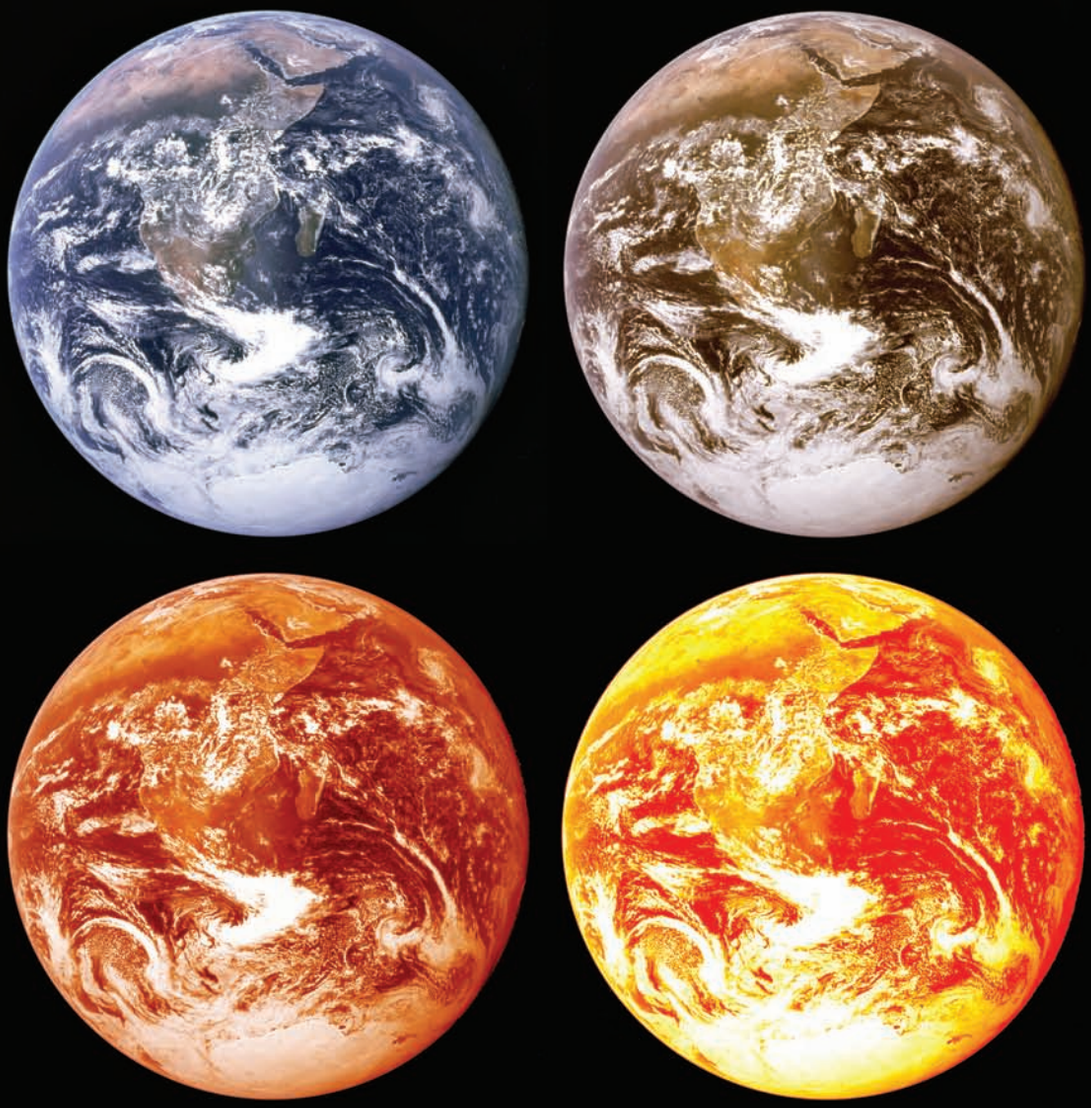
NEWS JOURNAL
College of Chemistry, University of California, Berkeley
SPRING 2006, VOLUME 14, ISSUE 1

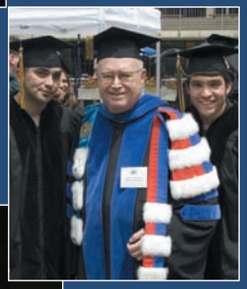


Global Warming

The College of Chemistry searches for solutions

Commencement 2006

It's that time of year again, when we celebrate the achievements of our graduating students. This year there are more than 280 scholars to applaud, joining the ranks of alumni of our distinguished college.



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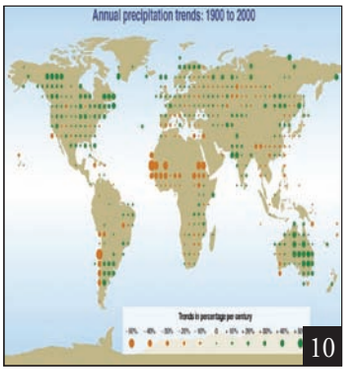

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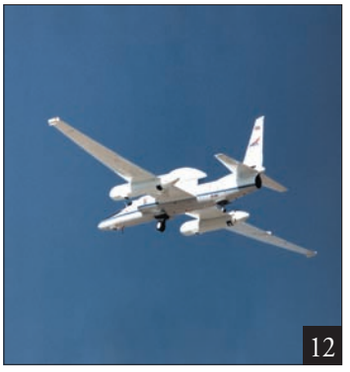
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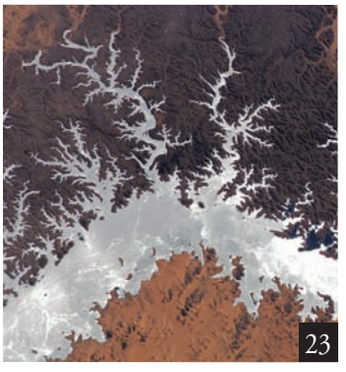
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Cover photo courtesy of NASA

Peg Skorpinski photo

by Charles B. Harris, Dean and Gilbert Newton Lewis Professor

Undergraduate enrollment grows as new programs expand

This year — my first as dean of the college — has been a busy and rewarding one. I've had the opportunity to oversee many exciting projects, and I am very optimistic about where the college is headed in the coming years.

Undergraduates continue to seek out our programs in record numbers. Over the past six years, the number of undergraduate majors in the college has increased dramatically — from a total of 574 in 2000-01 to an estimated 763 this year. This rapid increase is due almost entirely to the introduction of our very popular chemical biology major. This spring, for the first time ever, we have more students majoring in chemical biology than in either chemistry or chemical engineering. The program is a great interdisciplinary success story, and it clearly serves an important role in helping our students to pursue their intellectual and career goals.

Another ambitious interdisciplinary program — in materials chemistry — is gradually taking shape and will, I hope, prove to be as successful as chemical biology. We are working to develop a B.S. degree program in materials chemistry within the Department of Chemistry. The application of basic chemical principles to problems in materials discovery, design, and characterization has become a major area of research within the discipline of chemistry, and our proposed major would fulfill a need within industry and academia for students with such training. Beginning in spring of 2007, we will offer our first new undergraduate course as part of this curriculum, entitled "Introduction to Materials Chemistry." The course will cover such topics as synthetic methods, mechanical and thermal properties, surfaces and heterogeneous catalysis, and nanoscale and biological materials. The emphasis throughout will be on an atomic-level description of what gives rise to important materials characteristics.

Nationally, there are few existing programs in materials chemistry, and Berkeley has an opportunity to lead the way in producing the individuals best qualified for careers in this field. The program will involve close collaboration with our Department of Chemical Engineering and with the College of Engineering's Department of Materials Science and Engineering. These departments offer complementary degrees, although they are focused more on the macroscopic-level properties of materials and the engineering aspects of utilizing materials rather than on the fundamental atomic-level interactions within materials, which will be the focus of our new program.

With innovative interdisciplinary programs to entice them, our new students require a full set of modern teaching laboratories. We currently lack sufficient space to accommodate all qualified undergraduates who are interested in taking our lab courses — a situation that limits the number of students we can accept into the college, and that forces some Berkeley undergrads to complete their lab requirements at other schools. Our shortage of lab space is a pressing problem that I am working hard to remedy, both administratively and through fundraising. In addition, I hope to oversee the renovation of our freshman chemistry and sophomore organic labs during my tenure as dean.

Though undergraduate lab space is in short supply, we are about to receive a much-needed increase in space for faculty/graduate student labs and offices. The construction of the new Stanley Hall will be complete this fall, and a number of our research groups will relocate there to join the California Institute for Quantitative Biomedical Research (QB3), a cooperative effort among three UC campuses (Berkeley, Santa Cruz, and San Francisco). QB3 is an ambitious interdisciplinary effort that brings together faculty in the sciences and engineering who address biological problems. The new Stanley Hall fea-

tures an innovative architectural design aimed at encouraging interaction across research groups. With some of our faculty crossing the street to occupy that space, the college will have room to hire four or five new faculty members over the next five years.

A very busy season of recruiting for several of those faculty positions is coming to a close. With the impending retirement of Professor **Jack Kirsch** this summer, the chemistry department hopes to fill a joint position with the Department of Molecular and Cell Biology. Chemical engineering has just made a junior appointment in computational biology (see page 6) and is hoping to make a senior appointment to our Hubbard Howe, Jr. Distinguished Professorship in biochemical engineering. I've met with many exceptional candidates over the past few months, and I look forward to introducing some new faculty members to you in my next column.

I'd also like to tell you about some changes in our staff. I am pleased to introduce two new staff members who play key roles in keeping us in touch with our alumni, other supporters, and the general public. Director of Development **Mindy Rex** and Principal Editor **Michael Barnes** recently joined our College Relations team, which is headed by Assistant Dean **Jane Scheiber**. Mindy comes to us from Berkeley's Graduate Division, where she was a major gifts officer; she previously worked for the Leukemia Society and for the cancer centers at UCSF and Ohio State University. Michael joins us from UC's Office of the President, where he was a science writer for many years. As you can see from some of the photos in this issue of the *NewsJournal*, he is also an experienced photographer. In addition, I regretfully announce the retirement of undergraduate student affairs officer **Gloria Frank**, who, after 12 years as an adviser in the college, will leave us at the end of June. I'm sure many of you remember Gloria — she has been a helpful and generous adviser to hundreds of students over the years and a mainstay of the Scholars Program, and she will be greatly missed.

Our Commencement on Saturday, May 20th, featured speaker **Steve Chu**, Nobel laureate in physics and current director of Lawrence Berkeley National Laboratory. This event marks the end of the school year, but we are already looking forward to the fall. On Monday, September 11, in conjunction with the American Chemical Society's national meeting in San Francisco, the college and its departments will host a reception for alumni and friends from 6:30 to 8:30 p.m. at the San Francisco City Club. And on Saturday, October 7, we will host a homecoming event featuring Professor **Christopher Chang**. Please see the back cover of this publication for more information.

As my first year leading the college comes to a close, I am grateful to the many faculty and staff members who have assisted and supported me, and to all the alumni and friends whose involvement in the college is so crucial to its vibrancy and success. I look forward to our continued work together.

Dean Charles B. Harris presides over the annual staff appreciation day on May 17. Harris acknowledged several staff members for their service to the college, including Sandy Rehling, Director of Undergraduate Advising and Transfer Adviser (left), who has worked at the college for 30 years. Harris also thanked Gloria Frank, Undergraduate Adviser and Retention Coordinator (right) who is retiring after 12 years with the college and 30 years with the university.

"Undergraduates continue to seek out our programs in record numbers."

Peg Skorpinski photo

Our future lies with our young faculty members

by Michael A. Marletta, Chair, Joel B. Hildebrand Distinguished Professor, and Aldo DeBenedictis Distinguished Professor

It's hard to believe that in a few months, I will have been the chair for almost a year. It's been a busy and rewarding time, with a very steep learning curve. Many past chairs warned me that the first year would be difficult, and they were correct. I'll tell you briefly about what has been happening in the department and about the many honors and awards our faculty has received, but I'd also like to try something a little different in this column.

The future of the department lies with its young faculty members. We currently have nine assistant professors in the department, and I would like you to get to know them better. In my next several columns, I'll have the assistant professors introduce themselves and tell you more about their interests. We'll start with **Phillip Geissler**, a theoretical chemist. But first, here is a brief roundup of events and awards:

News Items

In its annual rankings of America's best graduate schools, *U.S. News & World Report* magazine ranked the Department of Chemistry in first place, tied with MIT. Although its methodology does not have the credibility of that used by the National Research Council in its ratings (last produced in 1995), the results are similar. The top five chemistry departments are the same in both rankings, with Berkeley in first place in both (alone in the NRC rankings). The updated NRC rankings are expected to be available in late 2007.

The Lawrence Berkeley National Laboratory's Molecular Foundry was inaugurated in March. The foundry is the first of five proposed U.S. Department of Energy Nanoscale Science Research Centers and the only one on the West Coast. The foundry is a user facility for nanoscale materials, dedicated to supporting research in nanoscience at institutions around the world. Users from academia, government and industrial laboratories may write proposals requesting free access to the resources housed there.

Chemistry Professor **Carolyn Bertozzi** is the Director of the foundry, replacing Chemistry Professor **Paul Alivisatos**, who has become Associate Director of LBNL. Of the six specialized facilities at the foundry, three are led by chemistry department faculty: Bertozzi directs the biological nanostructures facility, Alivisatos directs the inorganic nanostructures facility, and Professor **Jean Fréchet** directs the organic nanostructures facility.

Awards

Professor **Bill Lester** was among four recipients of the 2006 Chancellor's Award for Advancing Institutional Excellence, which acknowledges meritorious achievement by faculty in pursuit of the university's mission to create an inclusive environment to serve the needs of our increasingly diverse state.

Assistant Professor **Dean Toste** has won the American Chemical Society's Arthur C. Cope Scholar Award. This award, which recognizes and encourages excellence in organic chemistry, consists of $5,000, a certificate, and a $40,000 unrestricted research grant to be assigned by the recipient to any university or nonprofit institution. Toste will deliver an awards address at the Arthur C. Cope Symposium held as part of the ACS national meeting to be held this September in San Francisco.

Lecturer **Michelle Douskey** has been selected as a recipient of the 2006 Faculty Award for Outstanding Mentorship of GSIs. The award is bestowed on behalf of the Graduate Council's Advisory Committee for

"What has made Berkeley an incomparable environment . . . is the wealth of opportunities for collaboration."

GSI Affairs, the GSI Teaching and Resource Center, and the Alumni Association.

Professor Emeritus **Robert Harris** has been honored with a special edition of *Molecular Physics*. **Jeff Cina** (Ph.D. '85, Chem), a professor of theoretical physical chemistry at the University of Oregon, wrote a biographical essay on his friend and former research director for the special issue, published on April 20. Harris is in the beginning stages of writing a book summarizing the many advances in the theory of chirality over the last couple of decades. He is the source of many of those advances. Says Harris, "None of my work would be possible without the inspiration and model of my wife, Christine. She played a role far beyond that of a 'supportive wife,' and was essential to my ceasing to be a goof-off and learning to work, and to my development as a scientist."

Thanks to the intellectual strength of our young faculty, the Department of Chemistry has earned three of the six Sloan Foundation Research Fellowships awarded to the University of California, Berkeley, this year. **Jamie Doudna Cate**, **Phillip Geissler** and **Haw Yang** will each receive $45,000 over the next two years to help establish their research programs. On a campus as rich in talent as UC Berkeley, it's a distinct honor for our department to earn half of the prestigious Sloan Fellowships awarded to the University.

Phillip Geissler also won a five-year, $625,000 Packard Fellowship for Science and Engineering from the David and Lucile Packard Foundation. An average of 16 of these fellowships have been awarded annually since 1988 to allow the nation's most promising professors to pursue science and engineering research early in their careers with few funding restrictions and limited paperwork requirements. Geissler also won the department's teaching award this year.

Professor **Matthew Francis** has won the Donald Sterling Noyce teaching award. This award was endowed by Intel cofounder Robert Noyce in honor of his brother and our late undergraduate dean.

Finally, I would be remiss if I failed to mention that I have been elected to the National Academy of Sciences. To say that I am very pleased and honored is certainly an understatement. I am also grateful beyond words to the students I have worked with and learned from over the years. Their excitement, dedication and ideas are responsible for the recognition given by the NAS election.

Meet Phillip Geissler

And now here is more about one of our outstanding assistant professors, Phillip Geissler, in his own words:

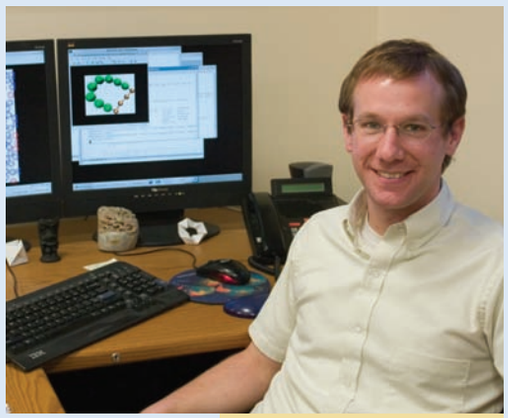
Following undergraduate studies at Cornell University, I entered graduate school in Berkeley's Department of Chemistry in 1996. My graduate work, under the tutelage of David Chandler, focused on several aspects of dynamics in liquids, with a focus on deducing microscopic reaction mechanisms from computer simulations. An amusing note from my graduate school days: I was my colleague Haw Yang's GSI for Chem 220B, a course on advanced theoretical methods in statistical mechanics, which Haw had no business taking but aced nonetheless.

I received my Ph.D. in 2000 and remained at Berkeley for a few months as a postdoc with Chandler. My first extended postdoctoral appointment, with Eugene Shakhnovich at Harvard, began in 2001. We investigated how protein-like polymers respond to pulling from their ends, trying to explain and explore the kinds of experiments Carlos Bustamante has made famous.

Late in 2001, I moved down the street to MIT, where I was a Science Fellow (an autonomous postdoc) until 2003. My independent work there ranged from the theory of ultrafast hydrogen bond dynamics in liquid water to modeling the spontaneous organization of nanocrystals in solution. In July 2003 I returned to Berkeley to join the faculty.

My current group of ten students and postdocs studies a variety of chemical phenomena in which fluctuations and disorder shape the behavior of biological and materials systems. Our interests include flexibility of biopolymers such as DNA, mechanics and growth of polymer networks like those that determine the shape and size of human cells, hydration of ions in non-uniform environments, self-assembly of complex structures from simple microscopic components, and the variety of ways to pack amino acid side-chains within dense protein structures.

Our work on actin networks has generated very interesting results, demonstrating that cross-linked biopolymers in cells behave neither as one would expect from the mechanics of a single molecule, nor as one would expect from a continuous elastic medium. We believe this finding illustrates a basic theme of living systems, whose components collectively achieve results neither a single molecule nor a macroscopic collection of molecules could. By constructing reduced models of these systems, we aim to highlight and discover the design principles biology uses both to overcome and to exploit fluctuations that are inescapable on the molecular scale.



