ChemLetter

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Paul Hopkins, Chair

In this issue

Dear Friend of Chemistry,

Greetings from Bagley Hall! We are pleased to provide and hope you enjoy this edition of the *ChemLetter*. It is my pleasure to describe some recent advances. But I also take the opportunity to describe the impact the continued financial downturn is having on public higher education. I warn you that the latter message is sobering.

First the good news. Our academic programs continue to serve their purposes of helping our students grow intellectually that they may enjoy fulfilling and productive lives and giving them the tools to contribute to the advancement of society. Nationally, we continue to be among the top 10 departments of chemistry in the production of chemistry bachelor's degrees, and are the undisputed leader in production of chemistry and biochemistry bachelor's degrees. Nearly 350 students were awarded one of these two degrees in the last year! Since I last wrote to you, Professor Pradipsinh Rathod has been awarded funding for a new NIH center, the International Center for Malaria Research for South Asia. Center researchers will endeavor to expedite the translation of new treatments for malaria that work in the laboratory to patients in the field. Emeritus Professor Larry Dalton won the extraordinarily prestigious 2011 Linus Pauling Award; he is the first faculty member working in the northwest to win this award, which has been given annually since 1966. Three of our faculty members (Professors Campbell, Jen, and Mayer) were named 2011 Fellows of the American Chemical Society, and three (Professors Jen, Keller, and Varanasi) were elected to the Washington State Academy of Sciences. We installed new 800 MHz and 700 MHz NMR spectrometers that cost nearly $2.5 million, which was provided by the NIH.

These successes and others were recently lauded by a committee of six faculty members, three from within the UW (Biochemistry, Biology, and Physics), and three from other top institutions (University of Michigan, Purdue University, and the UC San Diego), who led our department's 10 Year Review. These reviews are required for all degree-granting programs to ensure their continued high quality. One committee member commented that by every measure our achievement has been outstanding. The committee members agreed that we are doing it all on a shoestring instructional budget. All of us can take great pride in these accomplishments. Your support has been critical to our success.

As the Chair of Chemistry, my role is to keep you apprised of the status of this one department within our large University. In previous messages, I have lamented the local impacts of state budget cuts, which have included reducing our faculty from over 40 to under 33, and the loss of many graduate teaching assistant positions (TAs), thus decreasing support for our undergraduate instructional program. I wish I could say that we have turned the corner, but we have not. Indeed, as this issue of the *ChemLetter* heads to press, we are anticipating another double-digit percentage loss of our remaining state budget.

I take the liberty in the remainder of this message to step from the narrow role of Department Chair to give you a flavor for the challenges faced today by leaders in

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Photos: above: Nancy Wade; in masthead: ©2011 www.photos.com

public higher education. How this generation's leaders address these challenges could have far-reaching consequences for our nation.

I mentioned earlier the two fundamental missions of higher education. One of these is to set each of our students on a trajectory toward a fulfilling life, a private good that accrues to the individual. Many data tell us that this private good is substantial, with college graduates enjoying higher salaries, better health, and much more. The second mission is to benefit society more broadly, a public good. I hope that most of us would agree that the public benefits of institutions of higher education are clear.

In the recent past, the financing of public higher education accommodated both of these missions. Just 20 years ago, a minority (perhaps 20%) of the core funding originated in the tuition dollars paid by our students—the price they paid to obtain the private good. The balance of perhaps 80% of the core budget came from tax dollars collected broadly from our citizenry. The benefits of this funding model were many, with low tuition encouraging broad student access to higher education, and the ability of institutions to direct publicly provided funding to subsidize instructional costs in high cost fields (such as STEM: science, technology, engineering, and mathematics). This model allowed institutions to invest in activities that provided limited direct benefit to current students, but held the prospect of large public benefit, addressing the most pressing societal needs. Examples of the latter today might include global health, global warming, and global energy needs.

Much has changed in 20 years. State allocations for public higher education have consistently eroded. State funds have been withdrawn more rapidly than tuition has filled the resulting hole, with the seemingly paradoxical result that tuitions have risen at greater than the rate of inflation, while inflation-corrected per-student funding levels have declined. This trend has been accelerated by the financial downturn, with the State of Washington, most unfortunately, having been a national leader. The UW has lost more than half of its state funding in the last few years. We, and others around the nation, are seeing an inversion of these two sources of funding described above: we will soon see 80% of the core budget derived from student tuition and just 20% from the taxpayers more broadly.

This new funding paradigm raises difficult questions and is forcing unfortunate decisions. The obvious impact has been on the pocketbooks of students, who did not plan for repeated double-digit tuition increases. These tuition levels threaten access to public higher education. The loss of public funding additionally challenges the ability of the University to support higher cost educational programs (STEM) and programs that do not benefit students directly but promise societal benefit.

