ChemiCAL Science and Engineering

College of Chemistry, University of California, Berkeley
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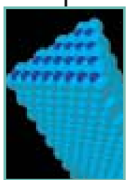
2 New professors join the College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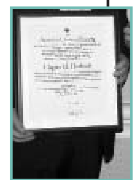
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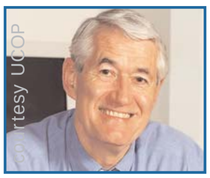
Birgeneau and Chu to lead campus and LBNL



Robert Birgeneau

Robert J. Birgeneau, an internationally distinguished physicist and respected academic leader, has been named the new chancellor of the University of California, Berkeley. He will take office in October 2004.

"Everything Bob Birgeneau has done has prepared him to be chancellor of UC Berkeley," said **Robert Dynes**, UC President, in a press release. "He is a distinguished scientist of the highest academic caliber, known internationally as a leader in his field. He is a compassionate and courageous man who possesses a deep commitment to social equity and to the social responsibilities of a public university. He also is one of the most highly sought-after leaders in higher education today, and we are extremely proud to be bringing him to the University of California."

Birgeneau immediately addressed some of the more urgent issues at Berkeley in his first press conference, pledging to increase the accessibility and funding for the campus. He also plans to encourage interdisciplinary research as the best way to solve some of the more pressing global issues.

He has served as president of the University of Toronto since 2000 and was previously Dean of the School of Science at the Massachusetts Institute of Technology, where he spent 25 years as a faculty member. He has been elected a foreign associate of the National Academy of Sciences, has received numerous awards for teaching and research, and is one of the most highly cited physicists in the world.

Up on the hill, another world-class scientist is taking the reins. Nobel laureate **Steven Chu** is the new director of Lawrence Berkeley National Laboratory.


Roy Kaltschmidt, LBNL

Steven Chu

Chu, a faculty member at Stanford University for 17 years, is one of three co-winners of the 1997 Nobel Prize in physics, which was awarded for the development of methods to cool and trap atoms with laser light.

His appointment as LBNL director, effective August 1, comes 28 years after he earned his Ph.D. in physics at UC Berkeley. "It feels like a homecoming," Chu said at a July 27 press conference.

ScienceMatters@Berkeley

ScienceMatters@Berkeley is a new monthly on-line research magazine launched jointly by the Colleges of Chemistry and of Letters & Science. It is designed to showcase the latest discoveries and exciting scientific research, as well as the scientific legacy of these two programs.

The response to the inaugural edition in August was tremendous, according to **Geoffrey Owen**, Dean of the Division of Biological Sciences. "These are exciting times where many disciplines are merging together and new discoveries are being made."

The first two issues highlight the cutting-edge work done by chemistry faculty members **Paul Alivisatos**, **Jennifer Doudna**, and **Carlos Bustamante**, among others. Both alumni and non-alumni can subscribe to the magazine and receive monthly email notification when a new issue goes on-line.

Visit the site at http://sciencematters.berkeley.edu .

New Faculty Members

Chris Chang: Optical markers for neurological imaging

Chris Chang, a new assistant professor of chemistry, is working on novel ways to image metal ions and oxidative bursts in the brain. By developing small-molecule probes specific for essential nutrients —copper, iron, zinc, magnesium—and products from oxygen metabolism, he envisions a way to trace some of the suspected key players in neurological disorders such as Alzheimer's and Parkinson's diseases.

"One major focus of my research is to develop non-invasive optical imaging agents that will complement existing MRI technologies while providing superior molecular resolution," Chang said.

"We want to know how the brain uses metals and how they trigger cascades of oxidation and reduction biology," explained Chang. "Metals are important because there is a large body of clinical and laboratory evidence that oxidative damage plays a key role in aging and neurological diseases. But not much is known about the roots of this process, particularly on the molecular scale; the basic science is unknown.

"One striking fact," he continued, "is that the brain makes up just 2 percent of body weight but uses 20 percent of the oxygen we breathe in—ten times more than would be expected!

"Additionally, there are fewer defenses and more sensitive sites to lose in brain tissue. Brain cells also have lower anti-oxidative and regenerative capacities than most cells while having more proteins and nucleic acids—vulnerable sites for oxidative damage."

It is well known that oxidative stress can contribute to neurodegeneration. The brain contains particularly large amounts of fatty lipids, proteins, and nucleic acids that, when attacked by oxygen-based free radicals, undergo peroxidation (oxidative damage). That leads, in turn, to cell malfunction and eventual cell death. Scientists in the field have performed a lot of research pointing to reactive oxygen species involved in Alzheimer's disease.

Filled with glow-in-the-dark fluorescent materials in round beakers, Chang's lab is a lot like a hippie den—just throw in some tie-dyed clothes to go with his round glasses. But the glowing liquids in Chang's beakers contain optical markers. When these molecules bind a chosen species of interest and are stimulated by light, they respond by becoming excited and re-emitting light of varying colors (fluorescence) that can be captured and measured by highly sensitive optical equipment. These optical markers can then be used to follow the path of oxidation events in dissociated neurons, intact tissue, and ultimately in living organisms.