Phillip Geissler relates the challenges and rewards of being an assistant professor.

My return to Berkeley has been a thrilling, though harried, experience. One of the greatest pleasures of my time as a professor is the unwavering personal and professional support of colleagues in the department, some of whom seemed quite intimidating when I was a graduate student! What has made Berkeley an incomparable environment for research at the faculty level is the wealth of opportunities for collaboration, especially with young people who are naive and enthusiastic enough to try almost anything. It is difficult to imagine how I could have become involved in so many fascinating collaborative explorations anywhere else.

Peg Skorpinski photo

We greet new students and faculty and bid farewell to old friends

by Alexis T. Bell, Chair and Warren and Katharine Schlinger Distinguished Professor

The department was very pleased to learn earlier this year that **Rachel Segalman** has received a prestigious NSF CAREER award. This grant, awarded to faculty in the early development of their academic careers, represents a substantial investment by the National Science Foundation in Rachel's work and will provide her with significant research support for the next five years.

I am also delighted to announce that two of our professors have been honored by the Division of Biochemical Technology (BIOT) of the American Chemical Society. **Douglas Clark** has received the 2006 Marvin J. Johnson Award for his outstanding research contributions to microbial and biochemical technology, and **David Schaffer** has received the 2006 Young Investigator Award in recognition of his many achievements in the area of gene therapy and stem cell biology. Doug and Dave will each present an award lecture in September at the Annual meeting of the ACS in San Francisco. Doug also received the department's teaching award this year for his dedication to mentoring his students.

Finally, it is a pleasure to tell you that **John Prausnitz's** lifetime of extraordinary contributions to the field of molecular thermodynamics has been recognized by the journal *Fluid Phase Equilibria*, with an entire issue honoring his work (Vol. 241, 2006). A Professor in the Graduate School, John has recently been working with **Jud King**, director of the Center for Studies in Higher Education and our former Chemical Engineering chair and College dean, on approaches for introducing more humanities concepts into the Chem E curriculum. His work is supported in part by a grant from the Camille and Henry Dreyfus Foundation.

Dr. Jhih-Wei Chu to Join the Faculty

I am extremely pleased to report that Dr. **Jhih-Wei Chu** will be joining the department as an Assistant Professor this fall. Dr. Chu obtained his Ph.D. degree in chemical engineering from MIT, working with Profs. **Bernhardt Trout** (Ph.D. '66, ChemE) and Daniel Wang. His research concerned the development of a mechanistic understanding of the oxidative degradation of pharmaceuticals using *ab initio* theoretical methods and molecular dynamics simulations. In the course of this work he was able to establish a quantitative structure-oxidative reactivity relationship for therapeutic proteins and to develop novel computational methodologies for finding reaction pathways in complicated systems. Since completing his work at MIT, Dr. Chu has been carrying out postdoctoral research at the University of Utah, where he has been investigating multi-scale modeling and simulation of actin filaments with Prof. Gregory Voth. This research has focused on understanding how protein-protein interactions contribute to the longer-range mechanical properties of actin filaments, and bioassemblies in general.

Recruiting New Graduate Students

With interest we awaited the responses this spring from the bright young people to whom we made an offer of admission to our graduate program. A total of 49 offers were extended. Most of these students came to Berkeley for a two-day visit in early March, in order to learn more about our program and to visit individually with members of our faculty. We look forward to welcoming 15 new Ph.D. students this fall, as well as seven Master's Degree students who will join our new Product Development Program, which is directed by Dr. **Keith Alexander** (Ph.D. '83, ChemE).

Berkeley Lectures

Since 1985, the department has invited an outstanding researcher from academe or industry to spend three days with us each year, during which he or she presents two lectures, the Berkeley Lectures in Chemical Engineering. This year we were honored to welcome

Professor James Dumesic of the Department of Chemical and Biological Engineering at the University of Wisconsin-Madison. Professor Dumesic is highly recognized for his outstanding work in catalysis and chemical reaction engineering. He is best known for his studies of the mechanisms of catalyzed reactions and the use of microkinetic analysis to describe the overall kinetics of such reactions. More recently, he has turned his attention to the conversion of biomass to gaseous and liquid fuels. These topics were the subjects of his two lectures — "Supported Metal Catalysts for Hydrogen Production Reactions" and "Catalytic Production of Fuels and Chemicals from Biomass-Derived Oxygenated Hydrocarbons" — presented on April 10 and 12.

Undergraduate Awards

Chevron has been actively and generously supporting our chemical engineering undergraduates this spring. I am happy to announce that two of our students have won Chevron Undergraduate Scholarships. Five finalists were selected from a group of ten exceptional students recommended by the department, and the winners, based on interviews with Chevron representatives, were **Constantyn Gieske** and **Bryan Liao**. In addition, undergrad **Jeraldine Mendoza** has won the Chevron Essay contest ("Why I chose Chem E for my career"), sponsored by AIChE. We are proud of our undergraduate students and extend our congratulations to them.

Technology Breakthrough Award

I also am delighted to report that a team of researchers from **Jay Keasling's** lab, postdoc **James Kirby** and chemical engineering graduate student **Eric Paradise**, won both the Grand Prize and the Science Category Award at the Berkeley Technology Breakthrough Competition last November. The annual competition seeks to reward campus researchers developing highly significant science and technologies that can be applied widely within five years. The award-winning presentation, "The Metabolic Engineering of Yeast," described research that could lead to the reduction of the cost of malaria treatment by 90 percent. Hats off to them both!

Memorials Held for Eugene Petersen and Alan Foss

In the last *NewsJournal*, I reported that **Eugene Petersen** had passed away on October 27, 2005. A memorial, held at The Faculty Club on November 9, was attended by many of his friends and colleagues. Members of his family and several of his colleagues spoke about their interactions with Gene and recalled his wide-ranging interests, which spanned chemical reaction engineering, the fabrications of high-point gears, woodworking, gardening, hiking in the Sierras, philosophy, and music.

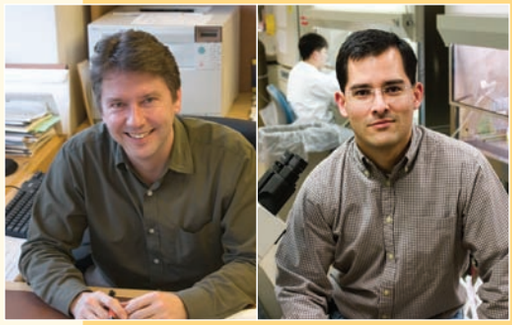
More recently, the department was saddened by the passing of **Alan Foss**, another long-time member of the faculty, on February 27 after an extended illness. A memorial service was held at the Unitarian Church of Oakland on March 25. Alan will long be remembered for his dedication to undergraduate teaching and, in particular, for the wonderful lecture and laboratory course that he developed in process control. At his memorial, his son, **Willard Foss** (B.S. '86, ChemE), also recalled Alan's devotion to his family and the many trips that he had planned and led to the Sierras and many other parts of the world.

The members of the faculty value their memories of Gene and Alan and the wonderful contributions that they made to the department.

The department also lost a valued lecturer and researcher, Dr. **Heinz Heinemann**, on November 23, 2005. A memorial celebration was held at The Faculty Club on January 29. (See the In Memoriam section, pages 35-36.)

Congratulations to Graduates

In May, another group of students graduated and became alumni of our department. Congratulations to these wonderful young men and women, and my best wishes for success as they start on their careers! My colleagues and I look forward to seeing them on campus at future alumni events.



Douglas Clark and David Schaffer have been recognized by the Division of Biochemical Technology (BIOT) of the American Chemical Society and will present award lectures at the annual meeting of the ACS in September in San Francisco.

Chevron's Matt Siebert (center) presents awards to Constantyn Gieske, winner of a Chevron undergraduate scholarship, and Jeraldine Mendoza, winner of the Chevron essay contest. Bryan Liao (above) also won a Chevron undergraduate scholarship.

For Peidong Yang,

it's a small world

Suzhou and Zhuzhou are two cities in China with similar names, but very little else in common — except that both are central to **Peidong Yang** and his family.

Suzhou has been called China's garden city, the "Venice of the East." Located near Shanghai, Suzhou's beauty inspired the Manchu rulers to build a model of its canals on the grounds of the Summer Palace in Beijing. Suzhou is where Yang was raised.

Peidong Yang traces the route of his travels since a boyhood in Suzhou, China

Zhuzhou is not so famous. It is a growing commercial and transportation center in Hunan province, the region known for its red earth, fertile countryside, and its fiery cuisine. Zhuzhou was home for Mei Wang, who would become Yang's wife.

The couple met between the two cities, in Hefei, when they both attended the University of Science and Technology of China (USTC). Yang, now 35, studied chemistry at USTC from 1988 to 1993 as part of the university's rigorous five-year degree program.

In 1993 Yang departed from China for a Ph.D. program in chemistry at Harvard. Wang left soon after for a physics Ph.D. program at Yale. They kept in touch and were married in 1996.

At Harvard, Yang wrote his dissertation on high-temperature superconductors under Charles Lieber. He then came to California in 1997 as a postdoctoral researcher at UC Santa Barbara, where he studied nanostructures and high-surface area silica for a year and a half in the group of Galen D. Stucky.

In 1998, Yang made a fateful decision. As he applied for academic positions, he needed to formulate a research program. "My dissertation research had been in the area of high-temperature superconductors," he says, "but academic interest had declined in that topic by 1998, and most of the research had moved over to industrial labs."

Yang next considered carbon nanotubes. Richard E. Smalley of Rice University had won the Nobel Prize in 1996 for his role in the discovery of "buckeyballs" and other fullerenes. "By 1998, carbon nanotubes were a very hot research topic," according to Yang. "I asked myself, should I jump into the crowd or try something different?"

In the end, Yang moved in a different direction. By sleuthing the research literature, he discovered that a team at Bell Labs had learned how to construct what they called "whiskers" out of silicon in the 1960s. Another group at Hitachi flirted with the nanowire concept in the early 1990s, but they did not continue their research.

Yang developed a research plan in nanowire fabrication, and he was hired as an assistant professor in the UC Berkeley Department of Chemistry in 1999. Since then his research has blossomed, and Yang, an associate professor since 2004, oversees the West Coast's leading research group in nanowire fabrication. Ironically, the East Coast's leading research group is that of his dissertation advisor at Harvard, Charles Lieber. "My old advisor is now my main competitor," Yang says with a smile.

Yang's nanowires are long thin structures less than 100 nanometers (billionths of a meter) in diameter, typically made of a semiconductor material like silicon, germanium, zinc oxide or gallium nitride. These nanowires are grown by chemical vapor deposition (CVD) or by the vapor liquid solid (VLS) process. In these processes, the material of the nanowire is deposited from a gas vapor onto a solid substrate (CVD) or onto a nanoscale droplet of liquid catalyst on a solid surface (VLS). Yang's

group is about 30-people strong, and they have coaxed a variety of applications from nanowires (see sidebar).

"Cheaper solar power cells are a good example of what can be done with nanowires," says Yang. "The advantage of nanowire solar cells is that they are made from low-cost material, the production techniques are inexpensive, and the production process is environmentally benign. And most important, they can achieve better energy conversion efficiency."

Conventional solar panels are large sheets of extremely pure silicon, similar to the material used in computer chips. When light strikes a solar panel, electrons are knocked out of place in the material, leaving "holes." The electrons must reach an electrode, where they are gathered in the billions and billions to produce a current. The electrons flow from the solar panel to do work — power a light bulb or run a refrigerator — and return to the solar panel, where they reunite with the holes.

"The problem with a conventional solar cell," says Yang, "is that an electron must hop from particle to particle inside the silicon semiconductor material in a random way until it reaches the electrode. It's like trying to get from San Francisco to San Jose by following city streets. Any imperfection in the material acts as a roadblock, and the electrons get stuck."

A solar cell made of an array of nanowires allows the light-energized electrons to flow directly to the electrode via the nanowire. "It's like traveling on a highway instead of a city street," says Yang.

For now the efficiency of the nanowire solar cells remains low, at about 3.5 percent, compared to up to 20 percent for commercial silicon solar panels. Yang's goal is to raise efficiency to 10 percent in the next few years.

Several empty bottles of champagne rest atop one of Yang's bookcases. There is one bottle for each of his students who has passed the qualifying exam. Yang is proud to have three of his Ph.D. students graduate this year. One will go to academia, two to postdoctoral positions.

Peidong Yang and family at the 2006 College of Chemistry commencement.

"The interest in nanowires is growing" says Yang, "and many major electronics firms like HP, IBM, GE and Intel have nanowire labs." One of his students, **Matthew Law**, was one of six graduating doctoral students to win the International Union of Pure and Applied Chemistry award for the best Ph.D. thesis in the chemical sciences.

Yang is especially proud of the youngest member of his "group," his daughter, who arrived in 2004. Wife Mei completed her Ph.D. in physics at Yale but returned to school at Berkeley's Haas Business School and now works in finance. Together they return to China with their daughter to visit both pairs of her grandparents, one pair in Suzhou and one in Zhuzhou.

APPLICATIONS OF NANOWIRES

Nanowire Photonics — One of the problems limiting the spread of fiber optic communications is the difficulty of producing purely optical devices that can control and manipulate digital pulses of light. Signals often have to be converted to electronic form for routing, which slows communication and reduces capacity. Arrays of nanowires can act as optical waveguides and switches to help control and channel the beams of light used in integrated photonic circuits.

Nanowire Solar Cells — Dense arrays of zinc oxide nanowires can harness light energy to produce electricity. The direct electrical pathways provided by the nanowires ensure the rapid collection of electrons. Nanowire solar cells have the potential of being produced more cheaply than current silicon cells.

Nanowire Resonators and Mechanics — The small size and high surface-to-volume ratios of nanowires endow them with a variety of interesting and useful mechanical properties. Their high stiffness and strength lend them to applications in tough composites and as nanoscale actuators and force sensors, similar to those used to sense motion and trigger the expansion of an auto's airbag.

Nanowire Electronics — Continued miniaturization in electronics is rapidly approaching limits that will prevent further increases in computing power. Semiconductor nanowires could be used as building blocks for assembling transistors that could lead to extremely small and efficient computers.

Climate change is real

The question is how do we respond

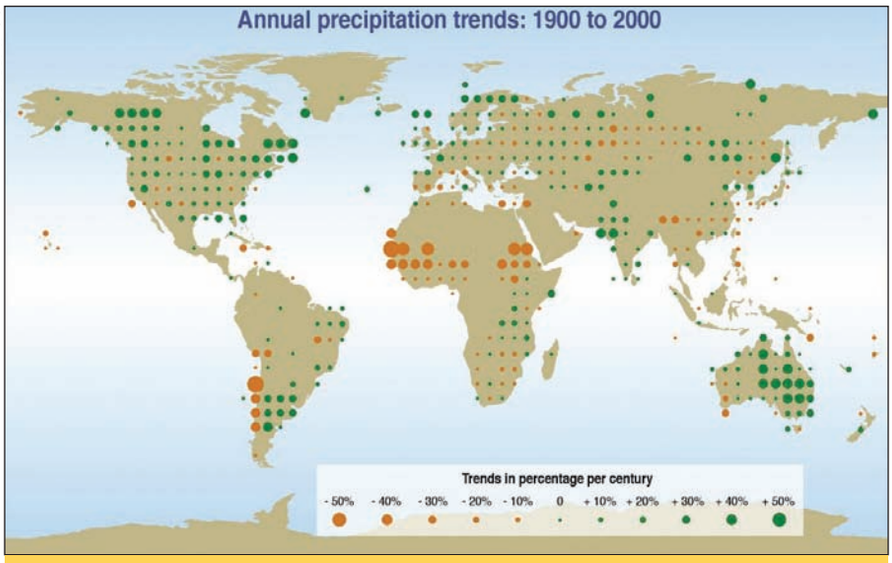
Ron Cohen still remembers the moment when the reality of global warming confronted him. He had graduated in 1991 from UC Berkeley's College of Chemistry after completing his chemistry Ph.D. with **Richard J. Saykally**. As he made his way east to start a postdoctoral position at Harvard, he stopped to visit the Columbia icefield north of Lake Louise in the Canadian Rockies. A popular tourist attraction, the icefield is the largest in North America south of Alaska.

Cohen stayed on at Harvard as a research associate and met **Kristie Boering**, a fellow atmospheric chemist and research associate, who had earned her Ph.D. at Stanford University in 1992. Cohen returned to UC Berkeley's College of Chemistry as an assistant professor in 1996, and Boering arrived two years later to start her assistant professorship at the college.

The couple married in early 1998 but waited for the end of the semester to take their honeymoon. That summer, Cohen returned with Boering to the Columbia icefield, and he was stunned by what he saw. "There was yards and yards of retreat in the icefield," says Cohen, "and it had only been seven years since I had last been there. I began to see global warming in a much more serious and personal way."

In January 2006, the NASA Goddard Institute for Space Studies reported that 2005 was the warmest year since the late 1800s, when reliable record keeping began. The year 2005 was slightly warmer than 1998, the previous record holder, when a strong El Niño, a warm water event in the eastern Pacific Ocean, added warmth to global temperatures. In 2005, global warmth slightly surpassed the levels of 1998 without the help of El Niño. Rounding out the top five warmest years since the late 1800s are 2002, 2003 and 2004.

Source: IPCC



During the 20th century, precipitation increased for most of the Earth except for equatorial Africa (which has experienced drought) and the Pacific coast of South America. Global climate models generally predict increasing precipitation and bigger storms as global temperatures rise.

According to the U.S. Environmental Protection Agency, "Rising global temperatures are expected to raise sea level, and change precipitation and other local climate conditions. Changing regional climate could alter forests, crop yields, and water supplies. It could also affect human health, animals and many types of ecosystems. Deserts may expand into existing rangelands, and features of some of our National Parks may be permanently altered."

In the aftermath of Hurricane Katrina, the EPA stated, "Preliminary evidence suggests that, once hurricanes do form, they will be stronger if the oceans are warmer due to global warming. However, the jury is still out whether or not hurricanes and other storms will become more frequent."

The scientific press is echoing the growing consensus about global warming. *Science* magazine reported on May 12, 2006, that a puzzling variation between climate models and satellite data had finally been resolved. "Global warming contrarians can cross out one of their last talking points," the magazine states, "…the world is warming throughout the lower atmosphere, not just at the surface, about the way greenhouse climate models predict."