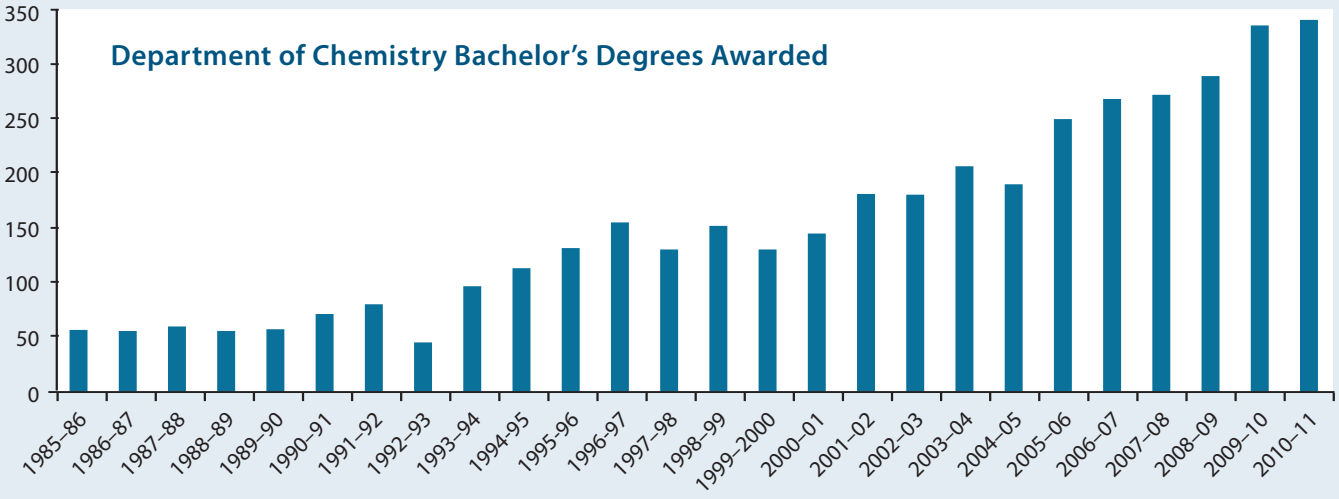
University leaders are grappling with the following kinds of questions. Should the institution use the tuition dollars paid by students in low instructional cost fields to subsidize students in high cost fields? Should we instead lower the cost of education in expensive fields, for example by raising class sizes and reducing one-on-one instruction and laboratory experiences? Should we adopt differential tuition rates such that students who require high cost instruction pay much higher tuition than students in low cost fields? Would paying closer to the true cost of their education discourage students from studying the STEM fields and, if so, what impact would this have on our national workforce? How can a family plan in advance to fund an education for which the cost differs by discipline? With student-paid tuition funds as the major source of the core budget, can the University invest in programs that do not yield direct benefit to today's students, but promise large societal impact?

In summary, declining state investment in public higher education is threatening student access to an affordable higher education, instruction in high cost fields (which include the STEM fields that, it has been argued, are critical to innovation), and the ability of our public universities to take on the big societal problems. More on this subject can be found in a recent report from The National Academies Press (PDF available at *http://www.nap.edu/catalog.php?record_id=12999*) titled, "Rising Above the Gathering Storm, Revisited: Rapidly Approaching Category 5." This sobering report argues that innovation is the key to our collective future well-being, that scientists and engineers are our nation's innovators, and for that

—continued on last page

My, How We've Grown!

The University of Washington Department of Chemistry is proud to be the largest bachelor's of science degree-granting department in the United States. See how our student population has grown over the years.



New Instructor: Dr. Andrea Carroll

We are delighted to welcome Dr. Andrea Carroll to the new position of Lecturer. Dr. Carroll first joined our department in 1998 as an entering graduate student. She received her Ph.D. in 2003, working with Prof. Jaromir Ruzicka in the field of analytical chemistry. After graduating, she continued her efforts on NIH-funded projects with Prof. Ruzicka as a postdoctoral researcher and research scientist, and in 2006, she took on the laboratory coordinator duties for the general chemistry courses. She has been an instructor for the general chemistry series since the summer of 2009, and we are excited to have her with the department on a more permanent basis. Department Chair Paul Hopkins asserts, "Critical as student numbers climb, Dr. Carroll has been invaluable in reinventing our laboratory coursework at the general chemistry level."

Goodbye 750 MHz. Hello 800 MHz

On July 27, 2011, the Department of Chemistry's 750 MHz Nuclear Magnetic Resonance (NMR) instrument was decommissioned. The aging magnet had become unstable over time and so a search for funding for a viable alternative began. The Department is proud to announce the arrival of a new 800 MHz NMR magnet. The new magnet and its various other parts arrived at Bagley Hall in the first week of October. The move of a 3-ton object from Europe to the basement of Bagley was only achieved after considerable planning and with the help of many experts. Among other things, the planning included ensuring that the magnet in transit from the loading dock to its new home would not overwhelm the weight-bearing capacity of the suspended concrete slab that serves as the floor of the basement. Disaster did not ensue: the magnet is now in its new home, resting on a concrete slab in the sub-basement. The following weeks were spent bringing the magnet online: the super-conducting coils are cooled to within a few degrees of absolute zero and are brought to the electrical current needed to achieve an 18.8 Tesla magnetic field. Congratulations and thanks to Professors Drobny, Klevit, and Varani for winning the grant that purchased this new instrument that will benefit so many research projects. And thank you also to Chemistry's Director of Technical Services, James Gladden, who has so capably led the Department's planning efforts for this installation.

A video of the controlled quench of the 750 MHz magnet can be viewed at *http://staff.washington.edu/wbeaty/750_quench.mov*.

FACULTY NEWS IN BRIEF

Three Professors Named 2011 ACS Fellows

Three professors from our department have been named 2011 American Chemistry Society (ACS) Fellows, an honor bestowed upon scientists "who have demonstrated outstanding accomplishments in chemistry and made important contributions to ACS." **Charles Campbell**, Lloyd E. and Florence M. West Endowed Professor of Chemistry; **Alex K.-Y. Jen**, Boeing-Johnson Chair, Professor of Materials Science and Engineering, and Professor of Chemistry; and **James Mayer**, Alvin L. and Verla R. Kwiram Endowed Professor of Chemistry, were recognized at an induction ceremony on August 29, 2011, during the ACS national meeting in Denver. Their induction brings the number of UW Department of Chemistry ACS Fellows to four—Professor Larry Dalton was inducted in 2009.

