

# Bioengineering News

Spring 2007

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## Longtime Leader Returning to Faculty

*National search for new UW Bioengineering chair to begin*



*Chair's assistant Shirley Nollette takes a rare moment's break with Dr. Yongmin Kim.*

After serving the department for nine years, Dr. Yongmin Kim will be stepping down as chair in June. His leadership will be sorely missed.

Serving as chair was a way to thank the UW for the nurturing environment Kim found when he came here in 1982, he says. "There are so many people here who are outstanding, personally and professionally, people I wanted to emulate. Now I've had the privilege of leading some positive developments in the department and serving the UW community."

Kim says his most important contribution has been recruiting new faculty and helping them succeed. "They are critical for the future of the department," he says.

Raising support for the new Foege Building was another vital contribution. "A first-class facility is essential for a first-class research department," he says. "I was only one of the components that made it happen. Everyone was helping, buying in to our vision of the future."

Another accomplishment was the creation of the under-

graduate degree program. Kim says it has been very rewarding watching the program mature and produce excellent graduates, ready to take the next steps in their careers.

The national search for a new chair has begun. The College of Engineering dean, Dr. Matt O'Donnell, and the School of Medicine dean, Dr. Paul Ramsey, have appointed Dr. Mani Soma of Electrical Engineering to chair a search committee that includes faculty from Bioengineering and other UW departments and an industry representative. Names of potential candidates should be submitted to the deans by January 2008. An acting chair will be named to lead in the interim.

As for Kim, after returning from next year's well-earned sabbatical, he plans to spend more time on things that had to take lower priority while he was chair — research, students, and family. He also wants to explore how technologies that are being developed in his lab can be used in developing countries.

## Foege to Give Rushmer Lecture



For this year's Rushmer Lecture, UW Bioengineering has a very special speaker: Dr. William H. Foege, our new building's namesake and preeminent global health humanitarian, master-mind of the successful campaign to eliminate smallpox from the face of the Earth.

Foege became director of the U.S. Centers for

Disease Control in 1977, helping save the lives of millions through efforts to wipe out devastating diseases and encourage childhood immunizations. After directing the CDC, he served from 1986 to 1992 as executive director of The Carter Center, which addresses global issues of democracy, human rights, disease, hunger, and conflict. Foege continues now as a Center fellow and as executive director of the Task Force for Child Survival, which he helped form to promote immunization and health worldwide. He is also a senior fellow at the Bill & Melinda Gates Foundation and Emeritus Presidential

Distinguished Professor of International Health at the Rollins School of Public Health, part of Emory University.

Foege has been reflecting on ideas for this talk since January, though the lecture won't be until June. That's because there's so much at stake in the subject, and so many unknowns. One inspiration for the talk is Sir Michael Marmot, who, among other roles, chairs the WHO Commission on Social Determinants of Health.

"Marmot believes that the 'unifying field theory' for health is for people to have some sense of control over their own lives," Foege says. "I'm thinking about whether there are ways to combine the qualities of art and technology to increase the number of people in the world who can participate in their own destiny. Maybe creative technology could actually help give people control and free them from a fatalistic approach to life. The University of Washington could be a laboratory for exploring the possibilities of combining the creativity of art and the common sense of science."

You can hear how these ideas will come together at the 19th Annual Rushmer Lecture on Thursday, June 7, from 4 to 5:20 p.m. in HSB A-420 (Hogness Auditorium). Afterwards, there will be a reception open to all in the Foege Building lobby, and student research posters will be presented.

## Department Commencement Set

On Friday, June 8, the department will celebrate the accomplishments of all our students who have graduated or will graduate from autumn 2006 to summer 2007. The celebration is tentatively set for 6 p.m. in Hogness Auditorium. There will be student and faculty speakers, presentation of certificates, and formal hooding of PhD graduates.

Then the formal mood will shift to a party mood, as the crowd mills over to the Vista Cafe for great food and camaraderie. Student research posters from the Rushmer Lecture poster session will be available for viewing in the Bioengineering Seminar Room (Foege N130).