The *Science* article referred to the first report of the White House's Climate Change Science Program (CCSP),

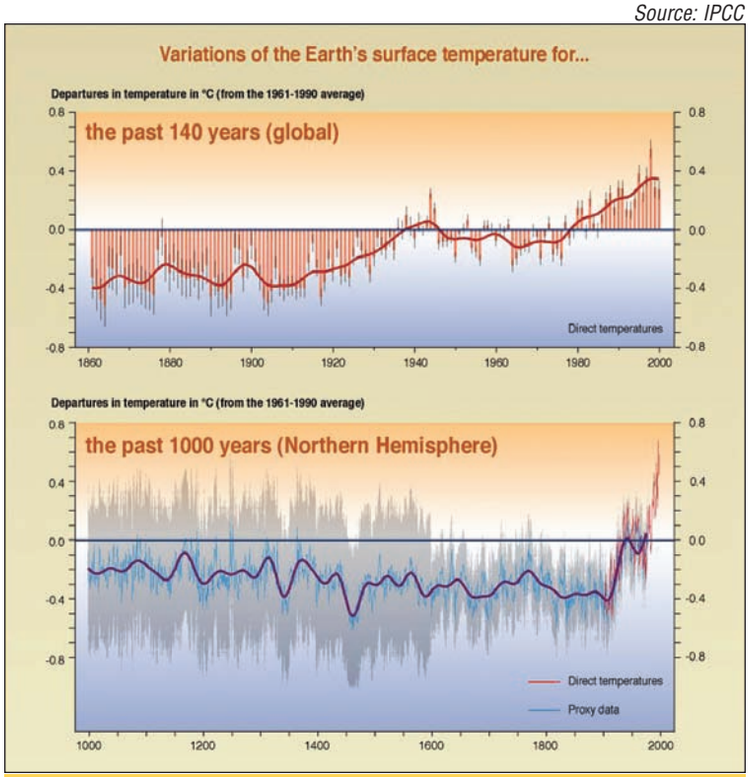
which successfully reconciled errors in the satellite temperature data. Critics had low expectations of the CCSP, but the report's chief editor, Thomas Karl, Director of the National Climatic Data Center, came out swinging. "The evidence continues to support a substantial human impact on global temperature increases," Karl says.

The growing body of evidence has trickled down into the popular media. The April 3, 2006, edition of TIME magazine featured a cover on global warming that read "Be worried. Be very worried." The article states that "Environmentalists and lawmakers spent years shouting at one another about whether the grim forecasts were true, but in the past five years or so, the serious debate has quietly ended. Global warming, even most skeptics have concluded, is the real deal, and human activity has been causing it."

The next two issues of the *NewsJournal* will explore global warming, its implications, and how the college's researchers are helping to understand and fight the consequences of climate change. In this issue you'll meet not only two atmospheric chemists, Associate Professors Kristie Boering and Ron Cohen, but also two chemical engineering professors, **Alex Bell** and **Harvey Blanch**.

Boering and Cohen both hold joint appointments in the Department of Earth and Planetary Sciences. Between them, their research spans from the molecular to the global, from below the ground to the heights of the stratosphere, from wilderness to the world's biggest cities. They are in a race against time, trying to benchmark and quantify atmospheric processes before the influence of global warming removes the evidence.

Source: IPCC



The Earth's surface temperature has risen steadily since the late 1970s. In this graph, data from 1860 to 2000 are based on actual temperature measurements. Before 1860, proxy data are measured from tree rings, ice cores and other historical records. After 2000 the estimates are based on climate models.

Chemical engineers Blanch and Bell are applying their years of expertise to ramping up the production of biofuels. Unlike fossil fuels, biofuels are *carbon-neutral* — the carbon that is added to the atmosphere when biofuels are burned is recycled by the vegetation that is grown to provide the raw materials for the fuel.

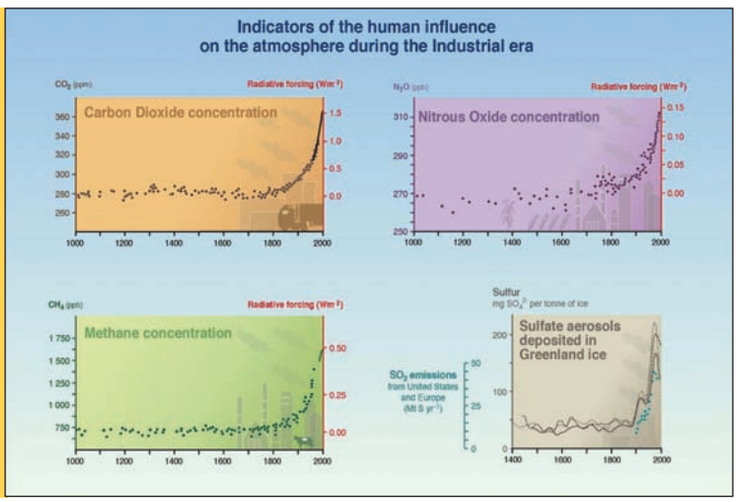
Bell, the current chair of the chemical engineering department, is an expert in catalysis, nitrogen oxide emissions, and environmentally safe chemical processes. He is working to develop the catalytic processes necessary to remove oxygen from plant sugars, converting them to hydrocarbons known as alkanes. These alkanes can be used as raw materials for gasoline and diesel fuels.

Blanch, a veteran of the biofuels efforts during the energy crunch of the 1970s, is revisiting the alternatives armed with the tools of the biotechnology revolution — tools that were not available 30 years ago. His goal is to develop enzymes that will convert plant cellulose to sugars, allowing the utilization of a much higher portion of plant biomass.

Together Bell and Blanch will marshal the extensive intellectual resources of the chemical engineering department and other UC Berkeley science and engineering departments to focus on developing biofuels. They will have a formidable ally in Steven Chu, Nobel Laureate and Director of the Lawrence Berkeley National Laboratory. According to Chu, "There are stronger and stronger indications that global warming is happening, that it's caused by humans, and its consequences are looking more and more ominous." Chu is eager to direct the resources of his Department of Energy-funded laboratory to the development of carbon-neutral transportation fuels.

The next issue of the *Journal* will explore how college researchers are turning to nanotechnology, photovoltaics and biological systems to allow solar power to reduce the need to burn fossil fuels. For discussion of hydrogen storage, please see our fall 2005 issue, available on the web at chemistry.berkeley.edu/Publications/journal/index.html.

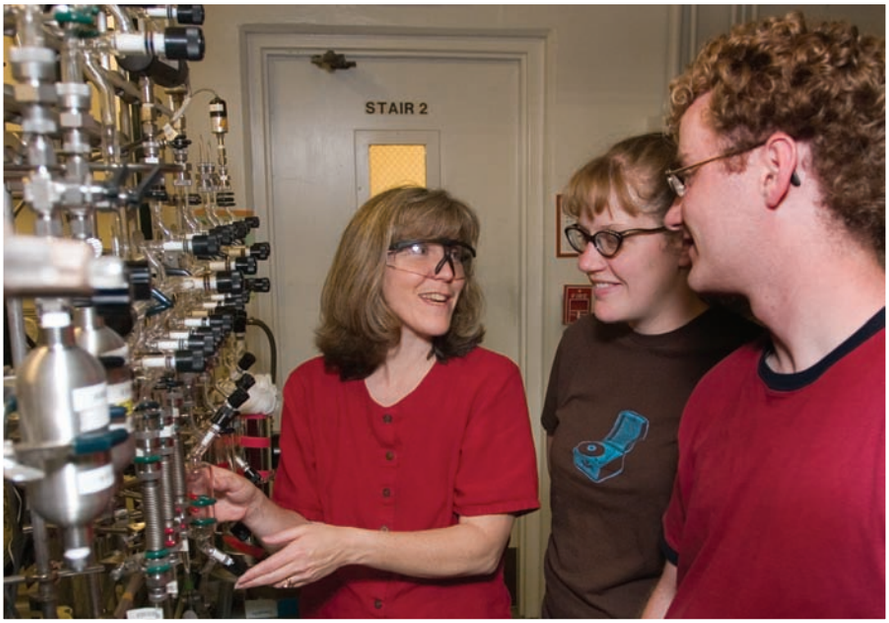
Source: IPCC



Atmospheric concentrations of greenhouse gases carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4) have all risen since the industrial revolution. The amount of sulfate aerosols (particulates) trapped in ice samples also has risen, but has declined in recent years with better pollution controls. Unlike greenhouse gases, sulfate aerosols are short-lived and can have a cooling effect.

Finding Clues in the Stratosphere

The next time you fly in a commercial passenger jet, look up. Above you is the stratosphere, and compared to the troposphere below you, with its turbulence and weather, the stratosphere appears calm and unexciting. Atmospheric chemist **Kristie Boering** would disagree. The stratosphere is her turf, about 6 to 30 miles above the ground, where for her the chemistry really starts to get interesting. "The reactions that led to the growth of the ozone hole are the best known examples of chemistry in the stratosphere, but there is a lot more going on up there that we need to understand," says Boering.



Kristie Boering discusses atmospheric gas samples with graduate students Kate Hoag and Aaron Johnson.

One major challenge to studying chemistry in the stratosphere is collecting samples from altitudes well above those at which airplanes can fly. For Boering, there are two ways to collect air samples. One method is high-altitude balloons, which can reach 120,000 feet. Another is the NASA ER-2, the research version of the famous U-2 spy plane that caused an international incident when pilot Gary Powers was shot down over the former Soviet Union in 1960.

The ER-2 can reach altitudes of 70,000 feet or higher even when fully loaded with instruments. The aircraft's instruments can analyze air while flying, or collect samples for further analysis on the ground. Boering has spent many hours chasing ER-2s to remote locations such as Fiji and New Zealand.

Boering is particularly interested in measuring the different isotopic compositions of greenhouse gases that make their way into the stratosphere. Oxygen has three stable isotopes, ^{16}O, ^{17}O and ^{18}O, each with eight protons but with eight, nine and ten neutrons, respectively. The hydrogen isotope deuterium contains one neutron in its nucleus, while the nucleus of the nitrogen isotope ^{15}N contains seven protons and eight neutrons.

These heavy isotopes are components of water vapor, carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4). These greenhouse gases undergo *isotopic enrichment* in the stratosphere. The lighter versions of these molecules interact more readily in the stratosphere's intense ultraviolet light with highly reactive *free radicals*, leaving behind molecules unusually rich in the isotopes of nitrogen, carbon and hydrogen. Through isotopic enrichment, the stratosphere leaves its mark on these greenhouse gases, and the chemical changes they undergo allow them to be tracked as they circulate through the stratosphere or re-enter the troposphere.

"These isotope signatures allow us to use these gases as tracers of chemical processes and circulation patterns both in the stratosphere itself and on the earth's surface below," says Boering, "but we need to understand more about why and at what rate this isotopic enrichment happens. And the sooner the better," Boering adds, "because measuring the concentration of these gases provides a benchmark that can help us monitor climate change."

Boering has already made a major contribution with her isotopic enrichment observations. In a paper that appeared in *Nature* magazine in 2003, Boering and colleagues reported on research that helped balance the molecular hydrogen (H_2) budget for the planet. Just as a household budget tracks income and expenses, a budget for an element like hydrogen attempts to account for all the sources and sinks.

(continued on page 14)

Connecting the Global to the Regional

Ron Cohen's research spans a remarkable range — from improving models of global climate, through charting the regional flow of atmospheric pollutants, down to measuring the details of individual mountain watersheds. "The big challenge for atmospheric chemists like me," says Cohen, "is to understand how global warming will affect what happens at the regional level, and likewise how the production of pollutants regionally will impact the global climate. Chemistry is relevant to every aspect of these questions."

Global circulation models give us the big picture of the Earth's climate, and Cohen's research has played an important role in improving how these models treat the evaporation of water and its different isotopic forms. Water molecules containing deuterium (hydrogen atoms with one neutron in their nuclei), and ^{18}O instead of ^{16}O (oxygen atoms with 10 neutrons in their nuclei instead of eight) evaporate more slowly than standard water, depending upon temperature and humidity. After water evaporates from the ocean's surface, it eventually returns to earth as rain or snow, and it can be trapped for thousands of years in ice layers in Antarctica. The isotopic composition of this ice can provide vital clues to the circulation of water vapor in the atmosphere and the history of Earth's climate.

In a critical series of experiments, Cohen and colleagues made exact measurements of evaporation rates of water's isotopic varieties and showed that they fit well with theoretical models, as opposed to the ad hoc calculations built into some global circulation models. The researchers also noted that just as the evaporation of perspiration cools your skin, so evaporation on the surface of the ocean cools it as well. The ocean's surface, where evaporation takes place, is colder than the bulk of the ocean water because evaporation itself is cooling the ocean surface. By taking into account these factors, Cohen has helped climate modelers predict the Earth's climate with greater precision.

At the regional level, Cohen has a good news/bad news story to tell. Since some air pollutants are greenhouse gases, fighting pollution fights global warming. But if global warming brings higher atmospheric temperatures and higher levels of water vapor in the atmosphere, then global warming will invigorate the chemical reactions that help create air pollution, leading in turn to further warming.

Cohen is particularly concerned about ozone (O_3). Ozone in the stratosphere, roughly 6 to 30 miles in altitude, helps shield the earth from excess ultraviolet radiation. But ozone at ground level is a greenhouse gas and a pollutant that irritates the lungs, triggers asthma attacks, and damages crops.

"Policies aimed at reducing the negative impacts of ozone have not accounted for potential climate change," says Cohen. "In particular, the San Francisco Bay area is more strongly influenced by temperature changes than inland regions, indicating that air quality will probably get worse in the future."

Ozone is formed in the lower atmosphere by complex chemical reactions involving oxides of nitrogen (NO and NO_2, together referred to as NO_x) and volatile organic compounds (VOCs). Cars and trucks, especially those with diesel engines, are the major source of NO_x. VOCs have

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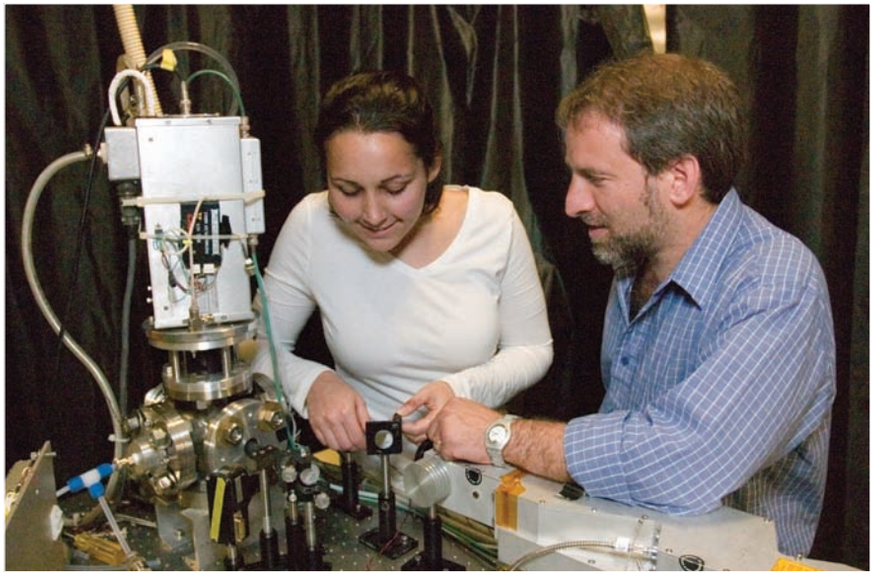


Graduate student Idalia Perez works with Ron Cohen on an instrument to test for trace gases in the atmosphere.

STRATOSPHERE (continued from page 12)

The pattern of hydrogen concentration in the atmosphere and its isotopic composition had been at odds with what scientists expected, throwing the hydrogen budget out of balance. It appeared that both atmospheric reactions and the soil were acting as large sinks. Researchers knew that soil microbes metabolized hydrogen, removing it from the atmosphere. Other researchers noted the high concentration of deuterium in the atmosphere near earth's surface and assumed this was due to isotopic enrichment of hydrogen as it reacts with other atmospheric gases. Boering's observations explained the discrepancies. Using the stratosphere as her laboratory, she and her co-authors demonstrated that the high concentration of deuterium in the stratosphere, and by analogy in the lower atmosphere, was also due to the oxidation of methane, which is a major source of hydrogen.

The NASA ER-2 research aircraft can carry a full range of instruments to altitudes of 70,000 feet.

With the hydrogen sources and sinks more precisely calculated, the hydrogen budget balanced. "It's a good thing to understand the hydrogen budget today," says Boering, "because if we switch to a hydrogen–based energy system, due to leaks there may be a large new source of hydrogen in the atmosphere, and we need to understand where the leaking hydrogen will go, what will happen to it chemically, and what the implications might be for climate change."

For Boering, many questions are left to be answered. As the troposphere warms, it appears the stratosphere is cooling, while the amount of water vapor in the stratosphere is rising. Add to this mix plans for a new generation of high-altitude commercial jetliners — next generation *Concordes* — that could inject combustion by-products directly into the stratosphere.

"We don't yet know what the outcome of these combined changes will be," concludes Boering, "but there is a possibility that we'll see increased chlorine activation and the loss of ozone. And there may be additional implications for climate change that we don't understand yet. As an atmospheric chemist, I think it's imperative to find new observational and modeling tools to help us understand and predict these changes."

CONNECTING (continued from page 13)

For Q&A with Boering and Cohen on global warming, see the college website, chemistry.berkeley.edu.

several man-made sources, including dry cleaning shops, barbeque lighter fluid, gasoline spills and auto exhaust. "But it's important to remember that vegetation is also a major source of VOCs," says Cohen, "and under future climate scenarios, VOCs from plants are expected to increase, contributing to a rise in surface ozone concentrations."

Strategies to control ozone pollution require accurate measurements of NO_x, and Cohen's research group has developed one of the world's most sensitive detectors for atmospheric NO_2, a detector that can be operated in remote locations for more than a year at low cost. The instruments developed by Cohen and his research group have been used in scientific experiments in several parts of the world, including a recent multi-university effort in March 2006 to measure the air pollution flowing from Mexico City.

Cohen's skills in instrumentation will also take him to two remote mountain areas in the University of California Natural Reserve System, where he will help plan and deploy monitors for two entire watersheds to collect data on hydrological cycles. Funded by the W. M. Keck Foundation, the project's goal is to better understand, literally from the ground up, how Earth's hydrological cycle will be impacted by global warming and other climate changes.

"Like it or not, we are all guinea pigs in a poorly regulated planetary experiment in climate change," Cohen states. "To understand how the climate is changing, and learn how to minimize the damage and someday restore temperatures to historical levels, we need to collect huge amounts of data as quickly as possible." Cohen doubts that he will live to see the day when the Earth's annual average temperature begins to drop. "But if we are smart and work hard, maybe our kids will," he concludes.

Building a sustainable biofuel production system

Biofuels are making the headlines lately, mostly because of scientific and political debate about whether ethanol derived from corn is a viable fossil fuel replacement, or whether it is another subsidy to agribusiness. Meanwhile we read about biodiesel in stories that feature "greasecars" that burn used frying oil in modified diesel engines.

Chemical engineering professors Harvey Blanch and Alex Bell discuss options for producing carbon-neutral fuels.

