Dear Friends of the Penn State Chemistry Department,

Ayusman Sen has finished a fantastic five years as Department Head and we are all grateful for his contributions to the Chemistry Department. Most notably, Ayusman hired nine new faculty members and shepherded the move of three faculty from another department into Chemistry.

As is traditional within the Chemistry Department, there is a rotation of the Department Head position among the faculty members. In my case, it is actually recycling as some of you may remember that I was Head from 1989 to 1994. Returning after a fifteen-year break has highlighted what has changed and what has remained much the same.

The heart of the department is education both in a formal classroom setting and in a research laboratory environment. For the undergraduates, the Chemistry Department is a service department with the third largest student credit hours in the university. We are teaching the same number of student credit hours as fifteen years ago but the ratio of underclassmen to upperclassmen has increased due to a change in the structure of the Commonwealth Educational System. Consequently, we have many more beginning and organic chemistry lectures and labs to teach. There is more emphasis now on providing innovative and current laboratory experiences.

The graduate education aspects of the department continue to flourish. There has been a distinctive trend towards more interdisciplinary efforts and more collaborative projects. Our faculty members are integrated into the Center for Nanoscale Science, the Huck Institutes of the Life Sciences, the Materials Research Institute, the Center for Environmental Kinetics Analysis, the Penn State Institutes of Energy and Environment and the Institute for CyberScience. Check out our website (non-existent in 1994) to see the exciting directions our research groups are headed. Needless to say, many of my colleagues from 1994 have retired to be replaced with new colleagues who are enthusiastically carrying forth with the tradition of excellence within the department.

Outreach activities have become a much more important part of our department portfolio. Chemistry faculty member Jackie Bortiatynski serves as the Director of SEECoS, Summer Experience in the Eberly College of Science, a six-week summer research program designed for low income high school students. Chemistry also participates in the annual Summer Research Opportunities Program (SROP). Several research groups have SROP students participating in their laboratories. Other faculty members and graduate students participate in outreach activities associated with the institutes mentioned above. Of course, the summer camps for kids continue to be highly popular.

The Chemistry Department continues to have a wonderful staff with many familiar faces greeting me upon my return. The growth areas are IT and support for the undergraduate and graduate areas.

I have emphasized the people of the Chemistry Department as it is the people who give us our character. It is the people that you as alumni and friends of the department remember. Most of all you will remember your classmates and those in your research groups. From my perspective, it is students that remain the same age over the years that have kept all of us young and have made our jobs enjoyable.

Thank you for your continued support and interest in the Penn State Chemistry Department. If you are back to PSU, please stop by and say hello.

Best wishes,
Barbara
We have a new arrival in the Chemistry Department this year. It came in pieces in large wooden crates. One bright, cloudless day, the pieces were hoisted into the air and lowered through a hatch into the building by crane. In fact, the building was designed for this eventuality, with room left for the hatch and access for the crane. At the time that these plans were being drawn, we just didn’t know how big the spectrometer would be, or when we’d find the funding.

The Department has a long history of exploring chemistry at the cutting edge of NMR. One person who spent his career working at these limits was Professor Lloyd Jackman. In 1967, when Jackman moved to Penn State, the Department had only continuous wave NMR spectrometers. Although these instruments could perform a variety of measurements, running them was a different experience, with users re-wiring the machines for various experiments.

It was around this time that Fourier transform machines started coming out and Jackman began exploring the furthest reaches of NMR. As he put it, “All the time, there were these new fangled experiments coming out that we’d like to try.” Jackman found funding for a Fourier transform NMR, which would finally allow for study of $^{13}$C spectra, a 200 MHz and a 360 MHz spectrometer, both of which had novel 2D capabilities, and an at-that-time high-field 500 MHz spectrometer. To keep up with advances in solid state and magic angle spinning (MAS), Jackman took a chance on the very first spectrometer from an NMR start-up firm. Even the man who wound the solenoid had never done so before. In the end, the chance paid off and the 300 MHz instrument with MAS and proton-decoupling capabilities met all specifications. It was in large part because of his innovation in NMR research at Penn State that the facility for the new 850 MHz spectrometer was named in honor of Dr. Lloyd Jackman.

This most recent acquisition has been the longest in coming, with plans predating the new Chemistry Building. Although NMR Program Coordinator John Lintner carefully designed space and installation access into the building and many people submitted NSF proposals for an 800 MHz magnet, year after year the proposals were rejected. Spectrometers of this caliper are so expensive that the NSF only funds one or two per year, and there are many applicants.

In 2007, fortune smiled. In talking with a representative for Bruker BioSpin, facility director Alan Benesi was able to make an advantageous agreement. When Penn State bought its new $3.5 million 850 MHz spectrometer from Bruker, the company would throw in an extra $1.5 million worth of equipment in exchange for recognition of the generous gift at the entrance to the facility. At that time, the Department was in need of some new biological NMR professors. And how better to attract top-notch biological NMR researchers than with a shiny new high field spectrometer? The combined need and impressive deal were convincing and the university agreed to fund the instrument, making the decision on the very day of Bruker’s deadline. The $1.5 million in equipment was used for two CryoProbes, allowing for higher sensitivity and lower detection limits, and for two new hardware consoles for the 500 and 600 MHz spectrometers.