The Fellows Program was created by the ACS Board of Directors in December 2008, "to recognize members of ACS for outstanding achievements in and contributions to Science, the Profession, and the Society." Fellows come from academia, industry, and government. The official list of names can be found in the Aug. 8, 2011 issue of *Chemical & Engineering News*.

Congratulations to Professors Campbell, Jen, and Mayer!

Faculty Elected to Washington State Academy of Sciences

Three faculty members of our department are among the 24 new members elected to the Washington State Academy of Sciences in recognition of their distinguished and continuing scientific achievements:

- **Sarah Keller**, Department of Chemistry, Associate Dean for Research Activities, College of Arts and Sciences.
- **Alex K-Y Jen**, Boeing-Johnson Chair, Professor of Materials Science and Engineering, and Professor of Chemistry.
- **Usha Varanasi**, Affiliate Professor, School of Fisheries and Aquatic Sciences & Department of Chemistry.

The Washington State Academy of Sciences provides expert scientific and engineering analysis to inform public policy-making, and works to increase the role and visibility of science in the state. The new members were inducted at the fourth annual meeting at the Museum of Flight in Seattle, on Sept. 22.

Faculty Lead UW to Top Citation Impact in Materials Science

According to a recent report, the UW led the world in impact of publications in materials science research during the period 2001–2011. This analysis, by Thomson-Reuters, focused on 800 papers published at the UW in this field, which were collectively cited about 24,000 times, achieving a remarkable 30.41 citations per publication. The UW's performance was closely followed by a number of outstanding private and public institutions.

Chemistry Chair Paul Hopkins points out that even in a large university such as the UW, the work of a small number of faculty members can strongly influence the outcome of such analyses. He explains that UW Chemistry Professor **Daniel Gamelin**, UW Chemistry and Materials Science Professor **Alex Jen**, UW Chemistry and Chemical Engineering Professor **Samson Jenekhe**, and former UW Chemistry Professor **Younan Xia** together published a total of nearly 750 papers in that time period that were cited more than 43,000 times, averaging about 57 citations per paper. Though all of these papers were clearly not included in the Thomson-Reuters analysis, Hopkins believes that the work of Gamelin, Jen, Jenekhe, and Xia was critical to lifting the UW to the number one spot.

Professor Rathod Receives Medicines for Malaria Venture Project Award

Pradipsinh Rathod, Professor of Chemistry and Adjunct Professor of Global Health, was recently awarded a Medicines for Malaria Venture (MMV) project award. The award was presented in Dar es

right: Charles Campbell, 2nd row, l to r: Alex Jen, James Mayer; 3rd row, l to r: Sarah Keller, Usha Varanasi





top row: Courtesy of the Dept. of Chemistry; 2nd row, l to r: Courtesy of Alex Jen and James Mayer; 3rd row, l to r: Mary Levin, Courtesy of Usha Varanasi

left: Samson Jenekhe; below, l to r: Daniel Chiu, Pradipsinh Rathod


top row: Courtesy of the Department of Chemical Engineering; 2nd row, l to r: Courtesy of the Department of Chemistry; Freddy Maro

Salaam by the President of Tanzania, Dr. Jakaya Mrisho Kikwete. Prof. Rathod received the award as a member of a group of researchers who are investigating new anti-malarial drugs that target malaria dihydroorotate dihydrogenase (DHODH) inhibitor binding sites. The award was presented in recognition of the international team's "impressive progress to rapidly bring DHODH inhibitors towards clinical testing."

Daniel Chiu Honored as One of UW's Most Entrepreneurial Faculty

Daniel Chiu, A. Bruce Montgomery Professor of Chemistry, was one of eight professors honored as UW's most entrepreneurial faculty researchers, under a new Entrepreneurial Faculty Fellows Program initiated by former Interim President Phyllis Wise.

The honorees have achieved success in translating their research into products and therapies or have started groundbreaking programs for translation to or collaboration with industry.

Fellows will mentor colleagues with entrepreneurial aspirations, advise the center on its programs, and provide input on UW policies and programs related to entrepreneurship. A committee of deans and center leadership selected the inaugural awardees.

Samson Jenekhe Ranked Among Most Influential Materials Scientists

Samson Jenekhe, Professor of Chemistry and Boeing-Martin Professor of Chemical Engineering, ranks as the world's 39th most influential materials scientist of the past decade, according to the *Times Higher Education's* calculation of citation impact for articles or reviews published since January 2000. Jenekhe's research is on polymers that efficiently emit light for video displays and harvest light for solar cells.

A.J. Boydston

Assistant Professor

Courtesy of thee Department of Chemistry

2007 Ph.D.
Advisor: Dr. Christopher Bielawski
University of Texas at Austin

2002 M.S.
2001 B.S.
Chemistry
University of Oregon

A.J. Boydston began studying chemistry as an undergraduate at the University of Oregon under the guidance of Professor Michael M. Haley. His research focused on the synthesis and study of dehydro-benzoannulenes. After completing B.S. and M.S. degrees, he began doctoral research at the University of Texas at Austin in the laboratories of Professor Christopher W. Bielawski. His thesis research involved the synthesis of annulated bis(imidazolium) salts, their application in the synthesis of main-chain organometallic polymers, and their utility as robust fluorophores.

After graduating in 2007, Dr. Boydston moved to Pasadena, California, to take a NIH postdoctoral position at the California Institute of Technology. There, he worked under the mentorship of Professor Robert H. Grubbs to develop new catalysts and methodologies for the synthesis and characterization of functionalized cyclic polymers.

