

ChalkTalk

CBE at Penn Engineering is a vibrant place.

We welcome to the faculty ranks Rob Riggelman who joined the department after his doctoral research at the University of Wisconsin with Juan de Pablo and post doctoral stint at U. C. Santa Barbara with Glenn Fredrickson. His work in molecular modeling and simulations of polymeric and nanocomposite materials integrates excellently with Penn's unique strengths in fundamental soft matter research.

In this issue, we profile Daeyeon Lee, an assistant professor who is rapidly establishing himself as a leader in colloidal assembly and novel materials. Known for his warm and helpful manner, Daeyeon is already beloved by his colleagues and students alike.

This semester 175 undergraduate students and 96 graduate students and post-doctoral researchers are exploring, researching and creating new knowledge at the forefront of the field. Our first Graduate Research Symposium held October 1 provided graduate students a forum to interact with industrial R&D leaders and showcased their latest research results.

We rely on your support and interaction as friends and alumni. If you have news, please relay it to us to consider for future issues of Penn CBE *Currents* (chebiom@seas.upenn.edu). I also encourage you to get involved. Your time and talent to mentor or to attend special events, and your contributions to our annual fund or in providing internships or funding research are vital to our department's continued success. I welcome your interest and insight. ♥

Kathleen Stebe
Goodwin Professor
and Chair



A Deep Thinker Tackles Surface Engineering

Beauty may only be skin deep, but it's exactly that thin surface layer that Professor Daeyeon Lee finds most fascinating in his research.

"Everything has a surface. By learning how to control surface properties independent of the material, we can improve functionality," he says.

Lee's research interest is functional thin film coatings – surface engineering using thin layers of polymers and nanoparticles. It is research that has real-world applications across a spectrum of needs: an invisible coating of nanoparticles on an automobile windshield to make it fog-proof; a soft-surface coating on a medical implant that prohibits biological rejection; coatings that advance the boundaries of renewable energy; and light-as-air applications for liquid surfaces.

"This is 'enabling technology' that has enormous potential to solve seemingly

insurmountable engineering problems," he says.

One of these insurmountable challenges is the ability to control the surface of bubbles. "I tell my children that I am working with bubbles and they think I have the best job in the world – which I do!" he says. By learning how to modify the air and water interface, Lee is able to make "perfect" bubbles that have implications in fundamental study – like understanding the atomic behavior of crystals – and are applicable in sound-proofing materials and contrast agents for biomedical imaging.

"Bubbles are wonderful. But made using traditional methods, bubbles tend to be very unstable and polydisperse," says Lee. "This prevents researchers from doing good science and engineering." Using a microfluidic technique, he makes bubbles that are very stable, uniform and precisely replicable. "Now we are working with

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A Process Evangelist With Purpose

“In our industry, innovation has been perceived to be the realm of chemistry and biology, but it is the engineering skill set that has delivered efficiency to the pharmaceutical process.”

– Paul McKenzie



About:

Paul McKenzie (CHE, '87)

Then:

First employer during undergraduate school was DuPont Marshall Laboratories

Now:

Global Head of Pharmaceutical Development and Manufacturing Sciences at Johnson and Johnson

Before:

Penn work study jobs in Stouffer dining hall

After:

Recently certified as a USA and YMCA swimming coach after having been an official for many years

When Paul McKenzie (CHE, '87) became a chemical engineer, he did not realize that his facility with process engineering would help revolutionize an industry. Now, as the Global Head of Pharmaceutical Development and Manufacturing Sciences at Johnson and Johnson, he preaches “process” to catalyze innovation in the pharmaceutical industry.

“In our industry, innovation has been perceived to be the realm of chemistry and biology, but it is the engineering skill set that has delivered efficiency to the pharmaceutical process,” says McKenzie.

At Johnson and Johnson, McKenzie is responsible for the development, clinical supply, marketed product support, and technical life-cycle management of chemical and biological pharmaceutical products. In an industry challenged to reduce costs and improve cycle time throughout drug development and production, McKenzie has become an evangelist for process improvements. “It is important to connect the process and analytical groups in research and development with those in manufacturing,” he says. “In this way, we will be able to collect and communicate data in the same way across the organization. This ultimately will streamline our

technology transfers and allow meaningful life-cycle management.”

Delivering new science in the form of a commercial product is a point of personal pride for McKenzie. “I enjoy bringing new medicines to the market for the benefit of patients worldwide. Knowing one of the medicines you have worked on has made a difference in someone’s life is a great feeling.”

McKenzie has both R&D and supply chain experience working across multiple technical areas with large and small molecules. Prior to joining Johnson and Johnson and after receiving his Ph.D. at Carnegie Mellon University, McKenzie worked for several pharmaceutical companies. He credits Penn with providing many skills that were integral to his success.

“Penn provided me a great set of tools in my tool box. From the rigor of the academic courses to the networking experienced through the diversity of the school and my internships, I was well prepared for the challenges I have experienced,” he says. “Senior design class with Arnold Kivnick, trying to isolate horseradish peroxidase, must have impacted me more than I thought at the time.” ♣

Towne News

Stuart W. Churchill, *Professor Emeritus*, was honored by the University of Michigan, which named a chair the Stuart W. Churchill Collegiate Professorship in Chemical Engineering.

Russell J. Composto has been named Chair of Division of Polymer Physics of American Physical Society.