Musing further on his work, Chang said, "We want to know—as is the heart of science—just how does nature work? As a chemist, I know how to think about new molecules and how to tweak them to study living systems at the molecular level.

"I started my career as a classically trained synthetic chemist thinking about how to design and make molecules from scratch," he noted. "I focused on going from step A to step Z in a synthetic scheme and characterizing the properties of what I had made."

His Ph.D. research in Dan Nocera's group at M.I.T. dealt with small-molecule activation chemistry catalyzed by proton-coupled electron transfer processes, with particular interest in energy-conversion reactions.

But a postdoctoral fellowship in Steve Lippard's group at M.I.T. opened Chang's eyes to the "bio" in bioinorganic chemistry. He has spent the past two years studying the functions of zinc in neurobiology with synthetic fluorescent imaging probes, laying much of the foundation for his current research.

In addition to mapping oxidation chemistry in the brain, Chang will design and develop reagents that catalyze bond-making and bond-breaking reactions of small molecules under mild conditions. "Nature can utilize a single active site to perform a variety of chemical reactions by fine-tuning the chemical reactivity of the molecular framework surrounding the site.

"Along these lines, we are creating synthetic systems that can catalyze different reactions using a single conserved active site," he explained.

Chang has won numerous awards in his young career, including a Fulbright scholarship, which funded a year of study in France before he went to graduate school; an NSF Predoctoral Fellowship

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Richmond Sarpong: Synthetic natural products

"My research draws heavily upon traditional approaches to synthesizing natural products and developing new methods," said Richmond Sarpong, an incoming assistant professor of chemistry. "However, my students and I will also develop new strategies and tools to synthesize biologically active compounds as well as novel materials more efficiently."

Sarpong's targets, natural products, are exactly that—products from nature. They are often a source of medicines and usually provide a starting point for the development of pharmaceuticals. "Most of the compounds we are interested in making will either help the alleviation of pain or further aid the development of anti-cancer therapeutics," he said.

Since they are derived from a wide range of plants and trees—both marine and terrestrial—most natural products are limited in quantity. "Our research places us in a position to make sufficient amounts of material to further biological testing, since very small amounts of the compounds of interest are usually available from the natural source.

"Further, because of the expertise that we gain during the synthesis of natural products, we are better equipped to design analogs of these compounds for the development of pharmaceuticals."

In general, Sarpong is interested in defining new ways of making carbon-carbon bonds that will enable more efficient ways to build natural products. He plans to use new methodology to work toward one of the preeminent challenges of organic chemistry: to design function as rationally as scientists are now able to design structure.

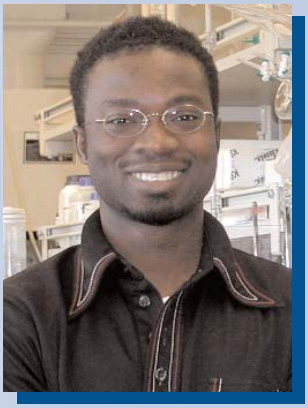
Born in Ghana, Sarpong grew up in various parts of Africa and received his secondary school degree in Botswana. After earning his B.A. in chemistry at Macalester College, he did doctoral research at Princeton on preparing functional analogs of the enediyne antitumor antibiotics, potent drugs that cleave DNA. He then pursued postdoctoral research with Brian Stoltz at Caltech, where he was part of a team that completed the first total synthesis of the protein phosphatase inhibitor dragmacidin D, and subsequently he developed methods to access a series of 7- and 5-membered ring-fused bicyclic compounds.

A talented chemist and scholar, Sarpong is happy to be here. "Berkeley stands out as the premier institution for chemistry that fosters a relaxed atmosphere between faculty and students.

"Professionally, I hope to develop as an effective teacher and mentor. It is important to me to prepare, encourage and get the next generation of scientists excited about chemistry and science in general. I am very interested in encouraging women and people from under-represented backgrounds to pursue careers in science, since having diverse viewpoints encourages a fresh perspective on devising solutions to problems."

Sarpong smiled and said without a trace of accent to betray his Ghanaian roots, "Most people are surprised to learn that I did not grow up in the United States. And I think my students would be amazed to learn that I am actually a pretty good cook…provided I am following a carefully written recipe, of course!"

His students may be most surprised to learn about his track star past. When Sarpong talks about his academic philosophy, he uses racing vocabulary and equates research to training for a race.



His background as an athlete figures prominently in his telling of one of his proudest personal achievements. "I had been an accomplished sprinter in college but was hopeless at longer distances. As a second-year graduate student I had promised myself that I would complete five miles in less than 40 minutes before I completed graduate school, which seemed far away at that time. I marked out the course the day after my second-year orals and over the next three years steadily worked on improving my endurance with a three-mile jog once or twice a week. The morning after my final thesis defense, I was able to complete the five-mile run in 38 minutes. I even had a little sprint at the end! This process really taught me that I could do almost anything if I diligently prepared for it, as long as the goal was reasonable. I'm still not going to run a marathon!