We hear much less about the serious efforts underway to meet the U.S. Department of Energy's target of replacing 30 percent of transportation fossil fuels with biofuels by 2025. The target also calls for replacing 25 percent of petrochemicals with biomass-based alternatives. At UC Berkeley, two professors of chemical engineering are quietly laying the groundwork to help achieve these goals.

Alex Bell, chair of the chemical engineering department and an expert on catalysis, and **Harvey Blanch**, a bioengineer and a veteran of biofuels research in the energy crisis of the 1970s, think that the goals are feasible, but that we have a long way to go. Ethanol, derived primarily from corn, is the major biofuel in use today. But it contributes only 2 percent to the transportation fuel mix in the United States, while biodiesel contributes only 0.01 percent.

"The 30 percent figure is reasonable, but it may take 20 years to get there," says Bell. "How do we create a steady supply of biofuels year after year? Can we do so without degrading agricultural land and using excessive amounts of water, fertilizer and other inputs? And how do we envision the whole structure of the biomass-based refinery system of the future? These are the problems we must overcome."

For Blanch the problems are political and social, not technical. "Many of the technical issues were worked out during the energy crisis in the 1970s, but the research programs were killed and the results shelved in the 1980s when gas prices fell," says Blanch. "The economics are looking better for reviving biofuels research, but solutions to these problems will take sustained political will, not just a few months of hearings in Washington, DC."

One country that did not drop its biofuels research is Brazil, which now has 30 years of R&D behind it and a thriving ethanol industry. South America's largest country is scheduled to achieve energy independence in the next few years, and it has been exporting ethanol to Europe. Brazil's fuel mix is based on roughly 25 percent ethanol and 75 percent domestic petroleum. Most autos there are designed to run on a variety of gasoline/ethanol mixtures, giving the country the flexibility to mix fuel sources and buffer itself from global supply crises.

Still, Bell and Blanch do not see Brazil as a model for the United States. "When you add up the amount of rainforest that is being destroyed in Brazil, you have to wonder how sustainable their agricultural system is," says Blanch. "Brazil's production is based on cheap agricultural labor and sugar cane, and in the U.S., cane is grown in only two states, Louisiana and Hawaii. And our agricultural system is very energy-intensive, not labor-intensive."

Along with ethanol, biodiesel has been touted as an alternative to fossil fuels. Experts from Consumers Union, publisher of *Consumer Reports* magazine, recently tested a diesel automobile that had been modified with a $795 kit to run on leftover restaurant frying oil, and they found that the system worked well. But Bell and Blanch are skeptical that biodiesel will ever be more than a niche fuel in an economy that is currently consuming 400 million gallons of gasoline every day.

Blanch and Bell have suggested a third path to producing biofuels, one based on converting the cellulose in

biomass to liquid alkanes, which can in turn be converted to gasoline and diesel fuel. Alkanes are straight- and branched-chain hydrocarbons that, unlike sugars and alcohols, don't contain any oxygen. Gasoline is made from alkanes with anywhere from five to eleven carbons in each molecule. Diesel fuel is a little heavier, based on alkanes with nine to fifteen carbon atoms.

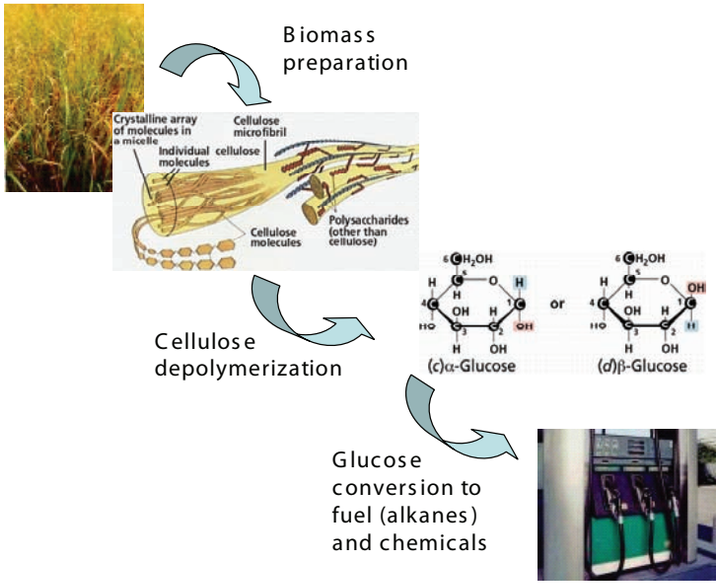
"The first part of what we are proposing," says Bell, "is to start with plant sugars, but instead of converting them via fermentation and distillation to ethanol, we plan to convert the sugars to alkanes via complex catalytic reactions. The big advantage to this strategy is that the overall energy efficiency of producing alkanes from sugars is about double that of producing ethanol — distilling the alcohol from water consumes about 60 percent of the energy in the ethanol that is produced."

"The second part of the proposal is cellulose conversion," says Blanch. "In the 70s, we conducted major research projects on how to convert plant cellulose to sugars that could then be converted to ethanol. Humans can't digest cellulose, so we call it fiber. Cows and termites are pretty good at it. But the champion at producing cellulases, the enzymes that break down cellulose, is the fungus *Trichoderma reesei*."

During WWII the army noticed that in the Pacific, tent fabric would fall apart very quickly. Elwin Reese of the U.S. Army Natick Labs discovered that a fungus was digesting the cellulose in the cotton tent fabric. Reese and co-worker Mary Mandels performed extensive research on *Trichoderma reesei*, which eventually was named after Reese.

"Using the techniques available in the 1970s," says Blanch, "researchers bioengineered the fungus to maximize the production of the enzymes that digest celluloses into sugars." One remaining problem is lignin, a tough fibrous plant material. Termites can partially digest lignin with the help of symbiotic bacteria in their gut, but no commercial process exists to digest it, and burning it dumps the carbon back into the atmosphere and contributes to global warming.

"One alternative," Blanch notes, "is to bioengineer a low-lignin crop that does not require fertilizer, that doesn't need much water, and that could be grown on land not suitable for food crops. The problem is that lignin is what makes the plant stalks rigid, and without it, a plant would probably be floppy and difficult to harvest. And of course," he adds, "there might be public resistance to huge plantations of a genetically-modified organism."



In a biomass-to-fuel conversion, biomass is first treated to expose the cellulose in the plant fibers. Next, enzymes break down the cellulose into its constituent sugars. These sugars are then converted to simple hydrocarbon fuels (alkanes) and other chemicals by catalytic processes.

In essence, what Bell and Blanch are proposing is a carbon-neutral way to produce gasoline and diesel. "The fuel production system is very complex," says Bell. "There is no 'killer application' on the horizon that will revolutionize the process. What is required is a smoothly integrated set of strategies from agricultural production, through cellulosic conversion to sugars, from sugars to alkanes, and then to petrochemical plants and distribution systems."

There are not many places fostering a group of scientists with the necessary breadth of skills to achieve this — including agricultural specialists, molecular and cell biologists, chemists and chemical engineers, and energy and environmental policy experts. UC Berkeley, in conjunction with the Lawrence Berkeley National Laboratory, is one of the few places where the necessary expertise can be pooled to focus on achieving the Department of Energy's 30 percent goal.

Some advocates of hydrogen fuel might argue that producing cellulosic alkanes as a feedstock for the petroleum industry would allow our economy to maintain the status quo and forestall the transition to a hydrogen energy system. Bell strongly disagrees.

"The arguments in favor of the hydrogen economy are attractive, but the hydrogen economy lies too comfortably far in the future," Bell emphasizes. "This justifies inaction on the alternatives. It lulls us into waiting for the big technological breakthroughs that will solve our problems and enable the widespread use of hydrogen. Meanwhile, we have many technologies that we could work with today. The hydrogen transportation and storage problems may take years to solve, and even if they are solved, the infrastructure for a hydrogen economy might take 50 years to build. We don't have 50 years to start to solve the global warming problem. Let's get to work with what we have now."

Blanch remains enthusiastic about technical possibilities, but skeptical of political realities. "Global warming is just the kind of long-term problem that our political system does not respond to effectively," says Blanch. "Our system responds to crisis. If we continue to have superhurricanes, then Washington, DC, will act. Or if the day comes when Americans drive to their local gas station and there is no gas available, then politicians will get interested. But I think as scientists and engineers we need to push ahead. Unlike the energy crisis of the 1970s, the problem of global warming is not going away. The stakes are very high."

News from around the campus

Changes in senior administration

George W. Breslauer, political science professor, academic leader and Russia scholar, will be UC Berkeley's next executive vice chancellor and provost.

Peg Skorpinski photo

Professor George W. Breslauer will be UC Berkeley's next executive vice chancellor and provost.

Taking on Berkeley's second-highest post, Breslauer will be the campus's chief academic officer, responsible for day-to-day campus operations. He will succeed Paul R. Gray, who will return to the faculty after six years in the position, having steered Berkeley through an era of significant enrollment growth and profound state budget cuts.

Breslauer has been a member of the Berkeley faculty for 35 years and has held numerous significant administrative positions on campus, including, as of last August, executive dean of the College of Letters & Science. His priorities will include maintaining access for students from low-income families, continuing to recruit top graduate students, and recruiting and retaining outstanding faculty.

Also joining the senior administrative team is Nathan Brostrom, newly appointed Vice Chancellor–Administration, who comes to us from JP Morgan where he served for ten years as Managing Director and Manager of the Western Region Public Finance group. Brostrom was the lead banker on the energy bond program that repaid the state general fund for the lost revenue from the 2000-2001 California energy crisis. As Vice Chancellor, he is responsible for managing the campus's annual operating budget of more than $1.3 billion.

Alumnus Richard Blum gives $15 million

A major new campus initiative to improve the quality of life of impoverished people around the world has been set in motion with an extraordinary gift.

UC Regent and alumnus Richard C. Blum ('58, M.B.A. '59) has given $15 million, including a $5 million challenge grant, to launch the Richard C. Blum Center for Developing Economies. The Blum Center will be university-led, teaming faculty and students to address global poverty, which affects nearly 3 billion people world-wide. Its goal is to tap the expertise and resources of Berkeley's unparalleled multidisciplinary environment to achieve significant — and financially sustainable — solutions to issues facing the world's poor.

"I believe UC Berkeley can have a singular effect in the fight to alleviate human suffering," said Blum. "If you look at the dangerous political divisions in today's world, you will find that most extremism has its roots in poverty and lack of education. We hope that our center will help train the next generation of leaders to be dedicated to alleviating poverty in the developing world."

Artificial compound eyes

A team of bioengineers on campus has fabricated a series of artificial compound eyes modeled on the hexagonal, honeycomb pattern of insect eyes.

Focusing and conducting light in the same manner as an insect's eye, "these eyes can eventually be used as cameras or sensory detectors to capture visual or chemical information from a wider field of vision than previously possible," said Luke P. Lee, the team's principal investigator and the Lloyd Distinguished Professor of Bioengineering at UC Berkeley.

The eyes have a wide range of potential applications, including high-speed motion detection; environmental sensing; surveillance; medical procedures requiring cameras, such as image-guided surgeries; and a number of clinical treatments that can be controlled by implanted light delivery devices. Their initial application may be in ultra-thin camera phones and wearable, hidden cameras.

Photo courtesy Science magazine

The artificial compound eye created by Professor Luke P. Lee and his team is similar in size, shape and structure to an insect's compound eye.

Simpson Student-Athlete Center

The first phase of a multi-year plan to renovate historic Memorial Stadium will get underway in December when construction begins on the Simpson Student-Athlete High Performance Center, a state-of-the-art training facility that will include a sports-

Plans are underway to renovate the historic Memorial Stadium, seen here awash in color for the annual Cal-Stanford Big Game, held every other year at Berkeley.

medicine center, strength and conditioning rooms, and team meeting, study and administrative spaces. The new facility, serving 13 of Cal's 27 intercollegiate teams, will provide a major boost for Cal Athletics, enhancing Cal's ability to recruit and train top talent. It will be financed entirely through private funds and is named for Barclay ('66, ex'43) and Sharon Simpson, who recently made the project's cornerstone gift.

The center will be built just outside the west stadium wall. It will replace training and equipment rooms and offices, now located under the stadium's west rim, that present seismic hazards to the people who use them daily. Construction of the center, planned for completion by autumn 2008, will not require the team to find an alternative site for home games.

Future phases of the plan will include a seismic retrofit of the north and south fault zones of the stadium, a new press box, and numerous grandstand improvements.

In addition to the stadium renovation, the master plan calls for the creation of a new academic facility in the southeast quadrant of campus that will be shared by Berkeley's law and business schools and will provide campus meeting spaces as well as facilities for collaboration.

Honors bestowed

Each spring, some of the highest honors in academia are awarded to a selection of America's most distinguished teachers and researchers. At UC Berkeley, 23 members of our faculty were singled out for distinction this year — more honorees than from any other university in the U.S., public or private. Eleven were elected as new Fellows to the American Academy of Arts & Sciences; five — including chemistry professor **Michael Marletta** — were elected to the National Academy of Sciences (two of whom were also elected to AAAS), three were awarded Guggenheim Fellowships, and six — including chemistry professors **Jamie Doudna Cate**, **Phillip Geissler**, and **Haw Yang** — were awarded Sloan Research Fellowships. Our congratulations go to each of them.

Transitions at LANL and LLNL

Following an intense contract competition process, Los Alamos National Security LLC, or LANS — a team that includes the University of California, Bechtel National, BWX Technologies, and the Washington Group International — has been selected by the Department of Energy to manage Los Alamos National Laboratory in New Mexico, beginning June 1, 2006.

This is the first time that management of LANL has been put to competition. Voicing confidence in LANS's strong proposal and leadership team, Secretary of Energy Samuel W. Bodman stated that this contract "will benefit the national security of the United States through superb science."

LANS President Michael Anastasio, former director of the Lawrence Livermore National Laboratory, will be the new director of LANL.

UC President Robert Dynes has appointed George H. Miller, a nuclear weapons and national security expert, a leader in large facilities management, and a UC employee for 34 years, to be the interim director of LLNL. Miller will serve through the remainder of the University's current contract to manage LLNL, through September 2007.

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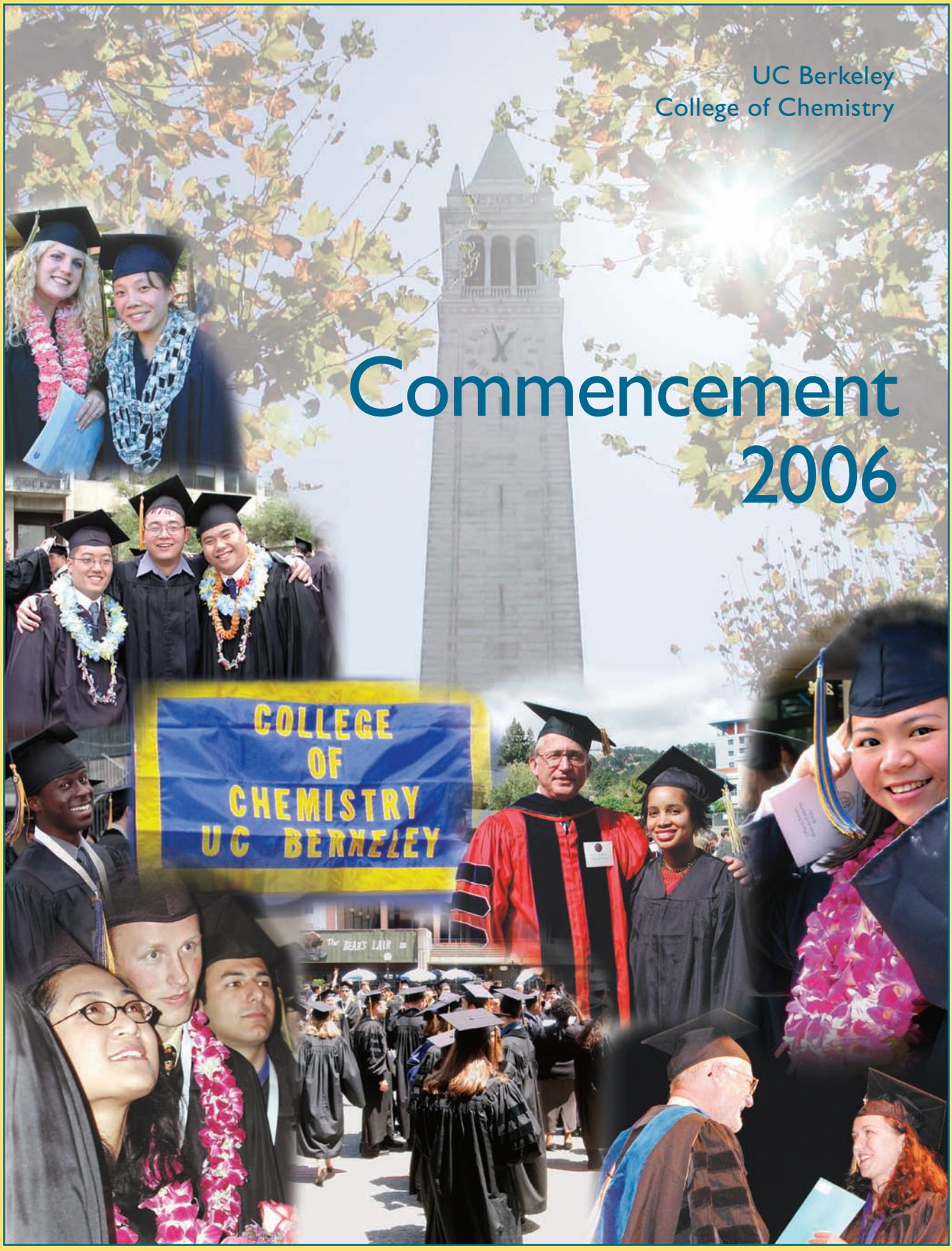
The press releases on which these stories are based may be found at http://newscenter.berkeley.edu.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UC BERKELEY

Meet our commencement speaker

Steven Chu, Director
Lawrence Berkeley National Laboratory

photo: LBNL

Steven Chu became the Director of the Lawrence Berkeley National Laboratory (LBNL) on August 1, 2004. A Nobel Prize-winning scholar and international expert in atomic physics, laser spectroscopy, biophysics and polymer physics, Chu oversees the oldest and most varied of the Department of Energy's multi-program research laboratories. LBNL has an annual budget of more than $520 million and a workforce of about 4,000.

Chu's distinguished career in laboratory research began as a graduate student in physics at UC Berkeley in 1970, when he also became acquainted with the facilities of LBNL. His first career appointment, from 1978-87, was as a member of the technical staff at AT&T Bell Laboratories in Murray Hill, NJ, where his achievements with laser spectroscopy and quantum physics became widely recognized.

During his last four years at Bell Labs he was head of the Quantum Electronics Research Department, where he began his groundbreaking work in cooling and trapping atoms by using laser light. In 1987, he became a professor in the physics and applied physics departments at Stanford University, where he continued his laser cooling and trapping work.