Dennis E. Discher was named 2009 Plenary Award speaker for AIChE Area 15d/e (Engineering Fundamentals in Life Science) Division 15 (Food, Pharmaceutical, and Bioengineering).

Raymond J. Gorte was named to the Electrochemical Society Editorial Advisory Committee and has been asked to serve as an Associate Editor for the Journal of the Electrochemical Society. Two special sessions honoring Ray Gorte, the 2009 Wilhelm Award Winner, will be held at the upcoming 2010 AIChE meeting.

Daeyeon Lee received the Victor K. LaMer Award for graduate research in Colloid and Surface Chemistry, ACS Colloid and Surface Chemistry Division.

Alan L. Myers, *Professor Emeritus*, was honored as a founder of the International Adsorption Society (IAS) at the IAS Tenth International Conference on Fundamentals of Adsorption.

Kathleen J. Stebe, *Chair*, presented the Kurt Wohl Memorial Lecture at the University of Delaware and has joined the Editorial Board for *Advances in Colloid and Interface Science*. She will give the Corrsin Lecture at Johns Hopkins University this term.

Karen I. Winey has been named an Associate Editor for *Macromolecules* and has chaired 2010 Polymer Physics Gordon Research Conference. She has received an NSF Special Creativity Award.

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A Deep Thinker Tackles Surface Engineering

colleagues at the hospital to learn how to apply these results outside of the lab," he says, explaining that they can be used inside a human body to increase the contrast of ultrasound images, revealing what otherwise could be obscured. "To take what I am doing in the lab and see the potential for it to impact people's lives really excites me."

The opportunity for collaboration was one of the reasons Lee chose to work at Penn. "Not only does Penn have the best Materials Research Science and Engineering Center (MRSEC) and the best equipment to work with, but the best people are here, willing to work together in a multidisciplinary environment in order to come up with and develop the big ideas," he says. It's an opportunity

Lee has struggled to find. "Collaboration is huge for accomplishing results with high impact. That's not easy to do at other places, but here I can talk to people who are interested in working collaboratively and not competitively." ♣

Daeyeon Lee, one of the department's newest professors, joined the faculty as Assistant Professor of Chemical and Biomolecular Engineering after earning his Ph. D. in Chemical Engineering at Massachusetts Institute of Technology. His research interests include colloids; polymers; nanomaterials; and microfluidics. Recently, he was awarded the 2010 Victor K. LaMer Award for Graduate Research in Colloid and Surface Chemistry from the American Chemical Society for his outstanding Ph. D. thesis.

Student Achievements

The Department of Chemical and Biomolecular Engineering congratulates the Class of 2010 and honors the department's 2009 – 2010 Student Award Recipients.

- » **Alan S. Futran** – *A. Norman Hixson Laboratory Report Prize, for the outstanding laboratory report prepared in CBE 410 Chemical Engineering Laboratory*
- » **Liane S. Carlson, Michael Y. Lee, Chukuemeka E. Oje, and Arthur Xu** – *1st Place, Melvin C. Molstad Prize for the best Senior Design Report*
- » **Edward J. Nie, Luisa Herrmann Rodrigues, Ali H. Raza, and Brian M. Wright** – *2nd Place, Melvin C. Molstad Prize for Senior Design Report*



- » **Jeanne W. Ho** – *Stuart W. Churchill Individual Research Prize for excellence in research/independent study*
- » **Arthur Xu (Senior), Spencer T. Glantz (Junior), William D. Mulhearn (Sophomore)** – *AIChE Student Award*
- » **Charles G. Slominski** – *American Chemical Society Award*
- » **Xinyu Cynthia Lau** – *American Institute of Chemists Medal Award*
- » **Stephen J. Lantz** – *Donald F. Othmer Sophomore Academic Excellence Award*

CURRENTS

NEWS FROM THE DEPARTMENT OF CHEMICAL
AND BIOMOLECULAR ENGINEERING



Grad Student Symposium Draws Attention



An eagle-eye view of the poster session during the first Graduate Student Symposium.

CBE doctoral students, faculty and a number of industry representatives participated in the department's first Graduate Student Symposium October 1, in Levine Hall. Presentations and poster sessions represented research topics in fuel cells, catalysis, drug discovery and delivery, cellular and tissue engineering, proteomics, materials, colloids and interface sciences, and computational modeling.

The event also fostered networking and interaction between students and potential industrial employers, including Air Products, ConocoPhillips, ESL Electronics, ExxonMobil, Johnson & Johnson, L'Oreal, Merck, Sandia National Lab, Thomas Jefferson University, and the University of Pennsylvania.

The event was an opportunity for graduate students to present their research to interested industry representatives, and allowed the University to show off its top graduate student talent. Special thanks are extended to those who coordinated this event: Ivan Baldychev, Tom Colace, Christine Carag Krieger, Rainer Küngas, Olga Shebanova, and Professor Matthew Lazzara. ♥

Join us at the AIChE Annual Meeting

You are invited to join us at the department reception at the AIChE Annual Meeting.

When: Sunday, November 7

Time: 8 – 10 p.m.

Place: The Hope Gallery and Museum of Fine Art
151 S. Main St.
Salt Lake City, UT

Salt Palace
Convention
Center

West 100 St.

East 100 St.

South Main St.

Hope
Gallery