Research in the Boydston group involves the design, synthesis, and application of functional organic macromolecules in a multidisciplinary environment utilizing techniques in organic synthesis, polymer chemistry, and materials science. The focus of the functional materials program centers on the interface of exciting areas of science including novel designs for responsive polymers, mechanochemical activation of substrates, and new strategies for drug delivery. The Boydston group is also interested in the development of new reaction methodology by means of combining aspects of organocatalysis with electro-organic synthesis to realize metal-free, catalytic redox chemistry of organic substrates.

Dr. Boydston first met his wife, Tassa, at Willamette High School in Eugene, Oregon. They attended the University of Oregon together where she completed her B.A. degree in political science, and she is now continuing her education at the UW. They currently have two children, two dogs, and together enjoy many activities including camping, snowboarding, and other sports.

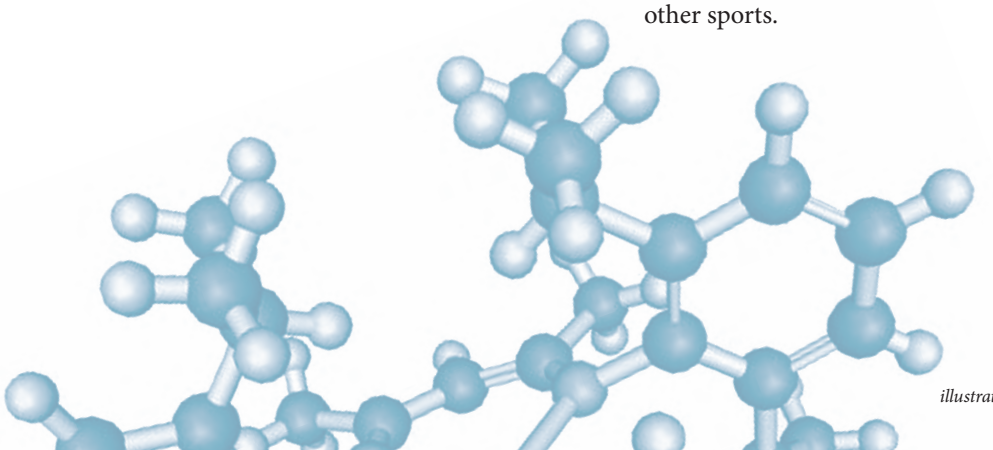


illustration: Courtesy of the Department of Chemistry

Champak Chatterjee

Assistant Professor

Courtesy of the Department of Chemistry

2005 Ph.D.
Advisor: Dr. Wilfred A. van der Donk
University of Illinois
at Urbana-Champaign

1998 M.S.
Organic Chemistry
Indian Institute of
Technology–Bombay

1998 B.S.
Chemistry
University of Bombay, India

Champak Chatterjee was born in Calcutta but raised and educated in Bombay, India. He obtained a bachelor's degree in chemistry from the University of Bombay and a master's degree in organic chemistry from the Indian Institute of Technology–Bombay (IITB). During his short stay at IITB, Dr. Chatterjee enrolled in the Introduction to Biomolecules class taught by the late Professor Anil K. Lala, which introduced him to the immense potential of synthetic chemistry in investigating complex systems of biomedical interest. This brief exposure inspired Dr. Chatterjee to join the Department of Chemistry at the University of Illinois at Urbana-Champaign in 1999 as a member of its first graduate class in Chemical Biology.

At Illinois, Dr. Chatterjee developed a deep-rooted interest in studying the various chemical changes that proteins undergo after their translation from mRNA, a process termed post-translational modification. While studying these processes in bacteria, he was fortunate to be a part of the team that reported the first cell-free enzymatic synthesis of a lantibiotic, which is a post-translationally modified peptide antibiotic that should one day lead to new therapies for drug-resistant *Staph.* infections.

After obtaining his Ph.D. in 2005, Dr. Chatterjee moved to New York City as a postdoctoral research associate at The Rockefeller University. With an aim to explore post-translational modifications in higher organisms, he developed several strategies to study the biochemical and biophysical effects of protein modification with the small eukaryotic protein ubiquitin.

Dr. Chatterjee's recent research efforts have suggested new paradigms by which ubiquitin controls gene function, and also have fueled his desire to study the diverse mechanistic roles of a growing family of ubiquitin-like protein modifiers (Ubls).

Dr. Chatterjee joined our department in Summer 2010. His research group is developing chemical tools to interrogate biological pathways involving Ubls in both bacteria and humans. The general approach of his laboratory combines synthetic protein chemistry, protein engineering, and molecular and cell biology in order to study the mechanisms underlying the regulation of protein function by Ubls, to characterize the enzymes involved in their conjugation and removal from their protein targets, and to identify peptide and small-molecule modulators of Ubl-specific enzymes.

Most recently, Dr. Chatterjee and his wife, Dr. Leah Miller, welcomed a baby boy, Adam Miller Chatterjee.

David Masiello

Assistant Professor

Courtesy of the Department of Chemistry

2004 Ph.D.
Chemical Physics
University of Florida

1999 B.S.
Mathematics
University of Florida

David Masiello rejoins our department as Assistant Professor four years after his first postdoctoral fellowship here. David was born and raised in Providence, Rhode Island, but chose to attend the University of Florida (in Gainesville) after his parents relocated to Orlando.

Dr. Masiello's academic career shows the type of variety necessary to be a theoretical chemist. His undergraduate major was mathematics (with a heavy dose of physical chemistry courses); he performed undergraduate research in optics and physics; and his Ph.D. research was conducted in chemical physics—a course of study which requires the full physics core curriculum in addition to the full physical chemistry core.