"It is important to set short-term goals to successfully reach the final goal—be it a complicated total synthesis, a new reaction, or a personal best on the track," he said with a smile.

Most of the compounds we are interested in making will either help the alleviation of pain or further aid the development of anti-cancer therapeutics.

Research *Highlights*

Controlling the Growth of Nanowires

Nanowires are long, thin, small wires less than one-hundredth the width of a human hair. Nanowires made from gallium nitride have enormous potential for use in high-power, high-performance opto-electronic devices. Already, they have shown promise in blue-light emitting diodes, short-wave-length ultraviolet nanolasers, and biochemical sensors.

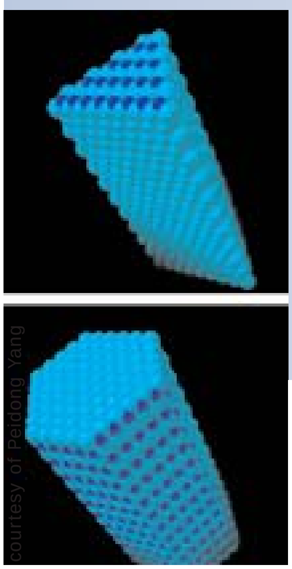
As they work to discover the best way to grow groups of nanowires for nanoscale device applications, scientists have learned how to control the position, composition, and dimensions of the nanowires.

Now chemistry professor **Peidong Yang** and his colleagues have shown, for the first time, that the direction that gallium nitride nanowires grow in can be controlled. The direction of the crystallographic growth determines the nanowire's cross-section, critical to determining the wire's electrical and thermal conductivity and other important properties. The key is to select the appropriate substrate for the desired nanowire.

In a recent publication in *Nature Materials*, Yang and his group used lithium aluminum oxide and magnesium oxide as substrates. The crystals of both materials are geometrically compatible with gallium nitride crystals, but the lithium aluminum oxide features a two-fold symmetry that matches the symmetry along one plane of the gallium nitride crystals, whereas the magnesium oxide has a three-fold symmetry that matches gallium nitride symmetry along a different plane.

Consequently, because of the different growth directions, cross-sections of the gallium nitride nanowires grown on lithium aluminum oxide form an isosceles triangle, whereas the cross-sections of those grown on magnesium oxide are hexagonal.

Yang and his coworkers are now working to use nanowires to produce nano-devices such as a light-emission diode or a transistor.



Gallium nitride nanowires with an isosceles triangle cross-section (top),and a hexagonal cross-section (bottom.)

How Worms Sniff out Oxygen

Most of the time, we take oxygen for granted. Humans survive and thrive in the 21 percent of oxygen in ambient air, and it's only when we brave extreme environments—climbing mountains or diving in the deep ocean—that we pay attention to that double-bonded molecule of element number 16. But organisms that live in atmospheres with tremendous variations in oxygen levels, such as in the soil, have to constantly sense and adjust to these levels at all times. How do they do it?

Chemistry professor **Michael Marletta** and his coworkers, in collaboration with Cornelia Bargmann's lab at UCSF, have an answer now to how the tiny nematode worm known as *C. elegans* detects oxygen levels in order to avoid regions with higher or lower levels of oxygen, which can be harmful.

The discovery of the nematode oxygen-sensing mechanism began as a side project, spun off from the main investigation into guanylate cyclase, a human enzyme that interacts with nitric oxide in many of its signaling roles, including blood vessel dilation. When nitric oxide enters a human cell it activates guanylate cyclase, which catalyzes the formation of cyclic GMP, a molecule that relaxes and thereby dilates blood vessels.

"When we took apart the guanylate cyclase protein to study nitric oxide signaling, we found that the binding site is a heme molecule almost identical to the heme molecule that gives hemoglobin its red color and binds to oxygen," said Marletta. "However, whereas the heme molecule in hemoglobin cannot discriminate between oxygen and nitric oxide, the heme molecule in guanylate cyclase only binds with nitric oxide. Somehow, nature engineered a way for the guanylate cyclase to screen out the oxygen, which is usually present in much higher concentrations than nitric oxide."

A better understanding of how these enzymes differentiate between nitric oxide and oxygen will impact biology, including research into human cardiovascular diseases.

In their experiments, the researchers also discovered that the worm doesn't like as much fresh air as people do. Nematodes are grown in laboratory in ambient air, which contains human-optimal 21 percent oxygen. But Marletta's experiments showed that the nematodes appear to prefer less.

"The bordering and clumping that worm experts refer to as social behavior is really the worms, in an artificial setting like a Petri dish, trying to get to an area of six percent oxygen," he noted.