If you plan to attend, please RSVP to [bioeng@u.washington.edu](mailto:bioeng@u.washington.edu). You can invite as many guests as you want to, but please indicate the size of your party to facilitate planning.

Faculty and graduating students will get a formal invitation in May, and the program will be available shortly before the event.

## Coulter Awardees Selected

Four bioengineer/clinician teams were selected for 2007 funding under our W. H. Coulter Foundation Translational Research grant:

- James Bassingthwaighe/James Caldwell (Medicine/Cardiology): "Quantitative PET myocardial perfusion imaging: integrated image manipulation, modeling and display for the clinician"
- Paul Yager/John Miller (Neurology): "Revolutionizing the monitoring of therapeutic drugs, Phase I: clinical demonstration of antiepileptic drug monitoring using saliva"
- Paolo Vicini/David Linker (Medicine/Cardiology): "Bloodless guidance of atrial flutter ablation"
- Xingde Li/Joo Ha Hwang (Medicine/Gastroenterology): "Further development of OCT balloon imaging technology for high-speed systematic surveillance of Barrett's and subsquamous Barrett's esophagus"

## Bioengineering Brings Undergrad's Dreams Together

Soft-spoken senior

Kathy Liu has big plans.

"My dream as a kid in China was to be an astronaut and explore space," she says. "I looked at the sky every day, thinking, 'Why is the moon shining? Why do we see stars?'"

When her family lived in Japan for four years she thought more about Earth and its different cultures; maybe she should be an interpreter? Then, moving to the U.S. at age 12, she fell in love with biology, and her future became more clear: she would use science to help improve quality of life for people around the globe.

These dreams came together for Liu in the Department of Bioengineering at the University of Washington. The major taps her curiosity about the natural world, her interest in other cultures, and her drive to create things hands-on. It also builds on her desire to do some good for other people. "Some countries might not have the resources to get the modern scientific instruments that are developed in nations with cutting-edge research programs," she says. "I want to work between countries, to help developing countries improve their instrumentation and their medical care."

Her career goals are furthered by her minor in technical Japanese, which led to a recent six-month internship in Japan. At Sumitomo Chemical, near Tokyo, Liu found herself suddenly immersed in the unfamiliar field of polymer science.

"In the beginning it was tough," Liu says. "I hadn't been in Japan since I was a child, and I had to learn about the culture from an adult's perspective." Her colleagues seemed shy at first. But when they found out she spoke Japanese, their shyness gradually wore off. Liu knew she was accepted when people started inviting her to socialize after work and asking her for help with writing their papers in English.



Fitting in with the people helped her fit in with the company's culture, which helped her with the practical components of the internship. "I had to understand what others were doing, tackle my own project, and learn how to run those instruments by myself," she says. She persevered, and pretty soon was doing microscopy and light scattering experiments with aplomb. Her goal was to produce a thin film with high clarity by blending two types of polyethylene (PE) using different parameters.

Her next project demanded even more resourcefulness, as she tried to find out why certain blends had greater clarity. She eventually concluded that tangling amongst the side branches of the high molecular weight component of one type of PE led to simultaneous development of a large number of nucleation sites for crystals, resulting in smaller crystals throughout the blend and thus in less opacity. First author on a paper on the work submitted recently to the *Journal of Applied Polymer Science*, Liu prepared for the unfamiliar writing task by studying the writing in papers from that journal. Her manager mentored her on some of the IP issues companies have to consider

*Continued on page 6*

## Seek New Angles

*Star alum tells current students to try it all, and keep on trying harder*

Maybe life for Dr. Tyrone Porter hasn't changed much since he was a grad student in UW Bioengineering. Now in his first faculty position at Boston University, he's still into just about everything.