His unique undergraduate research experiences drew upon his mathematics background—opening doors for him at The College of Optics and Photonics at the University of Central Florida, making and doping glasses and then measuring their properties; and at the Centre de Physique Moleculaire Optique et Hertzienne at the University of Bordeaux I in France, where he built his own interferometer and used mathematical modeling to analyze spectra. On-campus research into how to obtain absorbance spectra from refractive indices back at the University of Florida led to a published paper, a senior thesis, and first place for his undergraduate research.

Dr. Masiello decided to stay on at the University of Florida for his Ph.D. after meeting his now-wife, who was two years behind him in school. His research into the theory of molecular collisions was conducted in the Chemical Physics program, with his research advisor sitting in the Physics Department. Dr. Masiello's research sought to expand the theories and codes for molecular collisions—specifically, to allow for the radiative decay from the molecular excited state—by coupling quantum mechanics with electrodynamics.

After graduating, Dr. Masiello came to the UW as a postdoctoral fellow with Professor Bill Reinhardt, studying atomic physics—Bose-Einstein condensates and dilute atomic gases. Dr. Masiello describes this as "re-deriving quantum chemistry for bosons versus fermions." His next postdoctoral fellowship was at Northwestern University with George Schatz in nanoscience. This was his first opportunity to work with experimentalists, though he asserts that the only experimental chemistry he does now is cooking in the kitchen. Dr. Masiello is "thrilled" to be back in the Northwest where his group develops theoretical descriptions of molecular systems in the field of nanophotonics.

Dr. Masiello and his wife have a new addition to their family. Their son, Peter William Masiello, was born on September 18, 2011.

WELCOME!

We are delighted to welcome three new assistant professors to our department this year. Below are brief descriptions of their education and work history and their areas of research. Look for more detailed profiles in the next issue of *Chemletter*.

Matthew Bush

Dr. Matthew Bush specializes in using mass spectrometry to characterize the structures of large biological assemblies.

Dr. Bush earned his B.A. in 2003 from Carleton College and his Ph.D. in 2008 with Professors Evan R. Williams and Richard J. Saykally at the University of California, Berkeley. His graduate research used mass spectrometry and infrared spectroscopy to probe the structures of hydrated and biomolecular ions. Dr. Bush was most recently at the University of Oxford, where he was a Waters Research Fellow with Professor Carol V. Robinson at the Department of Chemistry and a Junior Research Fellow at Jesus College, developing ion mobility techniques to characterize the shapes of protein complexes.

Dr. Bush began his research program here in July 2011, focusing on bioanalytical chemistry, biophysical chemistry, and structural biology applications using mass spectrometry-based techniques to characterize biological assemblies.

Lutz Maibaum

Dr. Lutz Maibaum's expertise lies in the theoretical and computational study of biophysical processes.

Dr. Maibaum did his undergraduate work at the University of Düsseldorf, Germany. He received his Ph.D. from the University of California, Berkeley, where he studied the physics of solvation and supercooled liquids under the guidance of Professor David Chandler. He then worked with Professors at Lawrence Berkeley National Laboratory to investigate the interaction of cell membranes with the actin cytoskeleton. Dr. Maibaum was most recently a postdoctoral research associate with Professor Vijay Pande at Stanford University, where he developed methods to perform and analyze molecular dynamics computer simulations.

Dr. Maibaum began his research program here in September 2011. His work will focus on the aggregation of membrane-associated peptides and proteins.

Stefan Stoll

Dr. Stefan Stoll is a world-leading expert in the field of electron paramagnetic resonance (EPR) spectroscopy.

Dr. Stoll obtained a degree in Chemical Engineering from the Technical University Graz, Austria, and then earned his Ph.D. in 2003 under the direction of Arthur Schweiger at ETH Zurich, Switzerland. Dr. Stoll was a postdoctoral research associate with R. David Britt at the University of California, Davis, where he investigated the mechanisms and active-site structures of radical enzymes and redox proteins using EPR.

Dr. Stoll began his research activities here in August 2011. He will focus on elucidating the electronic and geometric structure of spin centers in metallo- and radical proteins, on understanding the structure of spin centers in a variety of materials, and on developing EPR methods with ever increasing sensitivity and resolution.

top row, l to r: Matthew Bush, Lutz Maibaum; left: Stefan Stoll

Courtesy of the Department of Chemistry

Larry R. Dalton

Named 2011 Linus Pauling Award Medalist

Verla Kwiram.

Larry Dalton (left) and Paul Hopkins at the Pauling Prize Symposium in Eugene, Oregon.

The American Chemical Society's Oregon, Portland, and Puget Sound Sections have named Larry R. Dalton, Emeritus Professor and B. Seymour Rabinovitch Chair Professor of Chemistry, the recipient of the 2011 Linus Pauling Award. The award recognizes outstanding achievement in chemistry comparable to that of its namesake and first winner, Linus Pauling, a Pacific Northwest native and 1954 Nobel Laureate in chemistry.

A farm boy from Belpre, Ohio, Dalton received his B.S. degrees in chemistry and mathematics from the Honors College of Michigan State University in 1965. He went on to earn his A.M. & Ph.D. degrees from Harvard University in 1971 as a Harvard University Fellow and a National Institutes of Health Predoctoral Fellow. Following his graduate research, Dalton became an Assistant Professor of Chemistry at Vanderbilt University as well as a consultant to the research staff of Varian Analytical Instrumentation Division. Dalton's contributions to statistical mechanics and computer programming unified various approaches to analyzing molecular dynamics, including rotational diffusion and local mode dynamics. The new experimental and theoretical (computer simulation) methods were applied to a number of problems in biological and material sciences.