This research eventually led to the Nobel Prize in Physics in 1997, an honor he shared with Claude Cohen-Tannoudji of France and U.S. colleague William D. Phillips. Their discoveries, focusing on the so-called "optical tweezers" laser trap, were instrumental in the study of fundamental phenomena and in measuring important physical quantities with unprecedented precision.

Chu was the Theodore and Francis Geballe Professor of Physics and Applied Physics at Stanford, where he remained for 17 years as a highly decorated scientist, teacher and administrator. He chaired the physics department from 1990-93 and from 1999-2001.

Chu is a member of the National Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, and Academia Sinica. He is an Honorary Lifetime member of the Optical Society of America, as well as a foreign member of the Chinese Academy of Sciences and the Korean Academy of Sciences and Technology.

Chu has won dozens of awards in addition to the Nobel Prize, including the Science for Art Prize, the Herbert Broida Prize for Spectroscopy, the Richtmyer Memorial Award, the King Faisal International Prize for Science, the Arthur Schawlow Prize for Laser Science, and the William Meggers Award for Laser Spectroscopy. He was a Humboldt Senior Scientist and a Guggenheim Fellow and has received six honorary degrees.

Born in St. Louis and raised in New York, Chu earned an A.B. in mathematics and a B.S. in physics at the University of Rochester, and a Ph.D. in physics at UC Berkeley (1976). He maintains a vigorous research program and directly supervises a team of graduate students and postdoctoral fellows. He is author or coauthor of more than 160 articles and professional papers, and more than two dozen former members of his group are now professors at leading research universities around the world.

The College of Chemistry celebrates the achievements of our graduating students

Graduates participating in commencement ceremonies this year include students completing their degree requirements between summer 2005 and fall 2006:

B.S. Chemistry – 55
B.A. Chemistry – 8
B.S. Chemical Biology – 51
B.S. Chemical Engineering – 78

M.S. Chemistry – 6
M.S. Chemical Engineering – 1
Ph.D. Chemistry – 62
Ph.D. Chemical Engineering – 25

Meet some of our graduates

Lola Odusanya arrived in the United States from Lagos, Nigeria, in 1998 to attend college in Virginia. All she brought with her were two suitcases, a few pairs of open-toed shoes, and the address of a family friend who lived in Washington state. Eight years later she has earned a Ph.D. in Chemical Engineering and is the President of the UC Berkeley Graduate Assembly.

At UC Berkeley, Lola studied in the research group of Nitash Balsara, where she worked on new designs to improve the capacity and safety of lithium batteries. Her term as the President of the Graduate Assembly has broadened her interests to include government policy.

She is considering a career in science policy in Washington, DC, where she says the summer weather is actually tolerable compared to Lagos. But hot weather or not, Lola, now a U.S. citizen, still ponders returning to Nigeria to apply her skills there.

"As I approach the next phase of my career with excitement mixed with some anxiety," she says, "I am confident that my education at Cal has provided me with the necessary tools to succeed wherever I go."

Max Montano's parents left the Bay Area for a more rustic lifestyle, and he grew up "way down a dirt road in Southern Oregon," as he puts it. He was homeschooled from kindergarten to fourth grade and studied at night under a kerosene lamp. After graduating with a degree in chemistry from Pacific University in Forest Grove, OR, he worked for Intel near Portland for two years before coming to UC Berkeley in 2002.

Max earned his Ph.D. in Chemistry in the research group of Gabor Somorjai, where he studied the surface properties of platinum, rhodium and other precious metals that play a critical role in automobile catalytic converters and industrial catalytic processes.

Amidst the bustle of the Bay Area, Max maintained a quiet lifestyle by commuting very early in the morning between a peaceful hillside above the ocean in Pacifica and a scenic hillside lab overlooking the Bay at the Lawrence Berkeley National Laboratory.

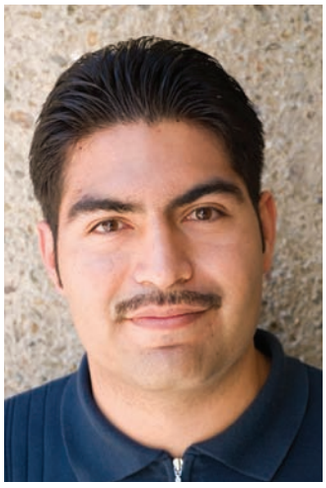
"The skills I've learned at UC extend far beyond the laboratory," says Max, "and I'll continue to use them in every aspect of my life." Max will return to work for Intel in Oregon, but he is considering teaching someday at a small liberal arts college.

Olga Paley was too good a candidate for one of the world's biggest biotech companies to pass by. An undergrad chemical engineering major, Olga was searching for graduate schools when she took a break to attend an on-campus job information session with Genentech. The company was so impressed with the skills she had acquired that it offered her a job as a process engineer — and she accepted.

Born in St. Petersburg, Russia, but raised since the age of 10 in San Mateo County, CA, Olga was inspired by her high school chemistry teacher. At Cal, she has worked to help synthesize an affordable anti-malarial drug in the lab of Jay Keasling. Last summer she worked on bioassay protocols at the University of Pennsylvania as part of a National Science Foundation grant.

"Chem E is not a particularly easy major," Olga admits, "but the small size of the department gave it an intimate, laid-back feeling, and that really helped us succeed." She also credits the advice of her postdoc mentor, Sydnor Withers.

At Genentech, Olga will help develop new techniques for purifying monoclonal antibodies. These antibodies are the basis of Genentech's revolutionary drugs that are prolonging the lives of patients with lymphoma and metastatic breast cancer.



José Gómez is the first person in his family to attend college — but as he points out, not the last. His younger brother Luis has followed in his footsteps and also attends UC Berkeley. While brother Luis chose to major in molecular and cell biology, José chose the College of Chemistry's popular Chemical Biology program for its more rigorous grounding in chemistry.

José grew up and attended high school in Arvin, CA, a farming community near Bakersfield. Under the UC Leadership Excellence through Advanced Degrees Program, José has spent three summers conducting research at the UC campuses in Riverside and Santa Barbara, in addition to the Berkeley campus.

Although he has become familiar with several UC campuses, José will attend grad school at Berkeley's arch-rival. In fall 2006, José will start a Ph.D. program in microbiology and immunology at Stanford University School of Medicine.

"The College of Chemistry offered the right environment for my success at Cal," says José, "with small classes, challenging courses, friendly advisors and access to research. The Scholars Program was especially important. There I met the students who would be my network of support during my college career."

Annie Yang wanted to get away from home for college, but not too far away. She was raised in San Francisco's quiet West Portal neighborhood and attended Lowell High, the city's most prestigious public school. She figured a move across the Bay was about the right distance, so she picked UC Berkeley. The offer of a Regents and Chancellor's Scholarship helped cement her choice.

Annie chose chemistry as her major because for her it is "the most fundamental of the sciences." A summer internship will take her to Washington, DC, where she will help develop computational toxicology models for the Federal Drug Administration. These models can help speed the drug approval process and reduce the need for human and animal testing.

"I feel privileged to have learned from some of the greatest thinkers and researchers in chemistry," she says. "Their high expectations forced me to go beyond the lecture hall and discover chemistry for myself."

Annie expects that grad school is in her future, and she hopes someday to apply her minor in education as a K-12 science teacher.

Congratulations to our new alums! Keep your Cal connections current by joining the Chemistry & Chemical Engineering Alumni Association and the @cal online community. Go to the College's home page at chemistry.berkeley.edu, and click on "Alumni Info." Stay in touch!

Leroy Chiao: An astronaut comes back to Earth

It was a combination of drive and luck that allowed **Leroy Chiao** to become an astronaut. After he graduated from U.C. Berkeley in 1983 with a B.S. in chemical engineering, Chiao headed to U.C. Santa Barbara for his graduate studies. There he discovered that the airport is practically next door to the campus. "Being so close to an airport allowed me to fulfill one of my dreams," says Chiao. "I took flying lessons and became a pilot."

Photo Credit: NASA

Leroy Chiao gives "thumbs up" on the way to the launch pad in Kazakhstan for the Expedition 10 flight to the international space station. Chiao spent over six months in space during this mission.

Chiao's flying and technical skills opened doors quickly. He graduated from Santa Barbara in 1987 with a Ph.D. in chemical engineering and took a job at Hexcel Corporation in Dublin, CA, near his hometown of Danville. At Hexcel he worked on a joint project with NASA to develop polymer composite reflectors for space telescopes. In 1989 he joined Lawrence Livermore National Laboratory, where his father had worked for many years, and he continued his work on aerospace composites.

In January 1990, at age 29 and less than three years after earning his Ph.D., another of Chiao's dreams came true — NASA selected him to be an astronaut. During his 15-year career with NASA, Chiao flew on four missions, including his final mission, Expedition 10, a six-and-a-half month stay aboard the international space station in 2004–2005, on which he was the first Asian-American and ethnic Chinese mission commander in the history of U.S. space flight (see box for details of space missions).

Chiao's last and longest trip in space did not start well. When he boarded the space station in October 2004, he and flight engineer Salizhan Sharipov discovered food stocks were running low. The previous crew had eaten more than planned, but they had failed to notify the ground crew. Chiao and Sharipov went on a mandatory diet and each lost five to ten pounds before the supply ship arrived.

Chiao and Sharipov, a native of Kyrgyzstan in Central Asia, took pride in being the first station crew of all-Asian heritage. Since Chiao's Russian was more serviceable than Sharipov's English, they communicated mostly in Russian during their mission.

The Expedition 10 crew maintained the station and worked with science teams on the ground to operate experiments and collect data. Many of the experiments focused on future, more lengthy space flights. Several looked at human physiology (their own) in long-duration space travel. When he was not busy with other tasks, Chiao kept in touch with students from across the United States via video conferencing, and he even called the Cal football team to wish them luck in the 2005 Holiday bowl.

"One of the highlights of my time in orbit was to look out the window at the Earth and snap photos," Chiao says. As part of his duties, Chiao captured photos and video of the Earth based on suggestions made by a team of scientists before the mission began.

Chiao found that what began as a routine task developed into a passionate hobby, as he gained more interest

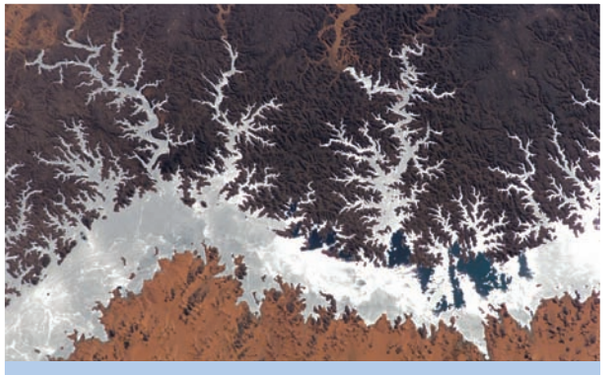
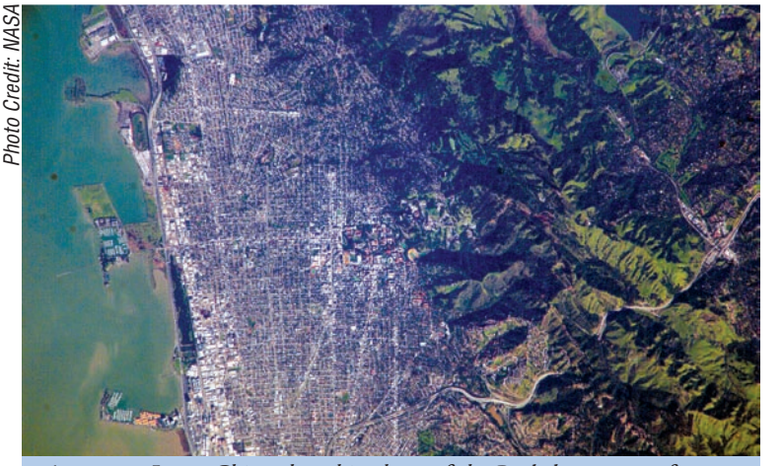


Photo Credit: NASA

The Nile River's Lake Nasser, formed behind the Aswan High Dam, glistens as the space station flies over Egypt. "I was able to shoot this photo just as the sun was reflecting off of the water, making it appear to be liquid metal," Chiao said.

Photo Credit: NASA



Astronaut Leroy Chiao shot this photo of the Berkeley campus from the international space station, 230 miles above the Earth's surface.

and skill in photography. "You know, after a while you just get a little better and a little better, and after six and a half months, you get to take a few good ones," he says.

"I try to be artistic, but I am, in many ways, a typical engineer. Photography in space helped to bring out the artistic side in me," Chiao says. "The beauty of the Earth was very inspiring, and I tried to find new ways to capture and express that beauty," he adds.

Chiao retired from NASA in December 2005, after 15 years with the agency. "Expedition 10 and my being the commander of the space station was the culmination of my career," Chiao says. "It was my chance to bring together all the experiences and skills I learned in my 15 years with NASA. I had done everything I wanted to do as an astronaut, and it was time to let some of the younger people at NASA move up, and time for me to try something new."

In February 2006, Chiao began consulting for the Atlanta engineering firm of SpaceWorks Engineering, Inc., and he works with them on a variety of projects. This fall he will join the mechanical engineering faculty at Louisiana State University in Baton Rouge, LA, where he will hold the new Smiley and Bernice Raborn Chair.

Chiao will commute to LSU from his Houston suburban home, where he lives with his wife, Karen. The couple, married in 2003, live in a neighborhood built around the local airport. Chiao's commute vehicle is his Grumman Tiger single-engine airplane, which he parks in its hanger adjacent to the runway.

Chiao's family has strong connections to UC Berkeley and the Bay Area. His father was an employee at LLNL, and both sisters are Berkeley graduates. His mother, Cherry, returned to school mid-career and earned a Ph.D. in Berkeley's Department of Materials Science and Engineering in 1976. "Both my parents and sisters still live in the Bay Area," says Chiao, "so returning to live and teach there is a possibility in the future."

About his experience at UC, Chiao says, "There is no one area of chemical engineering that specifically helped me in my career as an astronaut; it was more the general training in engineering. It was a very rigorous education and it taught me about a broad spectrum of technical subjects."

As a Chinese-American, Chiao has been nourished by two cultures. In an interview with a reporter from the *China Daily* newspaper, Chiao revealed that his radio call name in space is "Shandong," from the name of the province in China where he still has family members. "My parents always tried to teach us the best of both cultures," he told the reporter, attributing his achievement to "the Chinese ethic of hard work and education and the American ethic of innovation and aspiration."

One of Chiao's favorite memories is launching from the Baikonur Cosmodrome in Kazakhstan on his final mission to the space station. "The Russians are very proud of their accomplishments in space, and I enjoyed being part of a Russian launch. Unlike NASA launches, at Baikonur you walk on the ground in the open air to the rocket, while spectators on the sidelines cheer and call your name."

When Chiao reflects back on his NASA career he says, "In some ways it was good luck that the airport was so close to the Santa Barbara campus and I could learn to fly. But I had dreamed of being an astronaut ever since being a kid in Danville, so I think I would have figured out how to get into space one way or another."

Chiao's space flight experience

Space Shuttle Mission STS-65 Columbia (July 8–23, 1994) launched from and returned to land at the Kennedy Space Center, FL. The STS-65 mission flew the second International Microgravity Laboratory (IML-2). During the 15-day flight, the 7-member crew conducted more than 80 microgravity experiments.

Space Shuttle Mission STS-72 Endeavour (January 11–20, 1996) launched from and returned to land at the Kennedy Space Center, FL. The STS-72 mission lasted for nine days, during which the crew retrieved the Space Flyer Unit (launched from Japan 10 months earlier), and deployed and retrieved the Office of Aeronautics and Space Technology Flyer spacecraft.

Space Shuttle Mission STS-92 Discovery (October 11–24, 2000) launched from the Kennedy Space Center, FL and returned to land at Edwards Air Force Base, CA. During the 13-day flight, the 7-member crew attached a major truss and pressurized mating adapter to the space station.

International Space Station Expedition 10 (October 13, 2004 – April 24, 2005). Dr. Chiao was the Commander and NASA Science Officer of the 10th mission to the International Space Station. Expedition 10 launched from the Baikonur Cosmodrome in Kazakhstan aboard a Soyuz rocket for a six-and-a-half month stay.

Alumni Questionnaire

Today's date _____

Name _____
title first name middle name last name previous name

UC Berkeley degree _____
Chem/ChemE dept? degree or position year and term research director

Degrees from other institutions _____
major degree year institution

Spouse/Partner's name _____

Home address (☐new info.?) _____
street

_____
city state/zip phone fax email

Work or school (☐new info.?) _____
position job function start date

_____
name of organization academic department or company division

_____
street

_____
city state/zip phone fax email

Preferred mailing address: ☐ Home ☐ Work
Preferred email address: ☐ Home ☐ Work

Name and address of someone who will always know how to contact you: _____

_____

For Class Notes (Tell us your news: recent promotions, family additions, exciting trips...)

_____

_____

_____

_____

_____

_____

My signature grants permission for the use of this information in College of Chemistry publications and the alumni directory.

_____
Signed

☐ *I do not grant such permission.*

☐ I want to join the Alumni Association (It's free!) and receive announcements

I want to help by:

☐ Participating in future planning for the association

☐ Planning events in my area (with the assistance of the college)

I am interested in participating in the following:

☐ Lectures or symposia
☐ Social Events
☐ Career Networking
☐ Graduate student recruitment

for office use only:

☐ DR ☐ CN
☐ AC ☐ AA
☐ DE ☐ CR

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University of California
College of Chemistry
College Relations Office
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Berkeley, CA 94720-1460

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Jane Scheiber photo

Rebecca Zuckerman
Chair,
College Alumni
Association

Dear Fellow Alumni,

First of all, I would like to thank the steering team for their participation over the last six months in the events that have been sponsored by the College of Chemistry and its Chemistry & Chemi*cal* Engineering Alumni Association. Their creative ideas and positive attitudes really add to the success of our events. **Dean Charles B. Harris** has been an asset to the organization as well. His affable character and dedication to the college have contributed to the many events that have taken place since he became dean.

I would like to take this opportunity to report on several events that have occurred since last October. The well-attended "AIChE Alumni and Friends Reception" was held on November 1 in Cincinnati, Ohio, hosted by chemical engineering chair Alex Bell. The "Alumni of the G. N. Lewis Era" annual luncheon was held on Thursday, November 17, in the Heyns Room at The Faculty Club. Chemistry chair Michael Marletta was the invited speaker, and he gave a talk entitled "What do blood pressure, sexual function, your immune system and an environmental pollutant have in common? A strange juncture for chemistry and biology." His lively talk was well received by the alumni.