On September 23, 2009, the facility was finally dedicated in a ceremony honoring Jackman. But it wasn’t only Jackman’s scientific contributions that set him apart. Jackie Bortiatynski, one of Jackman’s graduate students, now a faculty member, remembers him as extremely patient and kind, never saying a cross word. He was an attentive mentor, discussing his students’ ideas with them daily and inspiring them by example to mentor each other and to help others with the instruments. Bortiatynski recalls: “Working with him was a real pleasure.”

Jackman was also passionate about his science, continuing to process his own data into his 60s. Bortiatynski recalls that he was very detailed in his work, always wanting to understand the chemistry thoroughly. “As a researcher, I don’t think I’ve ever met anybody who was as insightful or … as elegant, in some
He always left an impression of how beautiful the chemistry is.” Jackman’s enthusiasm for NMR continues, as he considers trying out the new spectrometer. “I’d have to beg a sample somewhere, you know; I don’t have a lab anymore. But I might.”

“As a researcher, I don’t think I’ve ever met anybody who was as insightful or as elegant, in some ways... He always left an impression of how beautiful the chemistry is.”

There is much enthusiasm about the new magnet and the cutting-edge experiments it makes accessible. One experiment, called INADEQUATE for its poor signal, provides 2D $^{13}$C spectra, allowing for identification of complex organics. Because the $^{13}$C isotope is so rare, coupled $^{13}$C signals at lower field strength are only observable with a larger sample than is readily available for many complex compounds. The 850 MHz magnet will extend this technique to samples as dilute as 100 mM.

Another experiment made available by the new spectrometer is the analysis of solid state material with quadrupolar nuclei. NMR signals from quadrupolar nuclei sharpen with increasing field strength. A very strong magnetic field, combined with special pulse sequences, make possible the study of many otherwise difficult solid materials.

The new instrument is very unusual for such a strong magnet because it has a wide enough bore for NMR imaging, i.e. MRI. In imaging, stronger magnets allow for better resolution. If the magnet is strong enough, it may even be possible to analyze the NMR “fingerprints” of individual cells in vivo. Thomas Neuberger, research associate in the Huck Institute of the Life Sciences, is currently constructing a microprobe which should make possible such high resolution imaging. He has already tested the new magnet’s imaging capabilities on a zebra fish.

With the new instrument nearly up and running, Jackman paused to recall his first impression of the new field of NMR. “I realized it was powerful. But until I got into it, I didn’t fully understand what it could really do.” Now, waiting to learn the full extent of the new instrument’s capabilities, Jackman simply states, “I’m fascinated.”
A CHAT WITH GRAD STUDENTS

by MIKE IBELE

We invite our alumni to compare their student experiences in Penn State Chemistry with those below. Have times changed?

Kristin “Qui” Cederquist
Preceptor: Christine Keating
Year: Fifth
Hometown: Atlanta, GA
Research: Studying the functionality of structured DNA bound to metal nanowires

If you could be one and only one chemical what would it be and why?
The chemical that gives grapefruit its distinctive smell: Grapefruit mercaptan. I love that smell!

You have five minutes to kill in the lab and all your glassware is clean. What do you do?
I draw on the Winston Churchill picture in our break room.

What was the last book you read?
The Fountainhead by Ayn Rand.

If you weren’t a chemist, what do you think you’d be?
A linguist

Name a fun place you like in State College that people might not have heard about.
The arboretum behind Sunset Park.

What’s your default graduate student food?
Progresso low sodium soup

Brandon Selfridge
Preceptor: Kenneth Feldman
Year: Fourth
Hometown: Reedsville, GA
Research: Synthesis of Lomaivitin B (a natural product)

If you could be one and only one chemical what would it be and why?
Vanadium, just to spite my lab mate who always wanted to be Vanadium.

How do you spend your free time?
With my wife and dog. I also take boxing classes.

What was the last book you read?
Organic Reactions and Orbital Symmetry; also My Life by Bill Clinton

If you weren’t a chemist, what do you think you’d be?
A dancer maybe?

What’s the best movie you’ve seen recently?
It was a Hindi comedy: Andaz Apna Apna (English: To Each His Own Style).

Name a fun place you like in State College that people might not have heard about.
Otto’s Pub and Brewery

What is your dream vacation?
To travel around Italy

What’s your default graduate student food?
Reheated frozen chicken

Shivangi Nangia
Preceptor: Barbra Garrison
Year: Third
Hometown: Delhi, India
Research: Molecular dynamic simulations of matrix assisted laser desorption ionization (MALDI)

If you could be one and only one chemical what would it be and why?
Water. Even though it’s the most studied chemical, it’s still interesting. It’s life sustaining. Even NASA would be searching for me!

