contractors in the area, there were no industrial construction companies to work with the local industries. Evans turned JH Kelly into a national specialty contractor, transforming a five-employee business to one with 1,000 employees and a fiveyear average revenue of \$266 million.



Evans attributes his success, in part, to his chemical engineering degree and the professors who supported him, including Prof. John Berg. "Recalling Dan as a student in the first class I ever taught at the University of Washington, it fills me with pride to see what he has accomplished in his career, and is continuing to accomplish," said Berg. "Among other things, he has transformed a local plumbing business in Longview to one of the largest specialty contractors in the country, and during his presentation to our incoming students this past autumn, he revealed innovations in municipal waste treatment that appear to be transformational in that field."

Between earning his degree and his work with JH Kelly, Evans worked for Standard Oil of California and earned an MBA at the University of Oregon. He will receive his Moulton Medal and plaque at this year's graduation ceremony on June 8th. ■

#### **Dale Brooks Speaks to AIChE Students**

Dale Brooks (BS '60) made a career in the Capitol and lived to tell about it. Brooks spoke to the AIChE Student Chapter Members this fall, recounting his experiences working as a Chevron lobbyist. The students were able to learn about an alternative use for their ChemE degree, working with politicians to affect the legislative process. Students were impressed with Brooks' enthusiasm, knowledge, and experiences in the beltway.

Senior Erica Ellingson said, "It was good to hear that, in ChemE, you don't just have to go into process engineering." Kira Schevchenko, AIChE Vice President said, "It's interesting that our scientific and engineering knowledge can be applied to the regulation of our government. He mentioned that a lot of amendments are made on the spot. If ChemEs want some influence, they have to be there."

Brooks was also a featured Leadership Seminar Speaker in 2010, presenting his aptly named "Mr. Brooks Goes to Washington and Survives to Tell the Story." ■

Read more Alumni News at www.cheme.washington.edu/alumni.html

### In **MEMORIAM**

#### Himmelblau Remembered as "a True Gentleman"

Chemical Engineering Distinguished Alumnus, Prof. David Himmelblau passed away April 2011 at the age of 87. Known for his outstanding contributions to chemical engineering, Himmelblau earned his MS in 1956 and his PhD in 1957 at the UW.

In 1961, Himmelblau took a faculty position with the

Department of Chemical Engineering at the University of Texas, Austin. He spent 42 years as a professor there, penning eleven

books and over 200 articles on sensor validation, artificial neural networks, and process analysis and optimization.



Himmelblau received the UW Chemical Engineering Distinguished Alumnus Award in 1995 for his contributions to the field of chemical engineering and higher

education. Bruce Finlayson, chair of the department at the time, presented the award to Prof. Himmelblau.

"I remember David Himmelblau as a true gentleman — always accessible and interested in what you were doing," said Finlayson. "His book for the first course in chemical engineering was the first one I taught from when I joined the University of Washington to begin my career. It was also the one we organized a self-paced course around. It was later that I learned he got his PhD here working with Professor Al Babb.

"In 1995, when I was chair, it was my pleasure to introduce him to our students as a Distinguished Alumnus of the Department. His talk was an inspiration to students as well as faculty. Dan Schwartz, currently our chair, said 'As an assistant professor, I recall thinking what an honor it was to have a job in a department that produced people like him.""

In his 50+ years as a chemical engineer and educator, Himmelblau was recognized as an AIChE Fellow, CAST Division Awardee, Founders Awardee, and American Society for Engineering Education (ASEE) Awardee. He served as director of AIChE, Chair of Chemical Engineering at the University of Texas as Austin, and held various leadership roles for Computer Aids for Chemical Engineering Education (CACHE) Corporation. AIChE created the David Himmelblau Award for Innovations in Computer-Based Chemical Engineering Education to honor his work. ■

#### Forestry to Fortune Cookies: Alumni Present Career Stories

What kind of degree prepares you for a career making fortune cookies? Why a degree in chemical engineering, of course. **Camillo Cheng (BS '76)**, owner of Golden Pheasant Foods, LLC., told his career story and accomplishments to Chemical Engineering seniors in the department's Leadership Seminar Series.