In 1976, Dalton joined the chemistry faculty of the State University of New York at Stony Brook while simultaneously consulting for Bruker Instruments and IBM, focusing his research on the development of new forms of magnetic resonance instrumentation and application of the techniques to the characterization of biomolecules and novel species in materials science. In 1982, Dalton moved to the University of Southern California, continuing his research on materials chemistry, in particular on organic electroactive materials, DNA mutagenesis, and red cell proteins. In 1998, Dalton joined the faculty of our department, where he continues to this day.

Dalton's other awards have included Alfred P. Sloan Fellow (1974), Camille and Henry Dreyfus Teacher Scholar Award (1975), National Institutes of Health Research Career Development Award (1975 and 1976), Burlington Northern Foundation Faculty Achievement Award (1986), University of Southern California Associates Award for Creativity in Research and Scholarship (1990), Richard C. Tolman Medal of the Southern California Section of the American Chemical Society (1996), Distinguished Alumni Award of Michigan State University (2000), IEEE/LEOS William Streifer Scientific Achievement Award (2006), Chemistry of Materials Award of the American Chemical Society (2003), and Quality of Education for Minorities in Mathematics, Science, and Engineering Network Giants in Science Award (2005).

FACULTY & THEIR AREAS OF FOCUS

Niels H. Andersen, Professor
Biophysical, Biorganic, and Medicinal Chemistry

Andrew J. (A.J.) Boydston, Assistant Professor
Organic, Organometallic, and Polymer Chemistry

Matthew Bush, Assistant Professor
Bioanalytical and Biophysical Chemistry

Charles T. Campbell, Professor
Nanoscience, Environmental Catalysis, Physical and Bioanalytical Chemistry

Champak Chatterjee, Assistant Professor
Synthetic Protein Chemistry, Chemical Biology, Biochemistry

Daniel T. Chiu, Professor
Analytical, Biological, Materials, and Physical Chemistry, Nanotechnology

Gary P. Drobny, Professor
Physical and Biophysical Chemistry

Daniel R. Gamelin, Professor
Physical Inorganic Chemistry

Michael H. Gelb, Professor
Chemical Biology, Biochemistry, Bioanalytical Chemistry

David S. Ginger, Professor
Physical and Materials Chemistry, Nanotechnology

Karen I. Goldberg, Professor
Organometallic and Inorganic Chemistry

D. Michael Heinekey, Professor
Organometallic and Inorganic Chemistry

Paul B. Hopkins, Professor and Chair
Organic and Bioorganic Chemistry

Alex K.-Y. Jen, Professor
Photonics, Optoelectronics, Biosensing & Nanoscience

Samson A. Jenekhe, Professor
Chemical Engineering

Sarah L. Keller, Professor
Biophysics and Physical Chemistry

Munira Khalil, Assistant Professor
Physical Chemistry

Julia A. Kovacs, Professor
Bioinorganic and Inorganic Chemistry

Gojko Lalic, Assistant Professor
Organic and Organometallic Chemistry

Xiaosong Li, Assistant Professor
Theoretical Chemistry

Lutz Maibaum, Assistant Professor
Theoretical Physical Chemistry

Dustin J. Maly, Assistant Professor
Biological Chemistry, Catalysis

David J. Masiello, Assistant Professor
Theoretical Chemistry, Many-body Theory, Nanoscale Optics

James M. Mayer, Professor
Inorganic, Organometallic, Bioinorganic, and Physical Organic Chemistry

Forrest E. Michael, Associate Professor
Organic and Organometallic Chemistry

Pradipsinh Rathod, Professor
Malaria Pharmacology, Functional Genomics

Philip J. Reid, Professor and Associate Chair, Undergraduate Program
Physical Chemistry

William P. Reinhardt, Professor
Theoretical Chemical Physics

Bruce H. Robinson, Professor
Biophysical and Physical Chemistry

Tomikazu Sasaki, Professor
Bioorganic, Organic, and Biostructural Chemistry

Thomas G. Spiro, Professor
Bioinorganic and Biophysical Chemistry

Stefan Stoll, Assistant Professor
Bioanalytical and Biophysical Chemistry

Robert E. Synovec, Professor and Associate Chair, Graduate Program
Analytical Chemistry

Frantisek Turecek, Professor
Analytical Chemistry

Gabriele Varani, Professor
Physical and Biophysical Chemistry

Bo Zhang, Assistant Professor
Analytical, Bioanalytical, and Electrochemistry

UNDERGRADUATE STUDENT PROFILES

Ioana Nitulescu

Ioana Nitulescu chose to come to the UW in order to stay close to her family. Originally from Bucharest, Romania, she moved to Seattle at age 11. Ioana was an outstanding high school student, graduating in the top 1% of her class. As a result, she was selected for the Washington Scholars Program, receiving full tuition support for four years. Her high school success left her with a dilemma, however. Her abundance of credits from high school meant she had to declare a major before the second quarter of her first year at UW. She was originally hesitant to declare chemistry—her intentions were to eventually major in neurobiology with the hopes of going on to medical school. She opted for biochemistry as a "temporary" major and continued on her course of study through general and organic chemistry. Ioana recalls, "Professor Ginger's CHEM 155 class taught me to always be curious and push myself, and Professors Michael and Lalic inspired me to pursue organic chemistry."

In December 2008, Ioana began undergraduate research in Professor Nigel Bamford's neurobiology laboratory, studying the neurobiological and behavioral effects of prenatal cocaine exposure on mice. Ioana describes the research:

"We found that mice that had been exposed to cocaine during fetal development showed impaired motor skills that reflected changes in the dopaminergic system of the striatal part of the brain. It was exciting to study an issue that contributes to our understanding of addiction and has a strong potential societal impact. I was able to contribute to several manuscripts from my work in the Bamford lab."