Turning the HIV virus on itself

In a biological version of fighting fire with fire, chemical engineering professor **David Schaffer** and his colleagues are designing a genetically modified form of the HIV virus to prevent HIV infections from developing into AIDS. The new virus, which exists only as a theoretical model and has not been synthesized, is known as crHIV-1 (which stands for conditionally replicating HIV-1) and has performed well in computer simulations.

"At this time we are nowhere near an AIDS therapy, but our model does show great promise in simulations and we're very excited about this line of research," said **Adam Arkin**, professor in bioengineering and one of Schaffer's collaborators, along with graduate student **Leor Weinberger**, who was instrumental in formulating the initial concept and subsequent development of this crHIV-1 model.

Many in the public still equate HIV (Human Immunodeficiency Virus) with AIDS (Acquired Immune Deficiency Syndrome), although they are two separate things. Persons infected with the HIV parasite gradually lose their ability to fight off disease and infection. AIDS is declared only when the victim's immune system becomes depleted beyond a critical level and opportunistic infections and other diseases arise as a result.

The characteristics of an HIV infection, specifically the presence of long-lived, latently infected cell populations, make it unlikely that it can be completely eradicated through the use of antiviral drugs. An alternative approach is to manage the infection so that it is no longer life-threatening.

"The idea is to reduce the virus population and thereby delay or even prevent the onset of AIDS," said Arkin. "This could be done by creating a parasite of HIV, crHIV, that would suppress production of the HIV parasite by converting latently infected cells into a pseudo-latent state."

Explains Schaffer, "Our design introduces only two new parameters. The first is the ability of the parasitic virus to suppress HIV production. We've designed antiviral cargos that target the host cell functions that HIV needs to replicate, rather than HIV viral functions that can be rapidly evolved around. The second parameter is the ability of the parasite virus to propagate in parallel with HIV. If our parasite suppresses HIV too much in its host cell, then it can't propagate and spread to other cells to prevent further HIV infection."

›››Lynn Yarris, LBNL Communications Department

Tracking Air Pollution

Ron Cohen and his colleagues spent time this summer gathering data as part of the largest air-quality study ever. "This project will track air pollution (nitrogen oxides, ozone and aerosol) as it migrates from North America to Europe over the Atlantic," he said. "The collective goal is to identify the quantity of gas and aerosols and to understand the transport and chemical changes of the gases over the ocean." This knowledge will help scientists understand how pollution is carried and contributes to climate change.

Cohen joined a fleet of other scientists on a NASA DC-8 aircraft converted into a flying laboratory carrying a collection of sophisticated instruments. "The data is obtained by flying in slow circles in the plane over various locations and at varying altitudes, sometimes for nine hours at a stretch.

"In some of the preliminary findings, we tracked pollutants released in Southeast Asia that appear in the Northeast. My group is currently investigating the effect from power plant emissions from the East Coast on the air quality in Europe."

On the DC-9, Cohen and his coworkers manned the Berkeley nitrogen oxide detector, a new instrument that simultaneously measures concentrations of several classes of nitrogen-containing air pollutants, including NO_2, peroxyacetyl nitrate, organic nitrates and nitric acid. The instrument takes advantage of the fact that various nitrogen-based compounds break down into nitrogen dioxide at different temperatures. Air flows through a channel in the instrument, which uses lasers to heat it to a particular temperature that lab experiments have indicated destroys a specific class of nitrogen-containing compound, such as peroxy nitrates.The instrument measures the amount of nitrogen dioxide produced at that specific temperature. By taking a series of readings as the temperature rises, the researchers can determine the air's chemical history.

The Cohen group instrument has unique abilities to observe hydroxyalkyl nitrates, compounds that have been little studied but that represent important terminations of atmospheric catalytic cycles.

Scott Sandholm (Georgia Tech)

Paul Wooldridge, a staff scientist with Ron Cohen, mans the nitrogen-dioxide detector in flight.

STAFF 2004 Appreciation

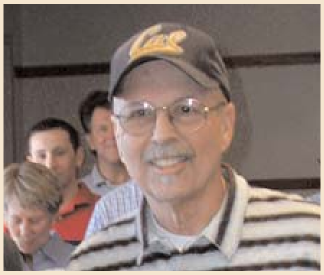
The 2004 Staff Appreciation ice cream social event took place on May 13. Retirees and staff members with a milestone year of service were recognized by Dean Clayton Heathcock for their outstanding work that helps to make the College of Chemistry a great place for scientific research and education.

Retirees and Years of Service:

Ronald Dal Porto—15
Elizabeth Frey—19
Alice Kaneshige—21
Lorna Woelfel—31
Heather Levine—32
Wendy Zukas—33
Brenda Jefferson—34

Service Awards and Years of Service:

Inger Coble—15
Dean Colomb—15
Barbara Harris—15
Olivia Hsueh—15
Cezar Ramiro—15
Yau-Man Chan—20
Carl Lamey—20
Dorothy Read—20
Cheryn Gliebe —30



Top photo: Inger Coble, Carl Lamey, Yau-Man Chan, Clayton Heathcock, Cheryn Gliebe, Cezar Ramiro and Olivia Hsueh.
Middle photo: Elizabeth Frey; Ronald Dal Porto.
Right photo: Clayton Heathcock, Lorna Woelfel and Alex Shtromberg.