Where do you plan to go from here?
An industry job anywhere in the world

If you weren’t a chemist, what do you think you’d be?
No idea. I couldn’t imagine myself doing anything else.

What’s the best movie you’ve seen recently?
It was a Hindi comedy: Andaz Apna Apna (English: To Each His Own Style).

Name a fun place you like in State College that people might not have heard about.
Whipple Dam Park. It’s only a twenty-minute drive from the heart of State College.

What is your dream vacation?
Switzerland, to see the Alps

What’s your default graduate student food?
Rice with daal (lentils)
Nicole Morozowich
Preceptor: Harry Allcock
Year: Second
Hometown: Irwin, PA
Research: Synthesizing new polymeric materials for hard tissue engineering

If you could be one and only one chemical what would it be and why?
Carbon. It has many different forms and is very versatile.

How do you spend your free time?
I play in a volleyball league and a softball league. I also go tailgating for all the home football games. I also like shooting hoops at Rec Hall.

What was the last book you read?
Harry Potter and the Deathly Hallows by J. K. Rowling

If you weren’t a chemist, what do you think you’d be?
An astronaut

Name a fun place you like in State College that people might not have heard about.
Faccia Luna -- a small pizza place out towards Tussey Mountain

What is your dream vacation?
I’d like to travel across Europe, especially Italy and all the Eastern European countries

What’s your default graduate student food?
Cookies!

Ryan Pavlick
Preceptor: Ayusman Sen
Year: First
Hometown: East Brunswick, NJ
Research: Moving nanoparticles with polymerization reactions.

If you could be one and only one chemical what would it be and why?
Palladium. The name sounds cool—like a paladin.

You have five minutes to kill in the lab and all your glassware is clean. What do you do?
Check Facebook

How do you spend your free time?
Trivia at the Darkhorse Tavern

What was the last book you read?
The Island of Dr. Moreau by H.G. Wells

If you weren’t a chemist, what do you think you’d be?
The owner of a bowling alley

Name a fun place you like in State College that people might not have heard about.
The dollar movie theater by the mall

What’s your default graduate student food?
Little Caesar’s $5 deal

Where do you plan to go from here?
A postdoc, then to a large research university
GRADUATE PROGRAMS OFFICE

by ELISABETH VOSE

Prospective graduate students in Chemistry routinely make their first contact with the Department through the Graduate Program Office, located in 105 Chemistry Building. Students completing their Master’s or PhD degrees often have their last contact with Department administration through this office, as well, as they are helped through the maze of paperwork by program staff. In between, the Grad Office acts as the main business office for graduate student affairs, a student counseling center, a haven and gathering place for stressed-out students, and even occasionally as an impromptu psychiatrist’s office. Managing all of this controlled chaos for a group of about 250 grad students are just two full-time staff—Dana Coval-Dinant (Program Office Manager) and Tasha Ermin (Program Staff Assistant). The space in 105 can perhaps best be described as “cozy”—just a reception area, some comfortable chairs, and a small private office in back. There is always a friendly face (and a full candy dish) awaiting visitors at the door, and the overall atmosphere is homey and warm. And yet, between Dana, Tasha, and one or two temporary part-time work-study students, a seemingly incredible amount of work is accomplished in this small office.

The year’s work begins before the Fall semester starts, when Dana and Tasha organize a month-long orientation period for the incoming graduate student class. In addition to the usual placement exams and selection of courses, grad orientation in Chemistry involves comprehensive TA training. Tasha processes graduate appointments and salaries, while Dana keeps an eye on returning students’ transcripts to remind them what courses they still need to complete and alert them to important deadlines (“We always tell incoming grads—’don’t worry, we’ll keep you on track!’”). By November, work begins on the next years’ recruiting and the office prepares to deal with hundreds of new applications. In early spring, prospective students are invited to attend an open house or arrange an individual campus visit. Throughout all of this, of course, Dana and Tasha are handling a multitude of other duties—working with the University Registrar, the Dean’s Office, and the Grad School, attending recruiting fairs and networking with faculty and staff from other institutions, working with the Graduate Program Coordinator to help students resolve concerns with faculty or labmates, and occasionally playing the role of “mother hens” to wayward grads. Recent PhD graduate Billy-Paul Holbrook notes, “When I had a question about almost anything, from completing the paperwork to apply for a postdoc position in France to setting up a videoconference, I’d just ask Dana or Tasha. They always either knew the answer or would find out for me.”

How do Dana and Tasha manage the amount and scope of work the Graduate Program Office handles? Mary Beth Williams, former head of the Graduate Admissions Committee, says “Tasha has…a remarkable level of organization and the ability to simultaneously balance multiple top priority tasks; [and] Dana’s ability to get things done is unrivaled.” Dana and Tasha see the variety of work as the biggest challenge in their jobs, but the two agree it’s also one of their favorite things about the work. Tasha says, “every day is completely new; you always come in not knowing what to expect.” Dana agrees, adding “it’s a different challenge every day. But we build up relationships with the faculty and when a problem comes up they listen to what we have to say. We have the freedom to change things if we see a way to make it better for the students, or for the department.”