Other featured presenters in the Fall 2011 series included:

- Rita Stevens (PhD '82), President, Planning Matters LLC
- Graham Bailey (BS '85), Paper Machine Manager Newsprint, Weyerhaeuser
- Pete Haggerty (MS '80), Vice President of Technology, Cascade Designs, Inc.
- Aaron Saks (BS '07), Project Leader, Boise Inc.
- Dan Evans (BS '66), Retired Chair of Kelly Group, LLC (*read more about Evans on pg. 4*)
- Michael J. Strand (PhD '73), Former Vice President, Med Data
- Kathryn Soucy (PhD '91), Patent Prosecution Professional, The Boeing Company
- Will Rathvon (BS '76), Global Head of Natural Resources Group, ANZ Bank



*Camillo Cheng brought the gift of fortune (cookies) to his seminar. From left: Chair Dan Schwartz, Prof. John Berg, Camillo Cheng, and former ChemE Chair Charles Sleicher.* 

#### Fourth-generation Husky is ChemE's First Dean's Medalist

When Melanie Drake graduated in June 2011, she took more than a bachelor's degree with her. Melanie is Chemical Engineering's first student to win a Dean's Medal for Academic Excellence, awarded for her achievements in academic grades and courses, research experience, extracurricular activities, and leadership.

Coming to the UW was an easy choice for Melanie. "I am a fourth-generation husky," she said. "I grew up being told by my dad that I could go to college anywhere except WSU. In the end, I was destined to be a husky." After taking a chemistry class with Prof. Campbell, Melanie fell in love with the subject. She became interested in energy research and realized Chemical Engineering was the right major for her.



Melanie Drake is the first Chemical Engineering student to receive a Dean's Medal. She is pictured with Prof. Stu Adler (left) and Chair Dan Schwartz.

" I grew up being told by my dad that I could go to college anywhere except WSU. In the end, I was destined to be a husky."

For her undergraduate research, Melanie worked with Professor Adler and graduate student Cortney Kreller on fuel cell research. "I had a wonderful experience doing undergraduate research, and it is one of the key factors in my decision to pursue a PhD. Both Cortney and Professor Adler taught me not only what it means to be a great engineer, but to be a great teacher and mentor as well." Winning a National Science Foundation Graduate Research Fellowship last year, Melanie is working toward a PhD at UC Berkeley. "I see graduate school as my opportunity to really contribute to science and the world. No matter what area I go into, I know I'll make a difference."

Even though her undergraduate days are over, she will carry a part of the UW with her. "Some of my favorite memories were the late nights in Benson when every-one started bonding through sleep deprivation and cabin fever in the computer lab," she said. "I view my graduating class as a sort of second family, and will keep in contact with many for the rest of my life."

#### Seniors Bergsman and James Earn Mary Gates Research Scholarships

Lucas James and David Bergsman share some similarities. Both are UW seniors, are majoring in chemical engineering, and both have been named 2011-12 Mary Gates Research Scholars.

They were two of 96 Research Schol-

ars selected to receive \$4,000 in scholarship funding this fall. The scholarship provides funding to undergraduates so they can focus their energy on research projects. Faculty mentors guide the undergraduate students on these projects.



Bergsman

David Bergsman, who works with Prof. John Berg, used the scholarship to continue his research on the mechanisms behind the charging of oxide particles in non-polar liquids. "This research is critical to understanding how a variety of new technologies work, and how they could be improved. One example is a kindle screen, which uses charged particles in non-polar solutions as part of the design of its screen. By better understanding this technology, we can make improvements to these screens."

For Lucas James, his research focus



James

is on solar energy. Working in Prof. Hugh Hillhouse's group, he explores the use of nanocrystal-based inks as the lightabsorbing material for thinfilm solar cells. "The research is capable of having a significant impact, as it deals with green energy. If we discover a better type of solar cell for use under

cloudy skies, or if we develop lowcost methods of synthesizing highefficiency cells, then this cleaner form of energy will become more popular, especially in Seattle."

#### Ford Fellow Corredor Joins UW Chemical Engineering

Charlie Corredor came to the department this fall with a unique honor. The graduate student, who transferred from Arizona State University, was named a pre-doctoral Ford Foundation Fellow in April 2011. He brought this prestigious honor to the UW, making him the first Ford Foundation Fellow in the history of UW Chemical Engineering.

Ford Foundation Fellowships, awarded for academic achievement, include a stipend and payment of the student's tuition and fees.

Charlie was working with Prof. Jonathan Posner at ASU when he learned he had received the fellowship. When Posner came to the UW, Charlie followed. "Dr. Posner was a huge weight for my decision to come to the UW. But, let's not forget how



Photo by Jessica Slater, ASU

prestigious the chemical engineering department is and how friendly and welcoming faculty and staff were. Now I am proud to say that I am a husky!"