Get to Know

more about the talented and hard-working staff members who make possible all of the great science and education in the college...

Angela Wilkes

After 17 years on campus, Angela Wilkes is great at being a behind-the-scenes supporter—first, working in the campus's Human Resources unit supporting staff members and would-be staff members; and now, as an administrative assistant supporting faculty members.

Wilkes was born to multi-task and currently works with faculty members Keasling and Prausnitz in chemical engineering, in addition to serving as the colloquium assistant and maintaining the course evaluations. "In Human Resources, I was a representative for employees and then for payroll. I had no contact with students or faculty members, and I wanted to experience the academic world. Here, I get to mingle with everybody.

"It's quite different to work with faculty members; they have a wide variety of work that needs to get done. I work with all of the graduate students and other scientists, making sure that they have everything they need to get their research done. I definitely have a very busy but satisfying job."

Get to Know:

Roger Sender

In his twenty years in the college, Roger Sender has led a double life—that of a musical composer and that of an administrative assistant. Currently supporting chemistry professors Arnold and Ellman, Sender plays guitar and various keyboards. He is a classically trained composer and has written music for independent films, video and local plays and TV.

"I wanted to pursue music composition without having to struggle to make a living at it, and working in the college was a good way to avoid that stress. After receiving my B.A. in musical composition from Berkeley, I worked with Jolene Adams in the original information services center here, moving to the administrative side of things in the early 1990s.

"I know it's a cliché to say it, but the reason I am able to be effective at work is because I'm surrounded by great people. The PI's, graduate students and post-docs know exactly what they need, and I help to keep things flowing smoothly," he said with a smile.

"My day-to-day life hasn't really changed much since college—I still dress casually, bike into work, and make music as much as I can. It's a fairly simple lifestyle."

Cheryn Gliebe

Cheryn Gliebe started working in the college in 1973, planning to return to school for her teaching credentials. "This was supposed to be a temporary job!" she said. "But there was no call for teachers that year, and I enjoyed the work and environment here."

Gliebe started out in the chemistry stores and then in purchasing in the 1970s and moved to administrative work in 1980 as William Miller's assistant. "We've been together longer than a lot of marriages," she noted. She also works with one additional faculty member, currently Stephen Leone, and manages the Pitzer Center for Theoretical Chemistry from her office in Gilman Hall.

"I'm a good organizer, so this is a perfect application of my skills. And the job is great because I have been able to work a flexible schedule for many years in order to be involved with my daughters' lives."

Even though she has been here for 31 years now, she's not going anywhere. "I don't think Bill will let me!" she laughed. And the squirrels and birds would be quite upset as well. "I buy one pound of grain and two pounds of peanuts every week to feed the critters," who sit on her windowsill every day, tapping away at the glass and waiting for their morning treat.

Weight Matters: Mass Spectrometry Facility

"Using mass spectrometry (MS), a researcher can quickly find out the molecular weight of a known or unknown reaction product, provided that the sample is fairly pure," said **Dr. Ulla Andersen**, the manager of the facility.

MS can determine the masses of molecules because an electrical charge is placed on the molecule and the resulting ions are separated by their mass to charge ratio. "In the facility, we can help you analyze your reaction components. Sometimes a researcher will know that the reaction went wrong and we can use MS to help determine what happened in the beaker."

Helping users understand what MS can and cannot do is a big part of Dr. Andersen's job. Along with **Dr. Zhongrui Zhou**, **Dr. Rita Nichiporuk** and **Elena Kreimer**, Dr. Andersen helps keep the instruments running and helps researchers develop methods to analyze their samples using the open access instruments.

The Instruments

In the summer of 2003, the facility acquired a new MALDI-TOF MS instrument, which can give sub-picomolar sensitivity ($<10^{-12}$ M) with a very fast turnover. (One sample can take between ten seconds and one hour, depending on the composition.) "A researcher can spot samples from a column onto a plate and look at the results," said Andersen.

The facility is located in 8 Lewis Hall and is open from 8.30 a.m. to 5.30 p.m. Monday through Friday. More information can be found at their website: http://chemistry.berkeley.edu/research_facilities/research_mass_spec.html.

STUDENT *News*

GLC and GSAC

Graduate students in the college have two student groups working for their best interests, and are always looking for volunteers.

In the three years since the Graduate Life Committee (GLC) began in the chemistry department, its members have helped to solve a number of student issues, including refurnishing the graduate students' lounge, implementing a new peer advising system for first-year students, installing new vending machines in Bixby Commons and lobbying for the return of off-hour access to the library.