Dana Coval-Dinant (left) and Tasha Ermin help a prospective student.
AWARDS

Faculty
Harry Alcock
Paul J. Flory Polymer Education Award

John Asbury
NSF CAREER Award

Steve Benkovic
Ralph F. Hirschmann Award in Peptide Chemistry
Benjamin Franklin Award in Life Sciences

Marty Bollinger
Penn State Faculty Scholar Medal in the Physical Sciences

Will Castleman
Irving Langmuir Award in Chemical Physics

Ray Funk
Priestley Prize for Outstanding Undergraduate Teaching in Chemistry

Tom Mallouk
Elected Member, American Academy of Arts and Sciences

Mark Maroncelli
Alexander van Humboldt Fellowship
Elected Fellow, American Association for the Advancement of Science

Scott Phillips
Gates Foundation Grand Challenge Explorations Award
Beckman Young Investigator Award
DARPA Young Faculty Award

Students
Landy Blasdel
NSF Postdoctoral Fellowship

Matt Buck
Harold F. Martin Graduate Assistant Outstanding Teaching Award

Kristin Cederquist and Nam Hawn Chou
Rohm and Haas Travel Award

Stacey Dean
Pennsylvania Space Grant Consortium Fellowship

Ashley Gibb
Fulbright English Teaching Assistantship

Jamie Golden
L. Peter Gold award for undergraduate leadership and scholarship

Laurie Heinicke
Travel Award, Center for RNA Molecular Biology

Tom Morrow
Schering-Plough Science and Innovation Award for Excellence in Analytical Chemistry

Tien Van
2009 College Chemistry Award, Society for Analytical Chemists of Pittsburgh

Dimitri Vaughn
NSF Graduate Fellowship

www.chem.psu.edu
Why a scientist? What first attracts the attention of a young man or woman to one of the sciences? A chemistry set received for a birthday? An inspiring teacher? A visit to a natural history museum? A television show? There is no denying the immense popularity of crime solving dramas such as *CSI: Crime Scene Investigation*. Forensic science dramas, a mixture of technology and intrigue, with science as a leavening agent, have drawn scores of young fans and made test tubes popular. Many educators report that, as a result of the fascination with such dramas, students are increasingly interested in chemistry and biology.

In 2003, faculty member Dan Sykes recognized this trend and adopted the CSI theme for a summer science camp for middle school students. The Penn State CSI camp was a big hit. In 2004, Sykes invited Robert Shaler, then with the Medical Examiner’s Office in New York City, to visit the summer camp and speak to the students. Shaler, a Penn State alumnus, inquired about the possibility of creating an undergraduate major in forensic science at Penn State. His questions led to the creation of a new program that, in 2005, began accepting students into either a chemical or a biological concentration in forensic science.

Sykes was asked to head the forensic chemistry concentration in the new major. As Sykes explains, “The forensic chemistry degree is an analytical chemistry degree. I would be doing the students a disservice if they were prepared only for jobs in crime labs. The students who complete the forensic chemistry program are qualified to work in analytical chemistry jobs in industry. Ninety percent of entry level jobs in industry are opportunities for analytical chemists.”

Sykes remarked recently that the creation of the forensic chemistry curriculum has had benefits for the traditional chemistry program. In addition to attracting students, the forensic science curriculum has led to the creation of a new chemistry course and the purchase of analytical instrumentation for the student laboratories. Using a combination of funds from the College of Science as well as the Forensic Science Program, Sykes was recently able to acquire a GC-MS and an LC-MS, the gold standards for forensic substance identification. The combination of gas/liquid chromatography and mass spectrometry techniques enables an investigator to perform a specific test that identifies the actual presence of a particular substance in a sample such as blood or urine. Additionally, Chemistry was able to create a new analytical chemistry course to meet the needs of the forensic students and also serve the interests of chemistry undergraduates. “The new program has attracted students and created more energy on the third floor of Whitmore Lab. There are more students hanging out and working in study groups,” Sykes observed.

Sykes also has Master’s degree students working with him on forensic chemistry projects. Since the aim of forensic science is to solve real world problems, it is not surprising that the focus in Sykes’ research group is more applied than the traditional research in the Department. The current projects in the group include the development of an apparatus that will sniff for the presence of an improvised explosive device (IED). This work has earned graduate student Jana James top awards from the American Academy of Forensic Science. Another student, Sara Smith, is working on a means of detecting the migration of endocrine-disrupting compounds such as phthalates from plastic bottles that are commonly used by the food and beverage industry. The project that has attracted the most attention in the popular press is the so-called “smell of death” work being done by Sarah Jones. Jones recently presented a paper at the American Chemical Society describing her efforts to develop methods for detecting volatile organic compounds (VOC) released...
during decomposition of mammalian tissue (she used a pig as a model system). The hope is that the technique will lead to the development of portable devices that will help searchers locate human remains.