The College of Engineering invited us to participate in their "Real World Engineering" program on February 2, 2006. Five alumni, including our former Chair of the Alumni Association, **Steve Sciamanna** (B.S. '79, Ph.D. '86, ChemE), participated on the chemical engineering panel. The other participants were **Janet Wendorf** (Ph.D. '04, ChemE), **Habib Amin** (Ph.D. '78, ChemE), **Clint Holzwarth** (B.S. '79, ChemE), and **Keith Alexander** (Ph.D. '83, ChemE). The panelists gave our current students valuable insights into the variety of career paths before them.

In early spring, on March 4, the "Cupola Era" alumni luncheon took place at The Faculty Club. It was extremely well attended by 73 alumni, faculty and staff. Professor Emeritus and Alumnus **Howard Mel** (B.S. '48, Ph.D. '54, Chem) gave a talk entitled "Wendell Latimer, Discovery and Tales from Old Gilman Hall." Everyone seemed to have a great time and to be intrigued by the history discussed.

Cal Day, a campus-wide open house for newly admitted students and their parents and the general community, was held on April 22. Two of our outstanding staff scientists, **Mark Kubinec** (Ph.D. '94, Chem) and **Lonnie Martin**, gave a demonstration titled "Molecules, Materials and Us" in Pimentel Hall. Following their demonstration, Associate Dean **Herbert L. Strauss** welcomed the students, their parents, and their questions.

(continued on next page)

College of Chemistry alumni celebrate with the graduating students at the Springfest celebration in The Faculty Club's Great Hall. Shown here from left to right are: G.V. Basbas (B.S. '04, ChemE); Gordon Chu (B.S. '03, ChemE); David Brown (Ph.D. '93, Chem); R.P. Hohmann (B.S. '78, ChemE); Steve Sciamanna (B.S. '79, Ph.D. '86, ChemE); Mark Ellsworth (Ph.D. '93, Chem); Bill Buchan (B.S. '85, ChemE); Fred Lam (B.S. '83, ChemE); Charles Burch (B.S. '86, Chem); Curt Munson (B.S. '76, Ph.D. '85, ChemE); Irena Dragojevic (B.S. '04, Chem); Bruce Stangeland (Ph.D. '67, ChemE).

Alumni News

It's that time of year to celebrate the College's graduating students! Alumni, faculty and graduate students were invited to join the graduating students at a "Springfest" held on May 3 in the Great Hall at The Faculty Club. This event was similar to the very successful Oktoberfest held last fall at the Pyramid Brewery. It was a great opportunity to meet and congratulate our newest alumni.

Mark your calendars for the "ACS Alumni and Friends Reception" on September 11, 2006, in conjunction with the ACS National Meetings. This event will be held at The San Francisco City Club and will be hosted by the college. *All* college alumni are invited to this reception. This will be a wonderful occasion to catch up with old friends, meet new ones, and do some networking.

The 2006 Annual AIChE Meeting will also be held in San Francisco this year. The chemical engineering department will host a complimentary "Alumni and Friends Reception" at one of the main conference hotels on November 14, 2006. Look for a separate mailing.

We are in the process of finalizing a very brief online questionnaire that will be sent to your email address. Please take a few minutes to complete the questionnaire and let us know types of programs, events and venues you would like the association to sponsor. If you aren't sure that our alumni relations office has your current email address, contact Camille Olufson at colufson@berkeley.edu, and she can update your information.

We have some exciting social gatherings and programs coming up, and I hope to see many of you there. As members of the Chemistry & Chemi*cal* Engineering Alumni Association steering team, we value Cal and we volunteer our time because we want to give something back to the university for the positive experiences we had during our time there.

I encourage folks to join the College's alumni association and @cal (Berkeley's online community) via the College's home page (www.chemistry.berkeley.edu). I would also emphasize to alumni the importance of signing up as career networkers. This is a great forum for students to access the plentiful expertise of former Cal students.

Gooo Bears!!

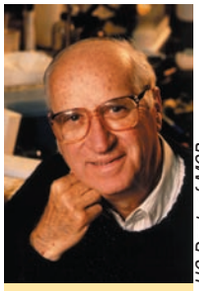
Rebecca Zuckerman
Ph.D. '00, Chem

class notes

by Dorothy Isaacson Read

1941

B.S. UC professor emeritus of molecular and cell biology, **Daniel E. Koshland, Jr. (Chem)**, was named the 2006 winner of the prestigious Welch Award in Chemistry, recognizing his contributions to biochemistry and medical science. Welch Foundation chairman and director, J. Evans Attwell, said, "It is difficult to overestimate the importance of his discoveries and their potential to ultimately improve life." Koshland's "induced fit" theory of enzyme interaction, which posits that enzymes change their shape as they react with other molecules, was first proposed in 1958 and has contributed to advances in drug design and hormone interaction, among other fields. Koshland was also largely responsible for the reorganization of the biological sciences at Berkeley and the concepts behind Berkeley's Health Sciences Initiative. A former editor of *Science*, he is currently doing research in using energy from sunlight to make hydrocarbon fuels.



UC Dept. of MCB

Daniel E. Koshland, Jr.

1942

B.S. Arthur B. Pardee (Chem) is Professor Emeritus at Harvard University and continues to do research on molecular biology and therapies, publish articles, edit books, and consult at the Dana-Farber Cancer Institute. He was previously on the faculties of UC Berkeley (biochemistry) and Princeton. He is a member of, and has been president of, several national scientific societies. His current interests include playing the cello, tennis, travel and reading. He and his wife, Ann Goodman, live in Cambridge, MA, and have a summer home in Woods Hole.

1945

B.S. Donald J. Simkin (Chem), who was a teaching assistant for Prof. Calvin's O Chem class in 1944, was also a Hammerschlag Fellow here from 1947-49. He taught rocket science at UCLA from 1958 to 1969, as well as at the U.S. Air Force Edwards AFB in 1959-60. He also served as the chief of rocket propulsion for the Apollo Lunar Program from 1962 to 1969 at Boeing, from which he retired in 2001 after 41 years. He did research and development in the areas of chemical kinetics in rocket engines, zero-G behavior of liquids, space re-entry dynamics, theory of liquids structure, cyclone extraction, and distillation. He has edited three AIChE books and published 25 papers, and he is listed in the *Who's Who in Engineering* and the *Who's Who in Business and Finance*. Many members of his family, including his sister, his wife, Natalie, their two sons, and a grandson, are UC graduates.

Art Dunlop (B.S. '46, Chem) gets acquainted with Chemistry Chair Michael Marletta at the Dean's Dinner.

1958

Ph.D. Kenneth S. Toth (Chem) spent his career at the Oak Ridge National Laboratory, working as a senior scientist in the Physics Division. He retired in 2000, and he still makes his home in Oak Ridge, TN.

1961

B.S. James R. Divine, PE (ChemE), was recently elected Fellow of NACE International, The Corrosion Society. He is currently chief engineer at ChemMet, Ltd., PC, a consulting chemical engineering firm in West Richland, WA.

Ph.D. Richard T. Meyer (Chem), who is CEO and President of CIC Photonics in Albuquerque, was awarded the 2004 "SBA Technology Exporter of the Year Award" for the New Mexico District. He was recognized for his company's foreign sales, mostly to Asian countries, which increased to 60% of its total revenues.

1965

Ph.D. Donald H. Levy (Chem), Albert A. Michelson Distinguished Service Professor at the University of Chicago, received ACS's E. Bright Wilson Award in Spectroscopy, sponsored by Rohm and Haas. He was honored, with other ACS national award winners, at the 2006 national ACS meeting in Atlanta. <> **Frank B. Miles (Chem)** earned a Ph.D. in mathematics from the University of Washington, and in 1972 he joined the faculty of the mathematics department of California State University Dominguez Hills. Although he retired officially in 2001, he continued to teach part-time through the 2003-2004 academic year. He is now completely retired and enjoying life in Torrance, CA, with his wife, Lyn, who earned a B.S. in bacteriology in 1963. <> **Darsh T. Wasan (ChemE)**, Motorola Chair Professor of Chemical Engineering and Vice President for International Affairs at the Illinois Institute of Technology, received the American Institute of Chemical Engineers' Alpha Chi Sigma Award for Chemical Engineering Research. He was recognized at their October 2005 meeting in Cincinnati for his discovery of the self-organization of nanoparticles in thin films and the resulting fundamental forces stabilizing them, as well as his contributions to applied research to numerous industries over the past ten years.

Professor Emeritus David Templeton (Ph.D. '47, Chem) and Earl Worden (Ph.D. '59, Chem) enjoy the presentation by Professor Emeritus Howard Mel (B.S. '48, Ph.D. '54, Chem) during the Cupola Era luncheon.

1969

M.S. William H. Brown (ChemE) retired in 2001 from his position as senior project engineer with Georgia Pacific in Camas, WA. He and his wife, Susan Larimer, make their home in Vancouver, WA.

Postdoc. Willard M. Welch (Chem) and a team of his fellow Pfizer retirees were awarded the 2006 ACS Award for Team Innovation, sponsored by Corporation Associates, at the 2006 ACS national meeting in Atlanta. They were recognized for their discovery and development of Zoloft, an antidepressant. In an interview with *C&EN*, Welch noted that Pfizer's environment accommodated the kind of informal, inquisitive research that led, serendipitously, to the team's discovery of this highly efficacious drug.

Classnotes

1971

Ph.D. Arlene Blum (Chem) worked actively on relief efforts serving the Himalayan mountain villages devastated by the earthquake in Pakistan last year, helping to bring survivors essential food, shelter, and clothing. She also spent a couple of months in 2005 on book tours for her memoir, *Breaking Trail: A Climbing Life*, in Thailand, where her daughter, Annalise, is setting up an English language program in five Thai villages hit by the tsunami. This spring, Arlene is leading a trek to a remote Buddhist temple on the slopes of Minya Konka in Kham (Eastern Tibet); in November she will journey to the former Himalayan kingdom of Sikkim; and in December she will lead a trek in Burma.

1973

B.S. Randolph L. Howard (ChemE) recently retired from Unocal as Senior Vice President, Global Gas, where he was involved in the commercial side of the liquefied natural gas and piped natural gas business, as well as the oil and gas trading functions. The purchase of Unocal by Chevron in mid-2005 provided the retirement opportunity.

1974

Postdoc. Klaas Bergmann (Chem) was honored in late 2005 with the order-of-merit from the state of Rheinland-Pfalz (RLP), Germany. This award, the highest distinction of RLP, recognizes his outstanding service in the area of science politics.

1975

Ph.D. Steven L. Bernasek (Chem) is the recipient of the ACS's Arthur W. Adamson Award for Distinguished Service in the Advancement of Surface Chemistry. A Princeton University chemistry faculty member since 1975, he is well known for his state-specific investigations of surface reaction dynamics, and for his pioneering contributions to iron surface chemistry and his study of transition-metal-compound surfaces, including metal oxides and ternary compounds. *C&EN* quotes his former research director at Berkeley, **Gabor Somorjai (Ph.D. '60, Chem)**: "Bernasek's contributions to surface chemistry have pioneered the development of new, active areas of research.… He continues to have broad impact and lead the way into new fields of surface chemistry." <> **Keelung Hong (Chem)** became CEO of TLC Biopharmaceuticals in South San Francisco in January 2005. His earlier positions included investigator at California Pacific Medical Center's Liposome Research Laboratory and co-founder and Chief Scientific Officer of Hermes Biosciences Inc.

Ellen and Chat Chatterjee (Ph.D. '71, ChemE) get reacquainted with Jud King, Professor Emeritus and Provost and Vice President–Academic Affairs Emeritus, at the Dean's Dinner.

1978

B.S. Thomas A. Delfino (see 1981 M.S. ChemE)

Ph.D. Joseph P. "Joe" Smith (Chem) is a senior research associate and group leader for environmental technology at ExxonMobil Upstream Research in Houston, TX.

1979

Ph.D. Stephen A. Winkle (Chem) writes that his two teenage daughters keep him busy — the eldest, Marylin, plays cello, and her sister, Cassandra, plays tenor sax. He says they "both like punk rock and are good 'lefties'." Besides being a devoted father, he is also a professor of chemistry at Florida International University in Miami.

1980

B.S. Alarik A. Rosenlund, Jr. (ChemE) returned in January from a four-and-a-half-year position as Service Director for Lam Research Singapore. He is now in Wisconsin, working on energy efficient buildings and building systems.

1981

M.S. Thomas A. Delfino (also 1978 B.S. ChemE) retired in January 2005 from his position as partner and principal chemical engineer at Geomatrix in Oakland. In March 2005, he assumed the role of Executive Director of the California Citrus Nursery Society.

Ph.D. Vera V. Mainz (Chem) is director of the NMR facility, the mass spectrometry lab, and the microanalysis lab at the University of Illinois Urbana-Champaign, and continues to serve as the secretary/treasurer of the history of chemistry division of the ACS. Her husband, **Gregory S. "Greg" Girolami**

(Chem), recently rotated off of his five-year stint as head of UIUC's chemistry department and has returned to full–time research and teaching.

1982

B.S. Roy E. Abendroth (Chem), who earned his M.D. from USC in 1986, plays the trumpet in band gigs by night, but he also keeps his "day job" as a radiation oncologist at California Pacific Medical Center in San Francisco. His primary work is in patient care, but he is also working with a radiobiologist to design potential new radio-sensitizing chemotherapeutic agents.

1983

B.S. Michael R. Hull (ChemE) earned his J.D. from USF in 1990 and last fall started a new patent law firm, Miller, Matthias & Hull, in Chicago. They specialize in patent prosecution and related opinion work.

1985

B.S. William H. "Bill" Buchan (ChemE) has spent the past 20 years helping to commercialize energy and environmental technologies, working for various consulting firms, including Arthur D. Little. Two other Cal degrees — an M.S. in Civil/Environmental Engineering in 1988 and an MBA in 2005 — led to his now operating his own East Bay consulting firm, Market Potential, helping entrepreneurs with energy/environmental technologies to create sustainable businesses.

Ph.D. Jeffrey A. "Jeff" Cina (Chem) wrote a biographical essay on his former research director here, Prof. Emeritus **Robert A. Harris**, which has been published in a special issue of the journal *Molecular Physics* in Harris's honor. Cina is professor of theoretical physical chemistry at the University of Oregon.

1989

B.S. Keith S. K. Lam (ChemE) received an MBA in marketing from Santa Clara University in 2005, graduating with honors. Also in 2005, he left Honeywell Electronic Materials, where he had worked for seven years, and joined Luxtron Corp, in Santa Clara, CA, which specializes in fiber optic temperature measurement systems for semiconductor, optoelectronic, power utility, industrial, and biomedical applications.

Tom Delfino (B.S. '78, M.S. '81, ChemE) relaxes with his father, Frank Delfino (B.S. '51, ChemE), at the Dean's Dinner.

1990

Ph.D. John F. Hartwig (Chem) is the 2006 recipient of the ACS Award in Organometallic Chemistry, sponsored by the Dow Chemical Company Foundation. The Irénée P. duPont Professor of Chemistry at Yale University, Hartwig is being recognized for his contributions to the application of organometallic chemistry and mechanistic principles to the development of new synthetic organic chemistry methods. He will be joining the chemistry faculty at the University of Illinois in July.

1991

B.S. Justin Du Bois (Chem), Associate Professor at Stanford University, was awarded the 2006 ACS Elias J. Corey Award for Outstanding Original Contribution in Organic Synthesis by a Young Investigator, sponsored by Pfizer. The prize recognizes original and insightful work by a young investigator that has had significant impact on the field of synthetic organic chemistry. In an interview for *C&EN*, he expressed his enthusiasm for research areas into which he has delved, including building functional molecules without being constrained by the boundaries of organic/inorganic, and discovering ways in which host molecules can be designed to bind selectively to particular substrates by using models from nature that integrate molecular recognition and catalysis into enzymatic designs. His group's syntheses of heterocyclic amine-derived natural products, including saxitoxin, agelastatin, and manzacidins A and C, have produced neuroactive molecules employed in studying the physiology of voltage-gated ion channels. A landmark achievement was the asymmetric synthesis of the highly complex tetrodotoxin, the guanidinium poison found in the Japanese fugu, or blowfish. Du Bois earned his Ph.D. in 1997 from California Institute of Technology and did postdoctoral research at M.I.T. before joining the Stanford faculty in 1999.

1992

Ph.D. John N. "Jack" Starr (ChemE) recently co-authored the "Lactic Acid" entry for the 2006 release of Ullmann's Encyclopedia of Industrial Chemistry. He is currently Director of Process Technology for NatureWorks LLC (a Cargill subsidiary) in Minneapolis, where he has worked for nine years.

Classnotes

1993

B.S. Dawn A. Shaughnessy (see 2000 Ph.D.)

Ph.D. Raz Jelinek (Chem) has been Chairman of the Chemistry Department of Ben Gurion University, Beer-Sheva, Israel, since August 2005. He and his wife, Dafna, have three boys.

1995

Ph.D. James D. Batteas (Chem) joined the Department of Chemistry at Texas A&M University, in College Station, TX, as an Associate Professor in August of 2005.

1998

Postdoc. Dennis M. Fantin (Chem, also B.A. '72, History; Ph.D. '91, Biophysics), Lecturer in the Department of Chemistry and Biochemistry at California Polytechnic State University, was the inspiration behind "A Vision of Love," a food extravaganza and fund-raiser created by his sister, caterer par excellence Paula LeDuc (B.A. '71, Sociology), for the Living Skills Center for the Visually Impaired in San Pablo, CA. Fantin, who since childhood has overcome the many obstacles of blindness to achieve his goals, has served as a beacon for his sister, who wants to help other visually impaired people to gain skills, confidence, and inspiration to live fulfilled lives.

Nelson Lin (B.S. '85, ChemE), Stacey Baba and Jim Vokac (M.S. '76, ChemE) chat during the Dean's Dinner.

1999

Ph.D. David R. Liu (Chem), Howard Hughes Medical Institute Investigator and Professor of Chemistry and Chemical Biology at Harvard University, received the ACS's Award in Pure Chemistry, sponsored by Alpha Chi Sigma Fraternity and Alpha Chi Sigma Educational Foundation, for 2006. The award recognizes individuals on the threshold of their careers who have already accomplished research of unusual merit, showing originality and independence of thought.

Harvard University Professor David Liu (Ph.D. '99, Chem) has received the ACS's Award in Pure Chemistry.

2000

Ph.D. Madeleine Schultz (Chem) moved back to Australia after her 2000-2001 Humboldt postdoc in Heidelberg, and last year she started doing research at the University of Queensland in Brisbane. Although still working on organometallic synthesis, she has changed from lanthanides during her Ph.D. and late transition metals in her postdoc to early transition metals in her current position. <> **Dawn A. (Keeney) Shaughnessy (Chem, also B.S. 1993)** is a staff chemist at Lawrence Livermore National Laboratory. She and her husband, David Shaughnessy, welcomed a new member of their family, Katelyn Veronica, to the world in February 2006. Both mom and baby have been doing well, and the family is excited about this new stage in their lives.