Corredor also recieved a 2012 NSF Graduate Research Fellowship. He is working toward his PhD and a future in higher education. ■

#### **Congrats ChemE Grads!**



This undergraduate class of 2011 walk at the undergraduate graduation ceremony last June. A total of 54 Chemical Engineering undergraduates earned their BS degrees. The 2012 Chemical Engineering graduation ceremony will be held on June 8, 2012.

#### ChemE Senior Rocks in and out of the Classroom

Kenny Choi wears several hats. He is the guitarist and vocalist for Daphne Loves Derby, an indie/folk band with millions of plays on MySpace and PureVolume, three released albums and one more pending release. He has a solo project called Wolfton, and produces for other musical artists and studios.

The self-proclaimed "closet nerd" is also a Chemical Engineering senior and the first recipient of the department's Rehm Award. Established in 2010 by alumnus Thomas Rehm, the

award gives \$2,500 to the student with the most improved GPA earned in their junior year. "I was confident that I could improve my performance by changing the way I studied, but I had no idea it would result in an award. I feel extremely fortunate," said Choi.

A trip and some Dummies texts brought Choi to ChemE. "While traveling through Texas a few years ago, I purchased copies of Chemistry For Dummies, Physics For Dummies, and Algebra For Dummies, solely because I was sick of reading paperback bestsellers. Around



the same time, I started reading scientific journals, and was really inspired by all the people who were using science to make the world a better place. I decided to do everything I could to add to their efforts. After doing some research, it seemed like a degree in chemical engineering was a perfect platform for my goals."

But his journey through the program posed some challenges for the student and rocker. "I really struggled during my first quarter in the department, and I still carry a piece of that anxiety with me when I take exams," he said. "But I learned how to be systematic with my studies. I keep track of exactly what I need to work on, and try to fulfill the agenda to the fullest."

Kenny credits part of his success to Rehm and his award. "Winning the award has definitely given me more confidence ... I had a chance to grab lunch with Dr. Rehm over the summer; it was really nice to thank him in person. I think he created this award to acknowledge students who are willing to fight after a fall. He understands how a little bit of encouragement can propel someone towards a goal. I promised Dr. Rehm I would continue trying my best; I can't let him down."



Benson Hall 105, Box 351750 Seattle, WA 98195-1750

**RETURN SERVICE REQUESTED** 

Daniel T. Schwartz Professor and Chair

Nicole Lutton Writer and Editor

Halbe Dougherty-Wood Associate Director, Advancement, Engineering

Send comments and address corrections to: njlutton@uw.edu or to the return address above.

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

# Catalyst

Thank You Donors! Scholar Donor Lunch 2011



Photo by Mary Levin

Students, faculty, and donors come together for this photo taken at the 2011 Scholar Donor Lunch: (seated from left) Professor Emeritus Charles Sleicher, Lois Rathvon, Tiep Pham, Halbe Dougherty-Wood, and Kevin Kronvall; (standing) Armando Perez-Selsky, Stefan Hristov, Prof. John Berg, Prof. Dan Schwartz, Pian Shi, Ken Davidson, Margaret Liu, John Di Iorio, Kathy Rathvon, Diane Benson, Gerry Tolentino, and Buzz Benson, and Michael Siedlik.

Read about Harvey Palmer, Charles Mattheai, and other alums at www.cheme.washington.edu/alumni.html

#### **Chair's Message**

(Continued from pg. 2)

a product innovation capstone experience. The students have prototyped a new non-stick surface, created a business model around it, and pitched their ideas to investors. The team calls themselves OmniOff (see cover), and their non-stick cookware product has received awards at two UW business competitions.

Graduate education has always focused on the R&D skills needed to thrive in the current and future employment markets. Our graduate program remains primarily PhD oriented, but we have just begun marketing a new MS program. With the rising role of R&D in future employment prospects, we believe a master's degree is an excellent way to efficiently advance a students marketable skills. Finally, graduate education and research are largely fueled by funding from companies, foundations, and the government. Raising research funds is an "entrepreneurial" activity where our faculty excel, with this year's funding up roughly 25% from the prior year.

How should a forward-looking ChemE department respond to the changing employment landscape? UW is creating the template for both undergraduate and graduate education that will truly impact industry, academia, and society.