The GLC's most recent project has been the development of a graduate student handbook, given out at orientation and available on-line, to steer incoming students straight. The handbook covers everything from TA assignments to qualifying exams.

The GLC meets on the first Wednesday of each month. For more information, contact Professor **John Arnold**, who chairs the committee.

Chemical engineering students can turn to the Graduate Student Advisory Committee (GSAC) for guidance. "The GSAC serves as a communication conduit between the students and the faculty, providing input and assistance with departmental functions and policies," said co-president **Wes Marner**, a fourth-year student with Jay Keasling. "We give advice on curriculum and departmental policy changes and have recently compiled data on student housing costs in order to advise the department on salary issues."

Two of the GSAC's major tasks are to help with graduate recruiting and to organize social events. "It is important to have a sense of community in the department, because it is so easy for students to become isolated and only interact with members of their research groups," said Marner. The group also helps incoming students get acclimated and organizes departmental graduate student instructor (GSI) training.

For more information on the GSAC, visit http://www.ocf.berkeley.edu/~gsac/index.htm .

Chemistry students weigh in on graduate life

It's official. The results are in. The recent GLC survey, with a 60 percent response rate, shows that for the most part, chemistry graduate students have a relatively few number of complaints and that those complaints are meeting with results. "Graduate students in the chemistry department are quite positive about their experience. Almost 90 percent of students said they would still come to Berkeley again if they had to do it all over again," said **Ian Stewart**, a third-year graduate student who headed the initiative.

The majority of respondents reported that the chemistry department is very supportive of their research and teaching, and that they have positive interactions with staff and faculty. And very few have heard derogatory remarks based on religion, gender, sexual orientation or race. "This is Berkeley; this is a very tolerant campus," noted one student.

"The survey helps the GLC to focus on what to address for the coming year," said **Jeff Long**, one of the faculty members on the committee. "And we still need to improve in some areas." The survey found that students are unhappy with the payroll procedures, which involve different pay scales depending on teaching and summer appointments. In addition, few seem to know what an associate advisor is and even fewer have one. And half of the students say they do not get regular degree progress reports.

Student Awards

In June, **Tim Rappl**, a chemical engineering graduate student with Nitash Balsara, won the Inaugural Neutron Scattering Society of America Prize for Outstanding Student Research for his presentation, "Nucleation of Phase Separation in Polymer Blends."

Three of the college's undergraduate students, **Jose Luis Gomez, Jr.**, **Pablo Garcia**, and **Raquel Orozco**, participated in the UC LEADS Program, presenting posters on their summer research programs. UC LEADS (Leadership Excellence through Advanced Degrees) aims to educate California's future leaders by preparing promising students for advanced education in science, mathematics and engineering.

Chemistry in and out of the Classroom

There's a buzz in the air about the new Chemistry in the Classroom (CIC) program, through which Berkeley chemistry students provide science demonstrations and lessons for elementary students in collaboration with Community Resources for Science (CRS), a non-profit organization that provides elementary teachers with science resources and support.

Ten of the department's graduate students are already participating in the program, with presentations ranging from "Cabbage Juice Chemistry" to "Protein Chemistry in the Kitchen" to "Polymers Everywhere." (Seems like the kitchen is an excellent place for inspiration.)

Enthusiastic response

The graduate students who are taking part like the program because it gives an "excellent preparation for a career in education, regardless of the level," noted a volunteer. Another participant commented that it "keeps us grounded, and it's fun to interact with and see the area's amazingly diverse community." Others have joined the program because they want to make science fun for students and want to help increase understanding as to how science is relevant in daily life.

To teach in the classrooms, the volunteers undergo an orientation to the program, which explains the details and helps them develop a lesson plan for the elementary grade and science topic. CRS matches participants with a classroom and then the fun begins.

To learn more or to get involved, please contact chemistry professor **Robert Bergman** at 510-642-2156 or at bergman@cchem.berkeley.edu. If you would like more information about the CRS's Community in the Classroom Scientist Volunteer Program, their website is www.crscience.org.

Fifth-grade students learned about chirality through Chemistry in the Classroom.

Outreach on Campus

The CIC program complements the ongoing outreach program run in the college by **Monica Jackson-Tribble**, an advisor in the undergraduate office.

The most recent outreach event took place in April, when 120 4th-grade scholars visited from Cambridge Elementary School of Concord. Cambridge school is a Title I school serving primarily children from Mexican immigrant parents.

"**Michael Goodblatt**, an outstanding student who received his B.A. in chemistry in May, led the presentation," said Jackson-Tribble. "We conducted experiments on water quality in the campus creek using state of the art water quality meters and learned about the life in the creek (cyanide emitting millipedes, fish, etc.) Mike solicited the help of a few of his research associates, including graduate students from Carolyn Bertozzi's group."

Jackson-Tribble is currently planning the next outreach event, National Chemistry Week, and is always looking for more volunteers, both undergraduate and graduate students. She can be reached at monica@cchem.berkeley.edu or 510-642-3451.