Analytical instrumentation is a core component of the teaching that Sykes does with both the graduate students and the undergraduates in his laboratories. He feels so strongly that all students taking analytical chemistry should have the opportunity to work with modern instrumentation that he formed the Small Instrument Project as a way to extend resources to high schools and small colleges. Working with Rod Kreuter in Chemistry’s Research Instruments Facility, Sykes created several analytical instruments that can be built for a small fraction of the cost for a new instrument. For example, the fluorimeter that Sykes and Kreuter designed costs approximately $50 to build while a new device can cost $10,000.

Penn State has been in the business of training and educating chemists for more than 150 years. Two of its notable faculty members, George Pond and Mary Willard, often assisted local officials with scientific crime detection. Kristen Yarmey writes in her history of Penn State Chemistry, Labors & Legacies, that Willard was known around the community as State College’s very own “Lady Crimebuster.” Her undergraduate advisor, George “Swampy” Pond, had sparked Willard’s interest in the science of crime. Pond helped the police solve a murder case in 1901 when he found nitroglycerin in the contents of the victim’s stomach. The new program in forensic chemistry is a solid addition to this tradition.

NOTES FROM WHITMORE LAB

Our undergraduates continue to excel both inside and outside the classroom. In addition to garnering numerous awards for academic achievement, students have succeeded in research projects, volunteered for community outreach events, spent one or more semesters in the study abroad program and entered the College of Science Co-Op program.

Enrollment in all chemistry classes has increased by nearly 20%. The number of chemistry majors has increased by 50% with just over 100 declared majors (juniors and seniors). In 2008/09 we graduated 40 students with a bachelor’s degree in chemistry.

Chandra Richards completed an NMR research project under the direction of Karl Mueller.

Ken Feldman supervised Kristi Potts’ work in synthetic organic chemistry.
David Boehr

David Boehr uses biochemical and biophysical techniques to study the role of protein dynamics in enzyme function, coordination, and regulation. In particular, he uses nuclear magnetic resonance (NMR) — an imaging technique that takes advantage of the magnetic properties of atomic nuclei to reveal information about molecules in order to analyze enzyme dynamics.

Boehr was the recipient of a Canadian Institutes of Health Research Postdoctoral Fellowship in 2004, a Natural Sciences and Engineering Research Council of Canada B Postgraduate Fellowship in 2001, and a Natural Sciences and Engineering Research Council of Canada A Postgraduate Fellowship in 1998. During his graduate studies, he also received an Alberta Heritage Medical Summer Studentship and a Chinook Summer Studentship. Boehr is the author of numerous peer-reviewed papers and has given talks and presented posters at several conferences.

Prior to joining the faculty at Penn State, Boehr was a postdoctoral fellow at the Scripps Research Institute from 2004 to 2008. There he used NMR techniques to assess the role of protein dynamics in the function of the dihydrofolate reductase enzyme. Boehr received his bachelor’s degree in biochemistry at the University of Lethbridge in Canada, where he earned a Gold Medal in Science. He earned his Ph.D. in biochemistry and biomedical sciences at McMaster University.

Gong Chen

Gong Chen conducts synthetic and biological studies of carbohydrates and peptides, two of the essential building blocks of living organisms. His goal is to develop a variety of biochemical tools that can be used to identify novel biological functions of carbohydrates and peptides. For example, he is undertaking chemical syntheses of complex carbohydrate-based and peptide-based natural products that have interesting structural and biological properties; he is developing new synthetic strategies to prepare artificial receptors with high specificity and affinity for complex carbohydrates; and he is conducting molecular imaging studies in order to visualize dynamic glycosylation processes — the addition of sugar groups to proteins — inside living cells. In addition to revealing molecular mechanisms, Chen hopes that his work will facilitate the development of valuable therapeutic and diagnostic agents.

Chen is the recipient of a New York State Breast Cancer Research Postdoctoral Fellowship, a Columbia Graduate Faculty Fellowship, and a Renming Scholarship. He has published over a dozen papers in peer-reviewed journals and holds two patents.

Prior to joining the faculty at Penn State, Chen was a postdoctoral research fellow at the Memorial Sloan-Kettering Cancer Center from 2005 to 2008. He was a graduate teaching assistant in the Department of Chemistry at Columbia University from 1999 to 2001 and a teaching assistant in the Department of Chemistry at Nanjing University in China from 1994 to 1999. Chen earned his bachelor’s degree in chemistry at Nanjing University in 1999 and his Ph.D. in bioorganic chemistry at Columbia University in 2004.

Scott Phillips

Scott Phillips, holder of the Martarano Career Development Professorship, does research in the areas of organic, analytical, and materials chemistry with broad applications in healthcare and the environment. In one project, he uses organic chemistry to create diagnostic devices that provide all of the functions typically obtained with laboratory instruments, but using only rationally-designed organic reagents that are embedded on a piece of paper (or some other ubiquitous matrix). These systems
may be useful in applications where low cost and ease of use are equally important as analytical performance, including detecting disease in the developing world, rapidly triaging patients in hospital emergency rooms, and screening—perhaps routinely due to the low cost of the detection systems—for markers of disease in the comforts of your own home.