"Being involved keeps me connected to the world around me," he says. "It takes a creative person to be open to new experiences and new ideas. Just listening to new music helps me relate to more people. In research, you have to be open if you want to push the science forward. If you take the time to go to a seminar in another department you never know — you might find a nugget you can apply to your own research."

When Porter first arrived at the UW in 1996, he was determined to focus on studies only, since he'd been highly involved in extracurricular activities since high school. But then Initiative 200 passed, prohibiting consideration of race in admissions procedures, and he was back to involvement as usual. He helped start the Minority Think Tank at the UW to counteract what he saw as the initiative's negative message to urban students. He campaigned to institute Student Ambassadors, which sent minority UW students to local high schools to serve as role models. He became one of the first members of the UW Bioengineering Student Advisory Board, and during his final year served on the UW Presidential Search Advisory Committee.

"I thought grad school would be hierarchical, but UW Bioengineering is very open; everyone is a peer," Porter says.



*Photo by Kalman Zabarsky, Boston University*

"That gave me confidence to try different things, to learn about what different people were doing. This was the most exciting educational time of my life."

With a three-year NSF fellowship followed by a Merck predoctoral fellowship, Porter could afford to soak it all in. He joined both Dr. Viola Vogel's lipid-protein interaction lab and Dr. Allan Hoffman's polymers lab, reveling in the sharing of information and equipment. A talk by Dr. Pat Stayton on environmentally sensitive polymers crystallized Porter's ideas for his dissertation project on the synergistic effect of pH-sensitive polymers and ultrasound on cell membranes, advised by ultrasound expert Dr. Larry Crum.

So where did this dynamo come from? Porter spent his childhood in inner-city Detroit, one of three

children of a high school principal and an elementary teacher, both of whom returned to school later in life for advanced degrees. Their father fed the siblings' love for problem-solving with chess and other analytical games, and their mother helped them with reading and writing homework. Porter found intellectual challenges and camaraderie online through The Michigan League of Academic Games, whose members he is still in contact with today. Saturdays during his high school years he took courses in a pre-college engineering program, and summers he spent in programs on nearby campuses.

"We were normal kids, from all walks of life," Porter recalls. "Having this peer group helped a great deal — knowing that I'm not the only one who does well in school and has this ambition to go to college. These programs do work."

As an undergrad, Porter continued to seek all the experiences he could get. He did a summer REU at Duke University in a cardiology lab, and the next summer did an internship at GE studying medical uses of ultrasound. “My supervisor there challenged me,” he says. “She gave me my own project, and pushed me to become a more disciplined scientist.” During that internship, which he found at the annual convention of the National Society of Black Engineers, Porter first decided that ultrasound was the career path for him.

“My advice to current students is to seek out different things,” he says. “Be open to others’ ideas and form a lot of

*“This was the most exciting educational time of my life.”*

*— Dr. Tyrone Porter, about the UW*

positive relationships. If you’re a grad student, mentor undergrads. They change at a much more rapid rate and keep you grounded, so you don’t get so focused that you walk around with blinders on. Also, don’t be afraid to fail; take it as motivation to keep reaching for a higher level.” For the higher level in his current research, Porter will continue exploring use of ultrasound for targeted molecular imaging and treatment of disease. One approach is using ultrasound to break apart polymers or lipids that carry therapeutic drugs, perhaps by elevating temperature. Another is using ultrasound to monitor tumor response to angiogenesis. And a third involves conjugating antibodies so that ultrasound contrast agents stick to targeted sites.

Ultimately, Porter plans to become an administrator, maybe even a university president. But for now, he’s enjoying teaching, research, and getting to know Boston. He warns budding faculty members that becoming an academic involves even more work than going to grad school, but he seems to be up to it, with energy left over for basketball, mountain sports, and scuba diving. He’s even found time for romance, and will be married in May to Monica Hall, who’s finishing her doctorate in pathology. They met at the UW when she attended the Bridges4 program here and Porter took the time to network – another payoff of getting involved!