Just six months after starting in the Bamford laboratory, she began a second research project with Professor Forrest Michael in our department on the development and mechanistic studies of an oxidative amination reaction. She worked on both projects for three quarters before deciding to pursue chemistry. At that point, she turned her full research attention to her work with Professor Michael. She credits her mentor, graduate student Carolyn Rosewall, for giving her "the tools I needed to start being a more independent chemist." Ioana eventually wrote her honors thesis on the project and received the Merck Index Award for her undergraduate efforts.

Courtesy of Ioana Nitulesu and Jiao Ma

Ioana Nitulescu

Jiao Ma

Ioana is currently in her first year of graduate school at Harvard, studying organic chemistry. In the next several months, she plans on selecting a laboratory to join and will begin teaching. She hopes to take advantage of opportunities in graduate school to become a better teacher and researcher as well as to get involved in a local student group on science policy. Her future aspirations include postdoctoral research and a position in academia, where she can focus on "how chemistry can teach us more about how the brain works."

Jiao Ma

Jiao Ma grew up in Japan, after moving there from China at the age of five. She attended a Chinese International School, learning Chinese, Japanese, and English simultaneously. With strong encouragement from her English teacher, her excitement for learning languages and studying abroad grew over time.

She learned about the UW while searching for colleges and quickly fell in love with the beautiful location and multicultural environment. In high school, Jiao's interest in science, and chemistry in particular, was sparked when her chemistry teacher showed her a C_{60} buckyball. She was able to pursue both of her interests when she decided to attend UW.

In her junior year, Jiao joined the research group of Dr. Xiaosong Li, Assistant Professor of Chemistry. Her research focused on performing theoretical characterizations of diluted magnetic semiconductor materials, specifically Co^{2+}- and Mn^{2+}-doped ZnO quantum dots, and performing TD-DFT calculations using the Gaussian software package.

Jiao says, "My introduction to electronic structure theory exposed me to a brand new world; I was amazed

by the power of computational chemistry. Without any laboratory work, the properties of a material, reaction pathways, and dynamics could be predicted with high accuracy. Although I had little familiarity with computer technology at the time, I was eager to venture into this new field."

She also enjoyed the tight-knit community of Dr. Li's research group and the way that theoretical research was done in close collaboration with an experimental group. Jiao continues, "From what I have discovered, such an approach makes the results from both groups more robust, practical, and goal-oriented. I look forward to joining the group dynamics at graduate school and seeing how effective and rewarding they can be." Jiao was awarded the Merck Index Award for top graduates in the chemical sciences.

Jiao is currently a graduate student in Chemistry and Chemical Biology at Harvard University. She has found the transition exciting, yet daunting as she relocates to the East Coast and is in the process of rotating through labs and taking classes.

She aims to keep her options open with respect to which research group she joins, and is working hard to learn as much as she can before she makes a decision next year. Jiao says, "I'm most interested in doing research in chemical biology using multidisciplinary approaches, both experimental and computational. As a graduate student and a future scientist, I hope to be able to bridge fundamental research to therapeutic applications, always stay curious, and be ambitious to tackle the most challenging questions. Even though I keep an eye on the future as I attend classes and work in the lab, to this day, I still keep a little model of a C_{60} buckyball on my desk just to remind me of the reasons why I started in the first place."

She continues, "I would like to use this opportunity to thank all the professors and advisers who have encouraged me to take on challenges and supported me patiently and provided me with great opportunities—this made my undergraduate career a truly valuable experience. Also, I'm thankful for all the great friends I made at the UW; they made my undergraduate life so much more enjoyable."

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Benjamin Matson
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GRADUATE STUDENT PROFILE

Aurelia Honerkamp-Smith

Aurelia Honerkamp-Smith, Graduate Medalist in the Natural Sciences, earned her Ph.D. from the UW in 2010. She worked with Professor Sarah Keller, studying the physical chemistry of lipid bilayers. Her work has led to four significant publications in peer-reviewed journals, one manuscript submitted, another manuscript in preparation, and an additional publication from her undergraduate research. She also has garnered nearly a dozen awards, including the national Anna Louise Hoffman Award for Outstanding Achievement in Graduate Research. "Aurelia is fearless in her intellectual endeavors," says Sarah Keller, Professor of Chemistry and Associate Dean for Research Activities in the College of Arts and Sciences. "She is willing to take ambitious risks in order to find the answers to challenging questions."

At the UW, Honerkamp-Smith worked with Keller on an investigation of critical fluctuations in lipid membranes. Along the way, she produced the first successful systematic measurement for the exponent she was studying. "All previous attempts by other researchers, using a variety of systems, were unsuccessful," says Keller. "In the midst of answering a biophysical question, Aurelia found herself at the forefront of a long-standing problem in fundamental physics. As a result, her results will have a high impact across a range of scientific communities."

Aurelia grew up alternating between Chattanooga, Tennessee, and Monmouth, Oregon. She started studying chemistry at the University of Tennessee in Chattanooga and then transferred to the University of Oregon to finish her undergraduate studies. At the University of Oregon, she participated in an undergraduate research project with Professor Andrew Marcus for several years. It was this positive laboratory experience that led her to pursue a graduate degree in chemistry. The diversity of faculty and research at the UW drew her to Seattle. "I got the impression that I could work on anything I wanted, and this turned out to be true! Although I came in as a chemist, my project ended up being very interdisciplinary and I'm really happy about the direction I came out in," says Aurelia. "An advantage of the UW program was that I was able to take classes in condensed matter physics and molecular biology in addition to the physical chemistry coursework: very helpful for research in interdisciplinary fields."