Postdoc. Martin K. Beyer (Chem) finished his postdoctoral qualification at Technische Universität (TU) Munich in 2004 with **Vladimir Bondybey (Ph.D. '71, Chem)**, and received a Heisenberg Fellowship from the Deutsche Forschungsgemeinschaft. He has been working as a Heisenberg Fellow at TU Berlin since November 2005.

2001

B.S. Richard K. Tsai (ChemE) is pursuing a Ph.D. in bioengineering at the University of Pennsylvania.

2004

B.S. Megan M. Conley (ChemE) traveled in Malaysia, Singapore, and Greece after graduation and, in early 2005, started work at Lockheed Martin Space Systems in Sunnyvale, CA, as a materials engineer. <> **Nicolas J. Londoño (ChemE)** did a co-op with ALZA/PGSA West as a process engineer last year. <> **Anh H. Pham (Chem)** interned as a research assistant at Genentech in 2005 and then enrolled in USC-Caltech's M.D./Ph.D. program.

Ph.D. Alán Aspuru-Guzik (Chem) began postdoctoral work with **Martin Head-Gordon** here in January 2005. He married Dori Kiyomi Aspuru-Takata the following June in Cuernavaca, Mexico. <> **Di Gao (ChemE)** has accepted a position as Assistant Professor in the University of Pittsburgh's Chemical and Petroleum Engineering Department. <> **Ezra C. Wood (Chem)** started a job at Aerodyne Research, Inc. in Billerica, MA, in January 2005. His work as a research scientist in a mobile laboratory has kept him busy on field campaigns in Arizona, Mexico, Cleveland,

and Oakland, measuring vehicle exhaust and air pollution. He writes that it has taken him a year, but he's finally readjusted to East Coast weather.

2005

B.S. Carl D. Aschenbrenner (ChemE) began work on a Ph.D. at The California Institute of Technology last fall, working with **Frances Arnold (Ph.D. '85, ChemE)**. <> **Chester Pok-Chung Chu (Chem)** will start the physics graduate degree program at M.I.T. this fall. <> **Stephen T. Connor (Chem)** will spend two months in Ecuador and Peru following graduation, and he will then start the chemistry graduate program at Stanford on an NSF Graduate Research Fellowship. He also reports that he has "adopted a bundle of slithering joy named Clarice." <> **Michelle (Eastlack) Dyer (ChemE)** married her boyfriend of three and a half years in June of 2005, and they started their new life together in Dallas, where she is a process engineer at Texas Instruments. <> **Pablo Garcia-Reynaga (Chem)** is in graduate school at UC San Diego's Department of Chemistry and Biochemistry. <> **Pavel V. Gurinovich (ChemE)** had a wonderful time on his final spring break before graduation — he and a group of friends, including a number of fellow Cal Bears, camped in Death Valley and Kings Canyon National Parks, experiencing every kind of weather and amazing vistas, "impossible to describe in words." <> **Vu P. Hong (Chem)** started graduate school in chemistry last fall at the Scripps Research Institute in La Jolla, CA. <> **Yung-Jin Hu (Chem)** has been admitted to Berkeley's chemistry Ph.D. program and is working as a grad student in the Nuclear Science division of LBNL. <> **Linda Hung (Chem)** is in a Ph.D. program in applied and computational mathematics at Princeton University. <> When last we heard from her, **Zaihleen S. Keller (Chem)** was planning a trip to Africa and Europe after graduation. <> An application engineer at ExxonMobil's Torrance, CA, refinery since February 2006, **Daniel B. Kim (ChemE)** supports the refinery's control network by tuning control loops, installing and supporting advanced control software, and troubleshooting refinery process issues. <> **Gregory H. Kim (ChemE)** went to Thailand following graduation and is now working for Boeing in El Segundo, CA. <> **Jessica Lam (Chem)** was pleased to end her Cal experience participating in the 13th Annual Chinese Martial Arts Tournament, organized by UC Berkeley with participants from around the world. <> **Denise Lee (ChemBio)** began work this March as a lab technician at Gilead Sciences in Foster City, CA. <> **Wai-Ming "Kevin" Lor (ChemBio)** is attending the University of Washington's Pharmacy School. <> **Joy Ohara (ChemBio)** has a position at the Glaucoma Center of San Francisco.<> **Andrew Pascall (ChemE)** married fellow Cal alumna Lainie Chaney in March 2005. <> **Fatmawati Sim (ChemE)** was excited and happy when her family visited the U.S. for the first time to attend her commencement ceremony. <> **Dawud H. Tan (ChemE)** is doing a co-op with ALZA this term and will go to graduate school in the fall.

Evan Bradley (B.S. '06, Chem), Laura Brozek (B.S. '06, Chem) and Colin Hughes (B.S. '06, Chem) celebrate at the Springfest. Hughes will enter the graduate chemistry program at the University of North Carolina this fall.

Ph.D. John D. Bass (ChemE) is doing a postdoc in the Laboratoire de Chimie de la Matière Condensée at the Université Pierre et Marie Curie in Paris. <> **Gregory J. Beran (Chem)** is doing postdoctoral research in M.I.T.'s Department of Chemical Engineering. <> **Troy L. Cellmer (ChemE)** has started a postdoc in the laboratory of chemical physics of the National Institutes of Health in Bethesda, MD. <> **William R. Dichtel (Chem)** is at UCLA/Caltech doing a postdoc in chemistry. <> **Steven Shipman (Chem)** began his postdoctoral work at the University of Virginia's Department of Chemistry in January of this year. <> **Ian J. Drake (ChemE)** took a position last August as a senior researcher at Rohm and Haas. <> **Joshua J. Kennedy-Smith (Chem)** is a medicinal chemist with Roche Pharmaceuticals in Palo Alto, CA. <> **Ognjen Milijanic (Chem)** has been doing postdoctoral study in the chemistry and biochemistry department at UCLA since last October. <> Also doing a postdoc in chemistry, **Valerie C. Pierre (Chem)** is at the California Institute of Technology. <> **Ola M. Saad (Chem)** took a position at UC Davis, doing postdoctoral research in their Genome Center.

2006

B.S. Sean M. Carroll (ChemE) is heading for the University of Texas at Austin, where he will enter the Ph.D. program. <> **Daran D. Cohn (Chem)** is a medical staff coordinator for the American Medical Forensic Specialists, a job she started in January 2006. <> **Anna J. Elzeftawy (ChemE)** is look-

ing forward to teaching chemistry in a Bay Area secondary school through the Teach for America program. She hopes to inspire young people to enjoy studying science. She's also looking forward to the birth of a new niece or nephew this October, and she hopes to take a trip to Korea with her boyfriend before she starts teaching in the fall. <> **José A. Gómez (ChemBio)** will begin the Ph.D. program in microbiology and immunology at Stanford University <> **Colin O. Hughes (Chem)** will be taking off for the University of North Carolina at Chapel Hill to begin their chemistry graduate program in July. <> **Matthew K. Jeung (ChemE)** is currently researching a cost-effective method of removing arsenic from drinking water by using coal ash coated with ferric hydroxide. He hopes to see this innovation used in Bangladesh, where millions are being poisoned by arsenic in their drinking water. He is passionate about improving water treatment in developing countries, and he plans to attend graduate school in environmental engineering. His final semester here is also being driven by "CHEM-E CAR," a world-wide competition to design, build, and operate an innovative "green" vehicle model. Having earned first place in the Western Regional Competition in spring 2006, his team looks forward to competing in the fall 2006 Nationals. <> **Karen S. Kim (ChemE & NucE)** has been on the technical staff of the nuclear section of EPRI in Palo Alto since June 2005. <> **Russell S. Komor (ChemE)** is a Ph.D. candidate at Caltech, where he has a Department of Defense fellowship. <> **Justin Opatkiewicz (ChemE)**, who is completing a double major with Materials Science, will be attending Stanford as a chemical engineering grad student with Zhenan Bao. He reassures us, though: "I will always be a Cal Bear at heart." <> **Raquel Orozco Alcaraz (ChemE)** spent her final semester studying in Chile. Not only did she visit some of South America's most majestic places, such as the Andes, Macchu Picchu, Patagonia, and Iguazu Falls, but she also gained a new perspective on social issues: she was in Chile when Michele Bachelete became the first woman president of the county, and she had the opportunity to attend seminars of important ministers of Chile and learn about culture, politics, and the world's unaddressed problems. She commented, "Studying abroad in another country should be seriously considered; it has taught me life lessons that I will take with me forever." <> **Jinnie J. Rhee (Chem)** will be pursuing a professional graduate degree at Harvard University. <> An enthusiastic **Wayne E. Sackett (ChemE)** writes that "Cal has been a great experience." He is graduating with a biotech focus in his studies here and a minor in Business Administration. He will start work in July at Valero Energy Corp in Benicia, CA, as an associate process engineer. <> **Ryan M. Spielvogel (ChemBio)** writes that he became engaged in January 2006 and that he'll be starting medical school in August. <> **Sergei Terterov (ChemBio)** begins his medical studies in August at the Keck School of Medicine. <> **Tisha M. Waki (ChemBio)** is finishing her Cal undergrad career with a bang, taking a trip with the Cal Women's Rugby Team to the Florida Nationals. <> **Alexander A. Warkentin (Chem)** is doing a summer internship at Wyeth Pharmaceuticals and will begin his graduate studies in organic chemistry at Princeton University this fall. **Karen M. Webster (ChemE)** will begin her new position at the Valero refinery in Benicia this summer. <> **You Wen Xie (ChemE)** landed a job at Boeing and will start working in late August. <> **Tianjiao Zhang (ChemE)** will be working as a process engineer in the College Grad Program at Samsung Austin Semiconductor, starting in July.

Photo by Jane Scheiber

Raquel Orozco Alcaraz (B.S. '06, ChemE) has returned from an enlightening final semester spent studying in Chile.

Ph.D. Boonchai "Bobby" Boonyaratanakornkit (ChemE) began work in January as a researcher in the Environmental Energy Technologies Division of LBNL. <> **Patricia Wing-Kee Cheung (ChemE)** started a new position in February at Arkema in King of Prussia, PA, as a scientist in their fluorochemicals section. <> **Andrew D. Malec (Chem)** is taking a position as a research scientist in the agrochemicals division of the Stepan Company in Northfield, IL, and will start in June. <> **Dilworth Y. Parkinson (Chem)** starts a postdoc at LBNL's Physical Biosciences division this coming June. <> **Amish A. Patel (Chem)** will start work in September as a strategy consultant for L.E.K. Consulting in Los Angeles. <> **Douglas J. Pitera (ChemE)** has transitioned from his studies to working as a scientist at Amyris Biotechnologies in Emeryville, CA, a biotech startup company that spun out of his graduate lab in the **Keasling** group. <> **Carlos A. Valdez (Chem)** is planning to stay here in the College as a research associate.

Faculty

Professor Alan S. Foss

Alan Foss

Chemical engineering emeritus professor Alan S. Foss died on February 22, 2006, at age 76, after a long illness.

Born in Stamford, CT, Foss earned his B.S. from the Worcester Polytechnic Institute in 1952, and his M.Ch.E. (1954) and his Ph.D. (1957) from the University of Delaware. He joined the Berkeley chemical engineering faculty in 1961, after working for five years at DuPont, and he became a full professor in 1973. He was vice chair of the department from 1967-69, and in 1993 he served as adviser to the student chapter of the American Institute of Chemical Engineers. Foss was also a senior staff scientist at LBNL from 1975 until 1994.

Foss specialized in chemical process control and control system synthesis. He developed mathematical models of chemical reactors and interactive software for training students in process control.

Foss is fondly remembered as the editor of the *Gilman Hall Newsletter.* According to a brief autobiography published in that journal in December 1983, Foss told prospective graduate students that "there must be an irrepressible driving force to go into teaching." Teaching was Foss's driving force. After more than two decades on the faculty, he stated, "The greatest challenge is … our undergraduate students. There, I find that a rather delicate balance is needed in telling, asking, testing, challenging, encouraging, tutoring, correcting, stretching, leading. I am still searching for the right mix."

Foss always thought of himself as a New Englander, having been born and educated there. He acquired his life-long love of lacrosse as a student at the Mount Hermon School in Massachusetts and coached the sport for many years in California.

Foss suffered a stroke in late 1993, but he continued to work on a significant NSF grant in collaboration with George Stephanopoulos of MIT to find new ways to include computation in undergraduate training related to process modeling. He retired in July 1994 but he was recalled to active teaching for the 1994-95 academic year.

Foss is survived by his wife of 45 years, Anna Màthà Foss, of Berkeley and by four children: son Willard (B.S. '86, ChemE); and three daughters, Esther (B.A. '85, Archit.), Emese, and Reka (B.A. '95, Landscape Archit.).

Professor Eugene E. Petersen

Eugene Edward Petersen, professor emeritus of chemical engineering, passed away at the age of 81 on October 27, 2005, after a short battle with cancer. Petersen was a leader in the field of reaction engineering and devoted his career to understanding the key unit of a chemical plant, the chemical reactor, where reactants are transformed into useful products. Through his development of pioneering theories and experiments, he helped transform a field that had been based on observation and experience to one of analytical principles.

Eugene Petersen

Born and raised in Tacoma, WA, Petersen spent 1941 as a pre-engineering student at the University of Puget Sound. He then worked as a tool-and-die-making apprentice before joining the Army, where he served three years (1943-46) as a Private First Class. After completing his military service, he went back to college, receiving his B.S. (1949) and M.S. (1950) degrees in chemical engineering from the University of Washington, followed by a Ph.D. in fuel science from Pennsylvania State University in 1953.

Petersen joined the Division of Chemical Engineering (later to become the Department) as an instructor in 1953 and was appointed a full professor in 1965.

He had a long-standing interest in determining why catalysts failed and how that failure affected the active material. To further his understanding, he developed the Single-Pellet Reactor, an instrument that allows a definitive analysis of chemical, diffusional and poisoning phenomena in catalysis.

Petersen also developed a powerful theoretical model for predicting catalyst performance over its lifetime, and he produced Monte-Carlo simulations of transport and chemical reaction within porous catalysts. He was well known for developing the first detailed model of the operation of a fluid bed reactor and its catalyst regenerator, an important petroleum refining operation.

Petersen performed seminal work on surface reactions, mixing processes, and transport to, from and through solid catalysts. Also, by studying chemical kinetics in conjunction with heat and mass transfer principles, he generated important data that was used by design engineers as they scaled-up successful lab-bench experiments into large industrial reactors.

Petersen was recognized with the 1985 R. H. Wilhem Award in Chemical Reaction Engineering from AIChE for his unique contribu-

tions to the theory and experimental elucidation of catalyst deactivation phenomena. He had more than 90 publications, including his 1965 milestone textbook, *Chemical Reaction Analysis*, which taught generations of students the sophistications inherent in catalytic reaction engineering.

Within the department, Petersen was recognized as a clear, incisive, and encouraging teacher. Over his 38 years on the faculty, he mentored 28 master's students and 27 doctoral students, many of whom went on to have illustrious careers in academia and industry.

Petersen retired in 1991, although he continued to perform research and stay connected with the college. He had many interests, including horticulture, poetry and piano.

A resident of Lafayette, he is survived by his wife of 57 years, Kathryn Dorothy Petersen; a son, Richard; a daughter, Renee Keller; and several grandchildren.

A fund for the Eugene E. Petersen Award in Chemical Engineering has been established in his memory to honor an outstanding chemical engineering student each year. Contributions may be sent to 420 Latimer Hall, University of California, Berkeley, CA 94720-1460.

A symposium in his honor will be held at the AIChE meetings in November in San Francisco. Please check the program for details.

Lecturer Heinz Heinemann

Heinz Heinemann, a long-time lecturer in chemical engineering and a chemistry researcher at LBNL, died November 23, 2005, of pneumonia in Washington, DC, at age 92.

During a 60-year career in industry and academia, Heinemann contributed to the invention and development of 14 commercial fossil fuel processes, received 75 patents and was the author of more than a hundred publications. Among his inventions was a process for converting methanol to gasoline. He also studied coal gasification and liquefaction.

Credit: LBNL

Heinz Heinemann

Born in Berlin, Germany, Heinemann attended the University and Technische Hochschule in Berlin. He received his Ph.D. in physical chemistry from the University of Basel, before coming to the United States in 1938. He became a U.S. citizen in 1944. Over the next forty years, he worked for several petroleum companies, including the Mobil Research and Development Co., where he was manager of catalysis research. After retiring from industry in 1978, Heinemann joined LBNL as a researcher and became a lecturer in the Department of Chemical Engineering.

He was a co-founder of the Catalysis Society of North America and the International Congress of Catalysis. He was also the founder of *Catalysis Reviews* and worked as its editor for 20 years.

Heinemann received many honors, among them election to the National Academy of Engineering, a Distinguished Scientist/Engineer award from the Department of Energy, and the Murphree Award of the ACS.

He is survived by his wife of 10 years, Dr. Barbara Tenenbaum of Washington, DC; daughter Sue Heinemann; and son and daughter-in-law Peter M. Heinemann and Dana Kueffner. His first wife, Elaine P. Heinemann, died in 1993 after 46 years of marriage.

Contributions may be made to the Heinz Heinemann Memorial Fund, 420 Latimer Hall, University of California, Berkeley, CA 94720-1460.

Alumni

1929

William L. Everson (B.S. Chem) passed away on April 20, 2005.

1931

Since 1949, **Henry W. "Hank" Greenhood (B.S. Chem)** made the Photographic Society of America a primary focus in his life. He served on its executive committee in various capacities, including as president, and under his leadership, the organization doubled its membership. He also chaired the awards committee, judged many international and domestic exhibitions, organized and led new chapters of the society, served as a trustee and leader for PSA's memorial endowment fund, and exhibited his own highly rated work. He passed away on August 30, 2005, at the age of 94 in Carmichael, CA. He is survived by his wife, Barbara, and his brother, Edward.

1935

Lloyd L. Farley (B.S. Chem) passed away on January 14, 2006. He had worked at Chevron Research Corporation in Richmond. He is survived by his wife, Melba, and daughter, Judith Buhlis.

Lester M. Makoff (B.S. Chem) passed away on February 17, 2006, at age 93. He is survived by his wife, Florence, sons, Rich and Stephen, and seven grandchildren.

1937


Credit: UC Berkeley

Henrik L. Blum

Professor emeritus of health administration and planning at Berkeley, and a leading innovator in health care reform, **Henrik L. Blum (B.S. Chem)** died on January 3, 2006, at the age of 90. Blum pioneered the field of health planning in an era prior to Medicare and Medicaid, when medical services for the poor and elderly were virtually nonexistent. While a student in chemistry, he met his future wife, Marian Ehrich, and they were married in 1939. He earned an M.D. in 1942 from UC San Francisco and a master's in public health from Harvard University in 1948. He worked briefly at Johns Hopkins University and at Stanford University. From 1950 to 1966, Blum served as health officer for Contra Costa County, where he helped establish numerous public health programs, including vision screening in schools, community mental health, and genetic counseling. In 1966 he joined the UC Berkeley Public Health faculty as a clinical professor. Two years later, he became a professor of community health planning and in 1970 established the school's Program in Planning and Policy. He also held teaching appointments at Stanford University's medical school and, in 1991, after his retirement in 1984, was called back to serve as interim chair of the UC Berkeley-UCSF Joint Medical Program. As a professor, he was an inspirational and influential mentor to his students. His wife of 66 years died in October 2005.