In a related project, Phillips is developing biomimetic strategies for storing and stabilizing antibodies, vaccines, and other biomolecules at elevated temperatures (i.e., not refrigerated). These methods should have immediate applications in the developing world—for example, for distributing vaccines.

In another project, Phillips is developing a new class of robust polymeric materials that are capable of rapidly and permanently disappearing in response to trace-levels of specific chemical signals. These polymers will be self-powered and able to alter their appearance without using electricity, batteries, or input from humans—they will “behave” autonomously. These systems should provide the basis for new plastics that are easily recycled, and in future efforts, this program will include materials that are reconfigurable and even grow and divide.

Prior to joining the Penn State faculty, Phillips worked from 2004 to 2008 as a postdoctoral fellow at Harvard University, where he developed new materials and detection platforms for use in drug development and detecting disease. Phillips received the 2009 Popular Mechanics Breakthrough Award for his efforts in this area. Phillips earned his bachelor’s degree in chemistry at the California State University, San Bernardino in 1999 and his Ph.D. in chemistry at the University of California, Berkeley in 2004.

Scott Showalter

Scott Showalter is a biophysical chemist who uses both experimental and computational techniques to study biological macromolecules. According to Showalter, “Proteins and nucleic acids are dynamic molecules, and developing an intuitive understanding of the relationship between structure, dynamics, and function is our goal.” In particular, he uses nuclear magnetic resonance (NMR) to investigate the implications of protein dynamics and disorder in the processes of protein-mediated signaling and RNA mediated regulation of gene expression. These two objectives provide the foundation for translational work that will lead to more effective strategies for combating diseases as diverse as cancer, Parkinson’s disease, and Alzheimer’s disease.

Showalter first discovered his passion for studying intrinsically disordered biomolecular systems during his graduate training at Washington University in St. Louis, where he studied the interaction between single-strand ribonucleic acids (RNA) and the proteins that bind them. NMR studies of RNA conformational dynamics are rare and data analysis through standard models often fails. Showalter demonstrated through computational simulations combined with experimental NMR dynamics data that this known challenge in the study of RNA originates in the inherently high degree of flexibility found even in relatively well ordered RNA molecules, which renders the assumptions built into standard models invalid.

After receiving a bachelor’s degree from Cornell University in 1999, Showalter entered the graduate program at Washington University and graduated with a Ph.D. in 2004. From 2005 to 2008, Showalter was a postdoctoral fellow at the National High Magnetic Field Laboratory, where he designed a quantitative method for assessing the convergence between computational simulation and experimental NMR assessments of protein and nucleic acid dynamics. As a researcher at the Pennsylvania State University, Showalter will continue his long-held interest in developing novel methods for analyzing dynamics information for highly flexible biomolecular systems including both regulatory RNA molecules and intrinsically disordered proteins.
DOCTORAL DISSERTATIONS AND MASTER’S THESIS

Avetta, Christopher T.
“Molecular Tubes: Synthetic Receptors for the Recognition and Sensing of Lipids” Ph D (Supervised by Timothy Glass)

Barbour, Larry Woodrow
“Examining Electron Transfer and Charge Transport in Organic Photovoltaic Materials” M S (Supervised by John Asbury)

Baril, Neil Francis
“High-Pressure Microfluidic Chemical Deposition: Replacing the Air within Microstructured Optical Fibers” Ph D (Supervised by John V. Badding)

Cai, Sutang
“Novel Artificial Cell Surface Receptors and Related Molecular Probes” M S (Supervised by Blake R. Peterson)

Cao, Yanyan
“Synthesis and Integration of Conjugated Polymer Nanostructures for Sensing and Other Applications” Ph D (Supervised by Thomas Mallouk)

Chen, Weinan
“Study Jet-Blowing Conditions on PTFE Nano Fibers (nPTFE) and Surface Modification of nPTFE Using Glass Plasma” M S (Supervised by John V. Badding)

Clayton, William Brent
“Studies toward the Total Synthesis of Streptorubin B” Ph D (Supervised by Ken S. Feldman)

Conforti, Patrick Frank
“Molecular Dynamics Simulations of Laser Ablation of Polymers” Ph D (Supervised by Barbara J. Garrison)

Cossey, Kimberly Nicole
“Hypothesis Driven Assessment of an NMR Curriculum” Ph D (Supervised by Karl T. Mueller)

Crawley, Seth Lucas
“Synthetic Efforts Directed towards the Total Synthesis of the Polycyclin Natural Products N-Methylwelwistatin and Communesin B” Ph D (Supervised by Raymond L. Funk)

Davey, Angel Marie
“Molecular Dynamics Imaging of Mast Cell Membrane Nanostructure in Immunoreceptor Signaling” Ph D (Supervised by Erin D. Sheets)