Courtesy of Aurelia Honerkamp-Smith

Aurelia Honerkamp-Smith

Aurelia credits the Department of Chemistry and its generous donors for providing some of the key opportunities of her graduate school experiences. "I was very fortunate to be able to devote my time completely to research after my first year, due to both departmental awards and fellowships from the Nanotechnology and Molecular Biology institutes, and as a result I got more accomplished than I would have thought possible," she says. "Another highlight was presenting my work at the national Biophysical Society meeting, which I did with the help of departmental travel funding. Getting the chance to meet and talk with other researchers from all over the country and world was exciting and really motivational."

Aurelia is now continuing her work on membrane-related biophysics at the University of Cambridge as a postdoctoral fellow in Applied Math. After she completes her work, she hopes to return to the US to continue research as a faculty member. "I am confident that she will succeed," says Keller. "I look forward to interacting with her as a professional colleague in the years to come."

DOCTORAL DEGREES AWARDED

Eilaf Ahmed
New Organic Semiconductors for Electronics and Optoelectronics
(Professor Samson Jenekhe)

Ekaterina Badaeva
Towards Understanding Electronic Structure of Co^{2+} and Mn^{2+} Doped ZnO Quantum Dots with Density Functional Theory Methods
(Professor Xiaosong Li)

Michael Bardaro
Investigating RNA Dynamics and its Relation to Biological Function through Nuclear Magnetic Resonance
(Professor Gabriele Varani)

Stephanie Benight
Nanoengineering of Soft Matter Interactions in Organic Electro-Optic Materials
(Professor Larry Dalton)

Samuel Berweger
Plasmonic Antennas for Optical Nano-crystallography and Femtosecond Spatio-Temporal Control
(Professor Markus Raschke)

Anna Boardman
Developing a Five Channel Capillary Electrophoresis Instrument for Analyzing Single Cells
(Professor Norman Dovichi)

Kristi Budzinski
Study of the Biophysical Properties of Glutamatergic Synaptic Vesicles during Neurotransmitter Loading
(Professor Daniel Chiu)

Thomas Chung
Toward a Fundamental Basis for Understanding Electron-Based Methods of Peptide Dissociation
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Studies Towards C-H Bond Functionalization by Platinum(II) Complexes
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Studies of Metal Oxides in Organic Redox Reactions: Zinc Oxide Nanoparticles as Chemical Reductants in Electron Transfer and Hydrogen Atom Transfer Reactions and the Use of Osmium Tetroxide to Oxidize Higher Alkanes
(Professor James Mayer)

Zachary Hill
A Chemical Genetic Method for Studying the Location-Specific Function of Protein Kinases
(Professor Dustin Maly)

Karl Jackson
Soft and Reactive Landing Studies on Plasma Pre-treated Silver Oxide Surfaces
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Kirsty Leong
Enhanced Plasmonic Hybrid Systems for Bio-Nanotechnology
(Professor Alex Jen)

Wanda Lew
Direct Measurements of Energetics of Molecules on Pt(III) Using Single Crystal Microcalorimetry
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Endosomal Rab Proteins: A Minimal Machinery for Regulating Vesicle Tethering
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Complexes of Iridium Relevant to the Catalytic Oxidation of Alkanes
(Professor D. Michael Heinekey)

Christopher Moss
Application of Novel Computational Methods to the Study of Electron Based Peptide Dissociations
(Professor Frantisek Turecek)

Jeremy Nadeau
The Impact Improvements in Retention Time Precision and Data Reduction Have on Analysis Time and Precision
(Professor Robert Synovec)

Kevin Noone
Spectroscopic Investigation of Photo-induced Interfacial Charge Transfer in Blends of Conjugated Polymers and Semiconductor Quantum Dots
(Professor David Ginger)

Benjamin Olbricht
Characterization of Organic Nonlinear Optical Materials using Ellipsometric, Waveguiding, and Absorption Spectroscopy Techniques
(Professor Larry Dalton)

Rob Oslund
Development and Use of Small Molecule Inhibitors to Investigate the Proinflammatory Role of Secreted Phospholipases A2
(Professor Michael Gelb)

Kari Pederson
DNA Dynamics in the HhaI Recognition Sequence
(Professor Gary Drobny)

Jessica Pikul
Modeling Superoxide Reductase and Superoxide Dismutase Reactivity
(Professor Julia Kovacs)

Doctoral Degrees, continued

Brent Polishak
The Design and Investigation of Second Order Nonlinear Optical Materials for Terahertz Generation and Detection Applications
(Professor Alex Jen)

Lauren Ramsay
Ultrasensitive Capillary Isoelectric Focusing for the Analysis of Biological Samples
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Chair's Letter, continued from page 2

reason, we must invest in them. To put it mildly, current directions in public higher education are not well-aligned with this recommendation. I invite you to download and read this important report.

To close on a more upbeat note, I would like again to thank the many of you who are giving back to the UW through your generous gifts. We receive hundreds of gifts each year, from the extraordinarily rare gifts to establish endowed chairs, such as those recently provided by the Rabinovitch and Weinstein families, to the annual gift of $10 that we increasingly receive from recent bachelor's degree recipients. All of these gifts make a difference for today's students. If you are already a donor, thank you, and please continue to give generously! If you've not previously given, please consider doing so today (go to: *http://depts.washington.edu/chem/*, then click on "Make a Gift" in the upper right corner).

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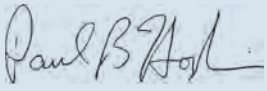

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