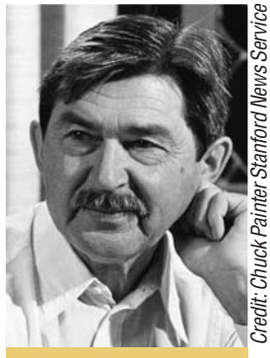
Harold E. Donaldson (B.S. Chem) worked for 31 years with Allied Corp. as a regional sales manager and, in 1980, took a position at the Chicago Gasket Company, where he managed sales for New England, Eastern Canada, and Alberta. He passed away on September 14, 2005, and is survived by his wife, Krystyna, and his children, including his youngest son, Andrew, who earned a Ph.D. in chemistry from Washington University.

1938

Amos S. Newton (B.S. Chem) earned a Ph.D. in chemistry, worked briefly at Eastman Kodak, and then, during the war, worked with Ernest Lawrence at the Lawrence Berkeley Laboratory, where he remained until his retirement as Emeritus Senior Scientist. In his last decades, he enjoyed travel, especially to South America, and was an active and generous member of the College alumni community, including attending numerous G. N. Lewis Era luncheons. He passed away on November 28, 2005, and was predeceased by his wife, Elizabeth.

1940

We recently learned from his widow, Barbara, that **John A. Eakin (B.S. Chem)** passed away on January 19, 2006.


Credit: Chuck Painter Stanford News Service

Henry Taube

Henry Taube (Ph.D. Chem), recipient of the 1983 Nobel Prize in chemistry, died on Nov. 16 at his home on the Stanford campus. He was 89. A member of the Stanford faculty since 1962, Taube was "one of the most creative contemporary workers in inorganic chemistry," according to the Royal Swedish Academy of Sciences, which awarded him the Nobel Prize in 1983 for his insights into how electrons are transferred from one molecule to another during chemical reactions. Born in Neudorf, Saskatchewan, Canada, in 1915, Taube attended the University of Saskatchewan, earning a bachelor of science degree in 1935 and a master of science in 1937. He received a doctorate from UC Berkeley in 1940 and was a chemistry instructor from 1940-41."Henry was always a pleasure to work with, and I think his students all loved him dearly," said Stanford chemistry Professor **John Brauman (Ph.D. '63, Chem)**, a long-time colleague. "He was quite an extraordinary scientist and a wonderful human being. All of us feel we've suffered a major loss." Taube is survived by Mary Taube, his wife of 53 years, of Stanford, CA; sons Karl Taube of Riverside, CA, and Heinrich Taube of Chicago; a daughter, Linda Taube of Galway, Ireland; and five grandchildren. His stepdaughter, Marianna Taube, died of cancer in 1998.

1941

John W. Scott (B.S. Chem). See 1951.

1942

Frank W. Anders (B.S. Chem) passed away on March 13, 2006. He was retired from Q-Tag Incorporated and living in San Diego with his wife, Paula.

Lee R. Artoe (B.A. Chem) passed away on April 1, 2005. He had lived in Wilmette, IL.

Robert L. Cochran (B.S. Chem) passed away on February 27, 2006.

Armand G. Guibert (B.S. Chem) earned an M.S. in mechanical engineering from Berkeley in 1952 and worked as a patent agent for SCM Corporation. He and his wife, Frances, lived in San Juan Bautista, CA. He passed away on December 9, 2005.

In Memoriam

Glen H. Whalen (B.S. Chem) and his wife, Barbara, had made their home in El Cerrito, CA. He passed away on June 29, 2005.

1943

Mark E. Blakely, Jr. (B.S. Chem) passed away on February 11, 2006. A native San Franciscan, he served in WWII as an artillery and infantry officer and later attended Moody Bible Institute and Dallas Theological Seminary. He was employed by El Paso Natural Gas as an engineer from 1953 to 1982 and retired as their manager of pipeline design. He also served as a minister at Coronado Nursing Home for more than 30 years. He is survived by his wife of 61 years, Alma, and by their five children, 12 grandchildren, and three great grandchildren.

Charles W. "Charlie" Kitto (B.S. Chem) started work at Standard Oil (now Chevron) in 1943 as a research engineer and managed their refineries in El Paso and then in El Segundo. He returned to live in San Rafael, CA, and rose to become Vice President and Director of Chevron before his retirement in 1986. He passed away on December 4, 2005, and is survived by his wife of 62 years, Eleanor, their two children, two grandchildren, and three great grandchildren.

John A. Miskel (B.S. Chem) worked at the Los Alamos Labs from 1943 to 1946 before earning a Ph.D. in 1949 from Washington University. He worked at the Brookhaven Lab from 1949 to 1955 and in the Nuclear Chemistry Division of the Livermore National Lab from 1955 until his phased retirement in the late 1980s. As a member of the alumni community, he was much involved in the well-being of the College and a regular attendee at the G. N. Lewis Era luncheons and other College events. He passed away on August 19, 2005; his wife, Annamae, predeceased him.

Retired from Del Monte Corporation and living in Berkeley with his wife, Jean, **Wayne W. Thornburg (B.S. Chem)** passed away on February 13, 2006.

1944

Joseph A. Eckart (B.S. Chem) passed away on August 19, 2005. He was living in Moraga, CA.

1945

After a career at LBNL, **Eileen R. (Carson) Leon (B.A. Chem)** was very active during retirement in Bay conservation and protection efforts with her husband, Ralph. They kept fit while enjoying Bay Area nature, volunteering on behalf of the East Bay Regional Parks and supporting groups such as Save the Bay. She passed away on January 31, 2005.

1948

After leaving Berkeley, **Daniel R. Miller (Ph.D. Chem)** took a position as assistant professor of chemistry and nuclear studies at Cornell University. In 1951 he joined the staff of the Atomic Energy Commission's Division of Research, rising to become Assistant Director for Chemistry Programs and then Deputy Director of the division. He continued in this role in the successor organizations of ERDA and DOE, retiring in 1979. As a consultant following his retirement, he assisted in the administration of the DOE Small Business Innovation Research Programs. He passed away on February 2, 2005.

L. Dallas Tuck (Ph.D. Chem and 1939 B.A.) passed away on May 12, 2005. At the time of his death he was Professor Emeritus at UC San Francisco's School of Pharmacy. His wife, Grace, survives him.

1949

Larned B. "Larry" Asprey (Ph.D. Chem) passed away on March 6, 2005, just before his 86th birthday. In 1944, he was assigned to the Manhattan Project's effort to separate and purify plutonium under Glenn Seaborg. He was among 70 scientists who petitioned President Truman in 1945 to seek every avenue of resolution to the war with Japan before deciding to use the atomic bomb, warning that the nation that "sets the precedent of using these newly liberated forces of nature for purposes of destruction may have to bear the responsibility of opening the door to an era of devastation on an unimaginable scale." Asprey worked for 35 years at Los Alamos National Laboratory, retiring in 1986. Regarded by fellow scientists as one of the giants of actinide and fluorine chemistry, he published approximately 150 papers and held eight patents. He received the Glenn T. Seaborg Actinide Separations Award and the Los Alamos Distinguished Service Award. He is survived by Margaret "Marge," his wife of more than 60 years, and six of their seven children.

William J. "Billy" Colen (B.S. ChemE) was president and owner of Bilco Corporation, a manufacturer of brick in the Dallas-Fort Worth area of Texas, since the mid 1950s. He passed away on October 12, 2005, and is survived by his wife, Artyce.

An emeritus professor of chemistry at Arizona State University, **LeRoy Eyring (Ph.D. Chem)** passed away on November 28, 2005, and is survived by his wife, LaReal.

Retired from North American Aviation as a facilities engineer, **William R. Heath (B.S. Chem)** lived in Torrance, CA. He passed away on November 11, 2005.

David E. Hilands (B.A. Chem) passed away on July 15, 2005. He and his wife, Evadne, had lived in Hillsboro, OR.

Konrad Semrau (M.S. and 1948 B.S. ChemE) worked as a member of the "special engineer detachment" of the Manhattan Project in Oak Ridge, TN, before coming to Berkeley. Following graduation he joined the Stanford Research Institute, where he worked as a chemical engineer until his retirement in 1989, after which he did consulting work. From 1986 onward, he dedicated much time and energy to the California Advocates for Nursing Home Residents, helping to change laws to allow residents and their families to seek legal remedy for abuse, as well as serving on CANHR's board of directors as treasurer, vice president, and president. He was greatly appreciated as a long-time supporter of the College of Chemistry. He passed away on March 8, 2006, in Chico, CA.

Kenneth Street, Jr. (Ph.D. Chem, 1943 B.S., and former faculty member) passed away on March 13, 2006, at the age of 86, near his home in California's northern mountains. A native of Berkeley, after earning his undergraduate degree, he completed the Navy pre-flight program at St. Mary's College and took a commission as a second lieutenant in the Marine Air Corps. During the war, he served in the South Pacific as a fighter pilot in Okinawa and the Philippines, earning the rank of first lieutenant, the Air Medal, and the Distinguished Flying Cross. While on leave, he married his childhood sweetheart, Jane Armitage (B.A. '42, General Curriculum). Following the war, Street returned to Berkeley to earn a Ph.D. with Glenn Seaborg in 1949 and was appointed to the chemistry faculty that same year. From 1952 to 1959, he served Livermore Radiation Lab successively as department head, associate director, and deputy director. He then returned to Berkeley's chemistry department, where he taught and did research in molecular beam electric-resonance spectroscopy, nuclear chemistry, and nuclear reactions, leaving again in 1974 to devote himself to his work at the Lawrence Livermore Lab, from which he retired in 1986. Street is survived by his wife of 62 years, two of their three children, Christine Meigs and Steve Street, six grandchildren, and five great grandchildren.

Alan H. Vanderbilt (B.S. Chem) taught chemistry at both Placer High School and Sierra College in California's Sierra foothills since 1954, where he also served as chair of the science division and as president of the Sierra College Faculty Association. He passed away on September 2, 2005, and is survived by his wife, Joanne.

Professor emeritus of chemistry at the University of Maine, **James L. Wolfhagen (Ph.D. Chem)** had retired in 1986 and was living in Orono, ME, with his wife and fellow alum, **Helen J. (Stephey) Wolfhagen (Ph.D. '51, Chem)**, who survives him. He passed away on March 13, 2006.

1951

Merle E. Jones (M.S. Chem) passed away on February 17, 2005. Retired from General Electric Company, where he was a lead engineer/chemist, he was living in Sioux Falls, SD, with his wife, Shirley.

John W. Scott, Jr. (M.S. ChemE and 1941 B.S. Chem), Berkeley native and the inspiration behind the formation of the "Alumni of the G. N. Lewis Era," passed away on January 3 at age 86. His education in the college was interrupted by active duty in the army, where he served as a captain. He spent a distinguished 38-year career at Chevron Research, becoming Vice President in 1967 and retiring in 1984. The holder of 36 patents, mainly in process development and catalysis, he was elected a Fellow of AIChE and a member of the National Academy of Engineering. He was among the college's most active and generous alumni, serving on the Chemical Engineering Department's Advisory Board and as a Trustee of the UC Berkeley Foundation, which honored him with the Trustees Citation in 1991 for his work in establishing the G. N. Lewis Era Fund. He is survived by his wife of 64 years, Jane Newman Scott (B.A. '70, Biochemistry), five children, including **Charles Scott (B.S. '72, ChemE)**, four grandchildren, and his cousin, Prof. Marian Diamond.

1952

Richard J. Borg (M.S. Chem and 1950 B.S.) earned a Ph.D. from Princeton University and held simultaneous appointments as a division leader at Lawrence Livermore National Lab and as a professor at UC Davis, doing research focused primarily on Mössbauer spectroscopy and magnetic spin glasses. The two textbooks he authored, *An Introduction to Solid State Diffusion* and *The Physical Chemistry of Solids*, are still in use. He retired to Sea Ranch, CA, in 1990 and passed away on January 4, 2006. He is survived by his wife, Iris Y. Borg (B.A. '50, Ph.D. '53 Geology) and their son, also a Berkeley alumnus.

1955

It was recently reported to us that **Robert E. De La Rue (M.S. ChemE and 1950 B.S.)** had passed away. He was principal of Robert E. De La Rue Associates, his consulting firm for 22 years. With over 450 U.S. and international client companies, De La Rue provided market research and business strategy studies in a wide range of market sectors. He also published a book, *Solar Space, Hot Water and Swimming Pool Heating Markets*. Retiring in the early 1990s, he enjoyed photography and extensive travel with his wife, Luisa. They had made their home in the San Jose, CA, area.

In Memoriam

Don W. Noren (B.S. ChemE) was founder, president, and chief design engineer of Noren Products, Inc. of Menlo Park, a manufacturer of products based on heat pipe technology. A member of the Golden Bears basketball team, he served in the Army for two years after graduation and then worked for Litton Industries before starting his own company in 1968. He held more than 50 patents. Noren passed away on November 3, 2005, and is survived by his wife, Merillyn, three children, and four grandchildren.

1959

Wilmer L. Reed (Ph.D. Chem) passed away on March 6, 2005. He had been professor of chemistry at De Anza College and lived in Cupertino with his wife, Janet, who survives him.

1961

UC Professor Emeritus **Rodney J. Arkley (Ph.D. Chem and 1940 B.A.)**, of the Department of Environmental Science, Policy, and Management, passed away on October 31, 2005. His work had focused primarily on soils and plant nutrition, and he authored numerous articles in those areas. He and his wife, Ruth, lived in Berkeley.

Louise K. Peterson (B.S. Chem) worked as a research technologist in the department of chemical engineering at the University of Washington. She and her husband, James, who survives her, made their home in Seattle. She passed away on June 29, 2005.

1963

David C. Whitney (Ph.D. Chem) was a professor of computer information systems in the Business Department of San Francisco State University, where he inspired and coached such future luminaries as Gilman Louie (of Hasbro and In-Q-Tel fame), who spoke of Whitney's teaching with great appreciation. Whitney passed away on March 15, 2006.

1964

George L. Horvath (B.S. ChemE), who had been an engineering manager for James River, Inc. in Cincinnati prior to moving to Novato, CA, passed away on July 14, 2005. His wife, Barbara, survives him.

1966

Raymond B. Kropp (B.A. Chem) earned an M.D. from UC San Francisco in 1970 and became medical director of the San Francisco SurgiCenter. He passed away on January 23, 2005, and is survived by his wife, Marjorie.

1967

Donald R. Gentner (Ph.D. Chem) passed away on June 12, 2005. He had worked as a designer at Sun Microsystems and lived in Palo Alto with his wife, Judith.

1969

Dennis B. Patterson (Ph.D. Chem) worked, most recently, as chief scientist with Hughes STX and Phillips Labs. He and his wife, Ann, lived in San Diego, CA. He passed away on May 8, 2005.

1970

James S. Ritscher (Ph.D. Chem) passed away on May 12, 2005. Retired as Witco Corporation's director of process research and development, he and his wife, Karen, resided in Cody, WY.

1982

Ron L. Batstone-Cunningham (Ph.D. Chem) was tragically killed at the age of 49 in an auto accident, when an oncoming car crossed the median and hit him on January 11, 2004. He had taught at various universities, including Clemson University, the University of South Dakota, and the University of North Dakota, and he then became a medical laboratory scientist in Grand Forks, ND. His daughter, who suffered broken bones in the crash, and his wife, Elizabeth, both survive him.

1985

Josiah W. Powell IV (B.S. Chem), a chemist for the U.S. Food & Drug Administration in Alameda, CA, was living in Houlton, ME, at the time of his death on March 23, 2005.

1993

Christopher J. Collins (B.S. Chem) was a postdoctoral fellow with R. Kip Guy at UC San Francisco and then worked as a researcher at SRI International. He passed way on August 26, 2005.

We say goodbye to our graduating students
and hello to our newest alumni
with the gift of our college mug.

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Upcoming Alumni Events

ACS Reception for Alumni and Friends

September 11, 2006, 6:00 – 8:00 p.m., The City Club of San Francisco.
All college alumni are welcome to attend this complimentary, festive event during the ACS National Meeting in San Francisco. Reservations are required by September 5, 2006, to colufson@berkeley.edu or by calling (510) 643-7379.

Homecoming and Parents Weekend

October 7, 2006, 10:00 – 11:00 a.m. in 180 Tan Hall, Berkeley Campus.
Assistant Professor of Chemistry Christopher Chang will present a lecture entitled **"Metals on the Brain: Towards Understanding the Chemistry of Aging."** Alzheimer's disease—and other serious human disorders where age is a risk factor—are connected to changes in the body's metabolism and metal nutrient status. Hear how Chang's group is studying the chemistry of the brain with the long-term goal of understanding, diagnosing, and possibly treating these grave neurodegenerative diseases. Prior to the lecture, join us for a complimentary continental breakfast and espresso drink in the Tan Hall lobby from 9:30 to 10:00 a.m.

"Free Radicals" and "CHEMillenium" Alumni Era Brunch

Saturday, October 7, 2006, 11:00 – 1:00 p.m., Heyns Room, The Faculty Club.
After hearing Christopher Chang's lecture, head over to The Faculty Club for a brunch with fellow classmates and alumni from the graduating years of 1963 – 1999. Talk with Professor Chang's graduate students and view their research posters. For registration, go to http://chemistry.berkeley.edu/alumni/events.html. Reserved parking will be available. Children are welcome at this casual event!

AIChE Reception for Alumni and Friends

November 14, 2006, 7:00 – 9:00 p.m., location to be announced.
Join us for this annual reception in connection with the AIChE Annual Meeting, to be held in San Francisco. Check for more details online as the date approaches.

"Alumni of the G. N. Lewis Era" Luncheon

November 16, 2006, noon – 2:00 p.m., Heyns Room, The Faculty Club.
Alumni and friends from the pre-1945 graduating years are invited to attend this annual luncheon. Dr. Patrick Coffey will be presenting a talk entitled **"Gilbert Newton Lewis: His Life and Death."** Look for a separate mailing in early fall.

MIT-Stanford-UC Berkeley Nanotechnology Forums

Check the homepage at http://mitstanfordberkeleynano.org/ for more information on these monthly nanotech forums.

Information

For a list of all College of Chemistry seminars and upcoming events, please contact the editor at 510/642-6867 or *m_barnes@berkeley.edu*. Please note that all college publications are posted on our website: *http://chemistry.berkeley.edu.*