Edathil, Jocelyn Philipose
“Design, Synthesis, Antiviral Evaluation, and Metabolism of Nucleoside Analogs” Ph D (Supervised by Blake R. Peterson)

Fleeger, Clair Rene

Golombeck, Rebecca Anne
“Investigations of Adsorption Sites on Oxide Surfaces using Solid-State NMR and TPD-IGC” Ph D (Supervised by Karl T. Mueller)

Hester, David Keith

Huntley, Raymond Joseph
“The Total Synthesis of Complex Molecules via Electrocyclic Ring Closures of Divinylpyrrolines and Divinylazolines” Ph D (supervised by Raymond L. Funk)

Jin, Hui
“Ultrafast Solutions Dynamics: Part I—Dynamics in Ionic Liquids; Part II—Non-Radiative Deactivation of Malononitrilies” Ph D (Supervised by Mark Maroncelli)

Jones, Charles Elwood
“Clusters: Addressing Material and Environmental Issues” Ph D (Supervised by A. Welford Castleman, Jr.)

Krogman, Nicholas Ryan
“Polyphosphazenes for Advanced Biomaterial Applications” Ph D (Supervised by Harry R. Allcock)

Kumarasiri, Malika Dhananjaya
“Anharmonic Effects of Small Clusters of Molecules and Ranking Activity of Protein Mutants” Ph D (Supervised by Sharon Hammes-Schiffer)
Li, Jianfeng
“Application of Modern Pummerer Methodology in Model Studies toward the Total Synthesis of Palau’amine” M S (Supervised by Ken S. Feldman)

Luo, Rong
“Copolymerization of Polar and Non-Polar Vinyl Monomers: Free Radical Polymerization and Late Transition Catalyzed Insertion Polymerization” Ph D (Supervised by Ayusman Sen)

McGraw, Adam Philip
“Protein-RNA Interactions Involved in Regulation of the Tryptophan Biosynthesis Operon (trpEDCFBA) in Bacillus subtilis” Ph D (Supervised by Philip Bevilacqua and Paul Babitzke)

Meketa, Matthew Lee
“Part One: Total Synthesis of Ageladine A; Part Two: Studies Directed towards a Total Synthesis of Actinophyllic Acid” Ph D (Supervised by Steven M. Weinreb)

Moore, Amanda Michelle
“Creating and Probing Molecular Assemblies for Single-Molecule Devices” Ph D (Supervised by Paul S. Weiss)

Morrow, Christin Palombo
“A Computational Study of the Dissolution of Aluminosilicate Minerals” M S (Supervised by Barbara J. Garrison)

Mullen, Thomas Joseph
“Nanoscale Self- and Directed Assemblies” Ph D (Supervised by Paul S. Weiss)

Nguyen, Nhu Quynh
“Biodegradable Polyphosphazenes” M S (Supervised by Harry R. Allcock)

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“Direct Numerical Investigation of Detonation Waves using a Monte Carlo Method” Ph D (Supervised by James B. Anderson and Lyle N. Long)

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Zou, Yaping
“Synthesis of New Phosphorus Ligands for Asymmetric Catalysis” M S (Supervised by Xumu Zhang)
WHAT ARE YOU DOING?
INTERVIEWS WITH SOME RECENT GRADUATES

by MIKE IBELE

Name: Lisa Dillenback
Graduated from: The Keating group

How does the work you’re doing now relate to your graduate school research, or is it completely different?
Right now I am teaching basic and general chemistry both at Skidmore College and at Hudson Valley Community College in NY. I taught an instrumental analysis course during my last year at Penn State and having that first-hand experience of troubleshooting lab equipment has been extremely useful. I also helped take over the lab for a Women in Science and Engineering (WISE) project while I was there, and that gave me some good practice with lesson planning and lab design.

How did you get your first job out of grad school?
After graduation, I moved up to Albany, NY to be with my then boyfriend (now my husband). I applied for every job I could find within an hour radius of our apartment.

If you could go back to grad school and do one thing different, what would it be?
I would have gone into a chemical education program. I really enjoy teaching, but I still have a lot of catch-up work figuring out what technology is available methods work well for a given situation.

How do you spend your free time these days?
I still enjoy baking. Running a muffin shop is my back-up plan if I ever get tired of chemistry. I have taken up quilting, too. And once I have my lesson plans all set, I have a stack of video games waiting for me.

Name: Yanyan Cao
Graduated from: The Mallouk group

How does the work you’re doing now relate to your graduate school research, or is it completely different?
My current job is a research scientist at DuPont CR&D. The basics in chemistry and physics are the same everywhere. The ability to come up with ideas and to execute them, which I think is an important part of graduate school training, is absolutely essential for my current role. Keeping a big picture in mind (even when your daily work is full of little details) is also important. I learned that from Dr. Mallouk’s style.

How did you get your first job out of grad school?
I made a good impression at the Career Fair and Sponsors Days that Penn State hosts every year.

If you could go back to grad school and do one thing different, what would it be?
I would spend more time socializing, and I’d engage in more scientific discourse with fellow students and colleagues.