## UW friends on Tyrone Porter:

**UW Regent Dr. Sally Jewell:** I really got to know Tyrone when he served on the UW president search committee, chaired by Medicine dean Paul Ramsey. Tyrone was chosen because of his perspective as a grad student in bioengineering, known for its cross-disciplinary work. He was an engaged committee member, and his thoughtful observations made a difference in how the committee viewed the candidates.

I remember the “spinach in the teeth” story. There was one candidate who figured out who the regents and Paul Ramsey were, and then proceeded to ignore everyone else. When we de-briefed, Tyrone quipped that Paul must have had spinach in his teeth, given the candidate’s fixation on him and the regents. This made us laugh, and also influenced that candidate’s removal from consideration.

Later, Jerry Grinstein (then president of the board) hosted the search committee for dinner. In honor of his participation in the process, Tyrone received a greater-than-life-sized poster of Paul with a piece of spinach Photoshopped onto his teeth.

Congrats to Tyrone on his position at BU. I wish he were coming back to the UW!

**Porter’s advisor, Dr. Larry Crum:** Tyrone came to the UW as one of the most recruited engineering students in the U.S. He was president of the National Black Engineers Society, and his photo was on the first page of a section in USA TODAY.

Tyrone visited the department as one of Pat Stayton’s recruits. I was impressed with his well-defined career goals; you just knew he was going to be very successful one day. I was particularly pleased that such a gifted student chose to work in my lab. We became good friends.

Another aspect of Tyrone that impressed me was that he was so multi-dimensional. He could play sports with the athletes on campus, hold his own at a scientific society meeting, and work with the county’s chief executive on affirmative action hiring. When he applied for a Hertz Foundation Graduate Fellowship — which he won — he had letters of recommendation from the UW’s president and provost. Medical School dean Paul Ramsey attended his dissertation defense.

After leaving the UW, Tyrone won a prestigious Hunt Fellowship. The students at BU love him and he has already attracted a number of minority students to BU. The UW and Bioengineering should be proud.

## **Undergrad** (continued from page 3)

before publishing.

Liu also credits Bioengineering's Program on Technology Commercialization with increasing her industry savvy. The courses feature guest lecturers from industry talking about business principles such as market analysis. "You learn how to convince people that you have a good idea," Liu says. "This program gives students skills they need to deliver technology to the people, to have a greater contribution to society."

The competitive environment in UW Bioengineering is stimulating for Liu. "I can raise myself up by being around top-notch students," she says. "When

I first came here, everyone seemed very independent. But as we struggled through all the classes, we became tight, like a team. Now we share our problems. We support each other and learn from each other."

One class Liu especially enjoys is Dr. Albert Folch's BioMEMS (MicroElectroMechanical Systems). She's learning how to arrange proteins or cells in patterns in microfluidic channels to test blood for diseases or to see how cells interact. The channels are made on a transparent polymer using photolithography and micromolding techniques.

Liu says her friends notice the difference her bioengineering training has made. "I always question myself," she says. "Then, rather than trying to grasp things all at once, I plan how to take things one step at a time."

Her next step now is working in Dr. Suzie Pun's lab, whose members research gene delivery techniques. One of the lab's goals is to find ways to embed genes in a scaffold for artificial tissues. The genes used in these experiments code for growth factors that promote vascularization to support cells seeded in the scaffold. Sandwiched between layers of degradable polymers, the genes would be released in a controlled fashion and taken up by the seeded cells after the artificial tissue is implanted. Liu's piece of the work now involves experimenting with controlled release of DNA. She plans to move on to study how much DNA is taken up and expressed by cells and whether blood vessel formation is indeed affected.

"Kathy has shown a good deal of independence in her

short time in the Pun lab," says her mentor, postdoc Dr. Justin Saul. "She has had several great ideas already, and has implemented them right away. I expect she'll have a strong senior project, and I'm excited to see where she goes with it."

"Justin is very very nice and helpful," Kathy says. "I ask him a lot of questions and he's always willing to help me reach to the answer. He doesn't give it directly; he helps you get it yourself."