Incoming students

Welcome to the new students. The college has its usual class of exceptional students beginning this fall.

Both departments have enrolled about the same number of graduate students as they do each year: the chemistry department has eighty new students, ten with outside fellowships; chemical engineering is enrolling twenty new students, five of them bringing outside fellowships with them.

At the undergraduate level, the college has a higher than expected number of new students: 266, of whom 158 are freshmen and 61 are transfers. Ninety-four of the new students are enrolled as chemistry majors, 13 as chemical biology majors and 119 as chemical engineering majors.

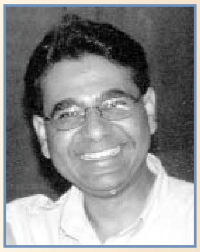
Preliminary estimates point to an all-time high for total enrollment in the college this fall, according to **Sandra Rehling**, Director of Undergraduate Advising and Transfer Adviser.

"It does not appear that the fee increase had an impact on undergraduate admission acceptance rates for the College of Chemistry since we are over target for both freshmen and transfers," Rehling added.

Music to their ears

JiYeon Ku, a chemistry graduate student in Phillip Geissler's group, sang a leading role in a performance of the opera *Gianni Schicci*, which was the culmination of a semester-long opera workshop course offered by the campus in the spring.

AIChE Award for Chakraborty



Arup Chakraborty, the Warren and Katharine Schlinger Distinguished Professor of Chemical Engineering, has won the Professional Progress Award for Outstanding Progress in Chemical Engineering for 2004 from the American Institute of Chemical Engineers. This award recognizes outstanding progress in chemical engineering by scientists under 45.

In 1996 Chakraborty, who is also a professor of chemistry and chair of the chemical engineering department, earned the Colburn award for outstanding publications by scientists under the age of 36. He is the first member of the college to win both these prestigious awards for younger scholars.

Faculty members **Nitash Balsara**, **Judith Klinman**, **Dean Toste**, **Birgitta Whaley** and **Peidong Yang** have received grants from the France-Berkeley Fund, which promotes scholarly exchange in all disciplines between UC Berkeley and all research centers and public institutions of higher education in France. http://ies.berkeley.edu/fbf/

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Neil Bartlett, an emeritus professor of chemistry, was recently awarded "Le Grand Prix" from La Fondation de la Maison de la Chimie (The Foundation of the House of Chemistry). The international honor is the grand prize of the Foundation, which facilitates chemistry conferences and scientific exchange. The award commemorates Bartlett's life work on novel high-oxidation-state materials.

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Chemical engineering professor **Alexis T. Bell** recently became the first person in the field of chemistry and chemical engineering to receive an honorary professorship of the Siberian Branch of the Russian Academy of Sciences. He also received an honorary doctoral degree from the organization.

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Chemistry professor **Carolyn Bertozzi** received the 2004 Agnes Fay Morgan Research Award from Iota Sigma Pi, the national honor society for women in chemistry. The award, named after the Berkeley nutritional scientist, is for outstanding research by a woman aged 40 and under.

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At the Protein Society meeting in San Diego, **Carlos Bustamante** accepted the Hans Neurath Prize for 2004. According to the press release, "this award, named for one of the pioneers of modern protein science, is intended for original and singular discoveries rather than for cumulative or lifetime contributions." Bustamante, a professor of chemistry, physics and molecular and cell biology, applies scanning microscopies to biological samples to obtain nanometer resolution of native biological structures in aqueous solution.

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Graham Fleming, Professor of Chemistry and Director of the LBNL's Physical Biosciences Division, was selected by the photochemical societies of Europe, Asia, and the Americas to receive the Porter Medal in honor of his life-long work in the field of photochemistry. It is presented every two years on the occasion of the International Union of Pure and Applied Chemistry symposium.

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Chemistry professors **Matthew Francis** and **Jay Groves** have each received a 2004 Hellman Award. Established by F. Warren

Berkeley Citation Awarded

Three of the college's illustrious faculty members were honored with the Berkeley Citation at the May commencement ceremony: chemistry professor Clayton H. Heathcock and chemical engineering professors C. Judson King and John M. Prausnitz.

The Berkeley Citation is the campus's highest academic honor and is given to a handful of individuals each year who have extraordinary achievements in their fields coupled with outstanding service to the university.

right, Clayton Heathcock; below, Jud King; below right, John Prausnitz

Hellman in 1995, the purpose of the Hellman Family Faculty Fund is to support the research of promising assistant professors who show capacity for great distinction in their field.

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Chemistry Professor **Clayton Heathcock** has won the ACS's 2004 Paul G. Gassman Distinguished Service Award. This division award recognizes outstanding service to the organic chemistry community. Heathcock was also feted in July with a day-long symposium, organized by former students and attended by 66 of his alumni.

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Chemistry professor **Sung-Hou Kim** has been elected an honorary member of the Korean National Academy of Sciences.