What about Penn State do you miss the most?
Being within walking distance to all the good restaurants.

What’s the most challenging part about your job now?
Time pressure. You have to beat the market or your project fails.

What’s the most rewarding part of your job now?
The ability to make a difference in the world with the technology that you work on.
Name: Walter “Wally” Paxton
Graduated from: The Sen group

How does the work you’re doing now relate to your graduate school research, or is it completely different?
When I did my postdoc at Pacific Northwestern National Labs (PNNL), general skills (problem solving, data treatment, experiment design, interpersonal communication) were very relevant. Specific technical skills were useful, but the general skills were more essential to being adaptable to new environments.

Now that I’m a postoc at Northwestern University (NU), it’s back to being a lot like grad school—designing and performing experiments, and writing up and presenting results.

How did you get your first job out of grad school?
For PNNL, I applied online. I didn’t know anyone there, and no one knew me. I guess they just liked my CV.

If you could go back to grad school and do one thing different, what would it be?
I’d go to more seminars. They keep your mind fresh with new ideas, or old ideas presented in new ways.

What about Penn State do you miss the most?
The Creamery. The seminars. The long bike rides to PSU.

'75 (Ph.D.) C. P. Wong, the Charles Smithgall Institute Endowed Chair and Regents’ Professor in the School of Materials Science and Engineering, has been chosen to receive an Outstanding Alumni Award from the Eberly College of Science.

'89 (Ph.D.) Chad Mirkin has been named by President Obama to the President’s Council of Advisors on Science and Technology (PCAST). PCAST was established in 1990 to enable the President to receive advice from the private sector and academic community on technology, scientific research priorities, and math and science education. Mirkin is a professor of materials science and engineering, chemistry, and medicine at Northwestern University. He also serves as the director of Northwestern’s International Institute of Nanotechnology. Co-founder of Nanosphere, Mirkin was awarded the prestigious Lemelson-MIT Prize. This prize recognizes outstanding inventors and encourages the pursuit of creative lives and careers through invention. Mirkin is a member of the Eberly College of Science Dean’s Advisory Board.
IN MEMORIAM

'54 (B.S.) Ann Thomas Schindler, 75 of Fort Washington, Pa., passed away on November 18, 2008 at Abington Memorial Hospital. Schindler received her bachelor’s degree in chemistry from Penn State and a master’s degree in chemical microscopy from Indiana University. Dr. Mary Willard, a professor of chemistry at Penn State, was a mentor to Schindler who helped her become a chemist when it was not common for women to do so. Schindler was employed as an analytical chemist, specializing in electron microscopy, first for American Cyanamid in Connecticut and then for Rohm and Haas locations in Bristol and Spring House, Pennsylvania. During her time in Connecticut, she participated in hobby fencing and won a state championship in the sport.

During Schindler’s Rohm and Haas career, from the early ’60’s through the mid ’70’s, the company developed acrylic emulsion technology where Schindler’s group provided particle-size measurements and data on particle morphology that were important for both synthesis and applications research. Schindler was also instrumental in the Rohm and Haas microscopy technology for the development of acrylic and butadiene emulsion polymer impact modifiers for acrylic and PVC plastics. Attesting to Schindler’s microscopy reputation and vast knowledge, research groups sent her samples to analyze for development, patent, or customer service issues.

Upon her retirement from Rohm and Hass, Schindler worked as a tax preparer, first for H&R Block and then as a volunteer at retirement communities. Her passion was dog training and she was a member of several dog training clubs and participated successfully with her dogs in obedience and agility competitions. She is survived by her husband, Fred, and her dog, Robin.

In her estate plans, Schindler left a generous bequest to the Chemistry Department. The Eberly College of Science thanks her and her family for this thoughtful gift.

ALUMNI NOTES

'89 (Ph.D.) Robert Pilato is a Project Manager at the Johns Hopkins Applied Physics Laboratory.

'89 (B.S.) Douglas Rhubright is Technical Director at Palmer International.

'96 (B.S.) Daniel Walter is a Consumer Safety Officer for the FDA.

'97 (Ph.D.) Terry Hogan works at the Bridgestone Americas Center for Research and technology where he is Section Manager for Polymer Synthesis.

'98 (Ph.D.) Jess Ford is now a Senior Staff scientist at Weatherford International working with optical measurements for control of processes in harsh environments. His current focus is development of spectroscopic tools for deployment during oil and gas drilling, wireline testing and production.

'99 (B.S.) Ben Snedeker is a Vice President at D.E. Shaw & Co, a global investment and technology firm.

'05 (B.S.) Keith Moquin is a graduate student at the University of Pittsburgh.

'06 (Ph.D.) Abigale Marcus, Staff Scientist at Xenoprot, Inc., reports that she has been learning LIBS, NIR, HPLC method development, and mass spec method development. Abigale has been working on process analytical chemistry for blending as well as organic synthesis with mid-ir probes for both soluble organic formation (and reactions) as well as particle sizing.
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