Liu's next step after her December 2007 graduation will be to pursue an MBA, perhaps working in the local biotech industry first. She already has clinical experience as a dental hygienist and outreach ex-

perience helping newcomers from China, so she is going to be one well-rounded alum.

"Kathy has a strong vision for her future," Saul says. "She has taken nice steps toward realizing those goals and should have a great mix of skills for the research and business worlds."

***"I ask him a lot of questions and he's always willing to help me reach to the answer."***

***— Kathy Liu, about her mentor Justin Saul***

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## **Bioengineering Camp for Summer**

Do you know people with a child who will be entering 9th or 10th grade this fall? A curious, hands-on type of kid who might be interested in exploring some of the latest methods bioengineers are developing for handling heart disease?

If so, have them check out the department's 2007 Bioengineering Summer Camp. Faculty, staff, and UW students help campers explore implants, tissue engineering, microfluidics, cardiac mechanics, and more during the five-day experience. Campers will see the cutting edge of the latest technologies and research, at one of the nation's top universities.

The camp will run August 6-10 on the Seattle campus in the Foege Bioengineering Building. The cost is \$250. The registration deadline is April 30.

For more information, see <http://depts.washington.edu/bioe/programs/summercamp/summercamp.html> or contact Kelli Jayn Nichols at (206) 685-2022 or [knichols@u.washington.edu](mailto:knichols@u.washington.edu).

## What a Donation to UW Bioengineering Can Do

*Donors have a special role in strengthening UW Bioengineering and providing exceptional learning opportunities for students. Private donations drive broad and permanent improvements in our faculty and programs. Because of our donors, we now have three endowed faculty positions, which allow us to attract and retain the most highly talented researchers and educators and to invest in creative projects and outreach. Donations have also supported development of our unique Program on Technology Commercialization to help science and engineering students learn how to move research results from the lab to the market where they can benefit the public.*

*Scholarships for our undergraduates allow them to focus on studies or research, broaden and enrich their education, travel to conferences, and prepare strong applications to graduate school, medical school, and jobs. A top priority for the department is to offer more of these scholarships in the future. As lead academic counselor Kelli Jayn Nichols says, "Scholarship money is part of building the best educational experience today, which leads to improvements in global health tomorrow."*

*To find out about contributing to UW Bioengineering, please contact Paul Julin at (206) 685-1927.*

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# NSF CAREER Awards for Gao and Thomas

*Advancing nanotech and biological adhesion research*



Winter 2007 brought great news for two of our young faculty: each received an NSF CAREER award to fund research and outreach efforts for the next five years.

Dr. Xiaohu Gao's project is "Novel Nanotechnology for Multiplexed Analysis of Genes and Proteins with PCR-like Sensitivity." The research will seek to over-

come analytical limitations of current technologies, which in general cannot detect single copies of disease biomarkers, particularly when the target is a protein that can't be amplified by PCR. Current technology also does not provide for simultaneous analysis of larger numbers of biomarkers.

In addition to the research, Xiaohu will design courses and mentoring programs that help reduce the time lag between the research frontier and educational programs.

Dr. Wendy Thomas's project is "Mechanically Activated Biological Adhesion." The CAREER award will fund her



studies of a reversible biological adhesion mechanism found in bacteria called a "catch bond." These bonds become stronger when force is applied, but relax when the force lets up. Bonds with these qualities could be useful for drug delivery, microfluidic devices, and medical robots. Using bacteria or the bacterial molecules that are

responsible for the bonds, Thomas will do theoretical calculations, stochastic simulations, and experiments to investigate such things as how the molecules connect to a surface and the importance of their concentration and strength.

For outreach, she will develop a module to present in middle and high schools through UW outreach programs that focus on underrepresented students. Titled "Does something act different just because it's little?," the module will expose the next generation of engineers to stochastic principles and modeling techniques needed for work at the nanoscale level.

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