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Jeffrey Long, professor of chemistry, received the Fresenius Award from Phi Lambda Upsilon, the honorary chemistry society.

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Chemistry professor **Michael Marletta** has won the 2004 Harrison-Howe Award from the Rochester section of ACS. Marletta studies enzyme catalysis and signal transduction with a specific focus on nitric oxide signaling

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Richard Mathies has been selected by the Optical Society of America (OSA), the Coblentz Society, and the Society of Applied Spectroscopy to receive the Ellis R. Lippincott Award in honor of his innovative contributions to experimental and interpretive methods in resonance Raman spectroscopy, and the application of these methods to elucidate ultrafast dynamical processes in photochemistry and photobiology.

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New teaching lab and renovations

There will be a brand-new biotechnology teaching laboratory for undergraduates on the fourth floor of Latimer Hall. This lab, which will be completed in the fall, will help provide students in both chemical engineering and chemical biology with 'hands-on' experience with important techniques and methods in industry, from isolating enzymes to performing quality analysis.

Additionally, several labs on the sixth floor of Latimer have been renovated for synthetic organic chemistry research. The re-roofing of Hildebrand Hall will also be finished to eliminate all leaks. And, according to **Susan Slavick**, the building operations manager, the college will soon have an additional 1000 gallons of distilled water storage on the roof of Latimer, bringing our capacity up to approximately 2500 gallons. "As the number of 'bio' researchers has increased, the need for distilled water is that much greater," she said.

"Thank you to everyone for patiently putting up with the dust as the facilities are constantly improved to meet new demands. And thanks especially to our private donors, without whose help these needed renovations could not have been accomplished," said Dean Heathcock.

John Newman, professor of chemical engineering, will receive the Research Award of the Battery Division of the Electrochemical Society in October.

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Norman Phillips, an emeritus professor of chemistry, received the Hugh M. Huffman Memorial Award of the Calorimetry Conference in June.

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Richard Saykally, professor of chemistry, received the Edwin Mack Award from the Ohio State University in May and gave the Malcolm Dole Distinguished Lectures in Chemical Physics at Northwestern University in June.

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Peidong Yang has been promoted to Associate Professor in the chemistry department.

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Chang, continued from page 2

and a Merck/M.I.T. Predoctoral Fellowship; and the ACS Undergraduate Award in Analytical Chemistry for his work with Harry Gray at Caltech. Most recently, he has been honored with a Camille and Henry Dreyfus New Faculty Award.

He is also an accomplished teacher and will be teaching a brand-new course: Chem 103, bioinorganic chemistry for chemical biology undergraduates. "I'm really looking forward to this class. It'll be both a big challenge and an exciting opportunity to delve into cutting-edge material with the students."

Out of the lab, Chang maintains that he is "pretty boring," and likes food, sports, and spending time with his wife, Michelle. "I also spend a lot of time reading and expanding my scientific horizons because you never know when that 'Eureka!' moment is going to come."

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Questions or comments should be directed to
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CALENDAR

Upcoming events for College of Chemistry alumni and friends:

check chemistry.berkeley.edu/alumni for the latest information

Sept. 22
Regents' Lecture
4:00 p.m.
Sibley Aud.

Dr. Zhores Alferov, who won the Nobel Prize in physics in 2000, will speak on "Semiconductor Heterostructures: The Concept and History of Research."

http://www.eecs.berkeley.edu/IPRO/CONSRT/regentslecture.html

Oct. 15-17
Homecoming & Parents' Weekend

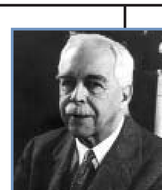
Chemistry professor **Dirk Trauner** will lecture on "Chemical Synthesis and Synthetic Biology" from 9:00 a.m. to 10:00 a.m. in 180 Tan Hall on Saturday, October 16. Before the lecture, join us from 8:30 a.m. to 9:00 a.m. in the Tan Hall lobby for a continental breakfast

homecoming.berkeley.edu

Oct. 16
Free Radicals & CHEMillennium event

Join us from 10:15 a.m. to noon for a networking brunch for these two era groups (1963-1999). Register for our brunch to receive a complimentary pass to attend all Homecoming faculty lectures, open houses, campus tours, children's activities and some athletic events. Watch for a special postcard with details.

chemistry.berkeley.edu/alumni



Oct. 19
G.N. Lewis Lecture
4:00 p.m.
Pitzer Aud.

Professor David Tirrell from the California Institute of Technology will give a lecture entitled "Programming Macromolecular Structure and Function with Artificial Genes."

chemistry.berkeley.edu/seminars

Nov. 18
G. N. Lewis Era Alumni lunch

Alumni from the years of 1945 and earlier are invited to this annual gathering. The event will be held from noon to 2:30 p.m. in the Heyns Room at The Faculty Club. Please save the date and watch for a separate mailing.

chemistry.berkeley.edu/alumni