CHEMISTRY & BIOCHEMISTRY

CALIFORNIA STATE UNIVERSITY **LONG BEACH** • FALL 2014

MEZYK RECEIVES TOP FACULTY AWARD

Chemistry & Biochemistry is published annually for past and present students and friends of the Department of Chemistry and Biochemistry. The opinions expressed on these pages do not necessarily reflect the official policies of the CSULB administration or those of The California State University Board of Trustees.

Fall 2014

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Cover photo: Dr. Stephen Mezyk.

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Dr. Krzysztof Slowinski

REMARKS BY THE CHAIR

Dear Alumni and Friends:

I am delighted to share with you some of our exceptional accomplishments during the 2013-14 academic year.

Many of our students have successfully competed with their peers at the state and national level. For example, Kyle Booth, Sam Nguyen, David Steidle and Nancy Trujuilo, working under the direction of Dr. Roger Acey, won the popular vote at the CSUPERB Early-stage Biotechnology Commercialization Challenge (CSUPERB-I2P) with their project "Heavy Metal Sponge." Patricia Nguyen, a biochemistry major working in Dr. Vas Narayanaswami's lab, and Sam Nguyen, a biochemistry major working in Dr. Acey's lab, won the 2014 CSUPERB-Howell Research Scholars Award. Charina Fabilane, a biochemistry major working in Dr. Narayanaswami's lab, was awarded the 2014 Women & Philanthropy Research and Creative Activity Scholarship, and Roy Hernandez was selected for the CSULB Outstanding Graduate Research Student Award.

Joseph Swabeck, a chemistry major working in Dr. Shahab Derakhshan's lab, was accepted to the Ph.D. program at UC Berkeley (#1 graduate program in the country as ranked by *U.S.News & World Report*); M.S. degree recipient Garret McKay, who won this year's College of Natural Sciences and Mathematics Outstanding Thesis Award for his research conducted in Dr. Stephen Mezyk's lab, was just accepted to the Ph.D. program at the University of Colorado; Wendy Beck, who conducted an M.S. degree research project in Dr. Paul Weers's lab, was accepted to the Ph.D. program at Cornell; and Makan Kaviani, who received an M.S. degree under the direction of Dr. Michael Schramm, landed a research scientist job at the Department of Chemistry Discovery, Research and Technology at Eli Lilly and Co. in Indianapolis.

These are just some examples of the outstanding success of our students, directly resulting from their involvement in original research performed alongside faculty members. Our department has always viewed student research experience as a cornerstone of the education in chemistry and biochemistry, but the last decade has brought truly extraordinary success that positions us as the CSU leader in undergraduate research mentoring. You can read more about our research success elsewhere in the newsletter.

Our faculty continue to excel in their professional endeavors. Dr. Mezyk was the recipient of the 2014 CSULB Outstanding Professor Award; Dr. Narayanaswami was awarded the Academic Affairs Award for Outstanding Faculty Mentor for Student Engagement in Research, Scholarly and Creative Activity; and Andrea Chen won the Mayfield Award for the current academic year.

Also, department faculty continued their successful acquisition of external research grants. Dr. Xianhui Bu received a $380,000 NSF-DMR research grant seeking to introduce new synthetic concepts and methods that can be employed to create homochiral porous materials as catalysts and adsorbents for the preparation of highly useful chemicals and pharmaceuticals. Dr. Acey received a $125,000 anonymous gift in support of his research program at CSULB—the largest private (individual, corporate or foundation) cash gift the department has ever received and the largest private cash gift for research on campus.

Dr. Jason Schwans was awarded the Research Corporation Cottrell College Science Award for a project titled "Unnatural Amino Acid Mutagenesis to Investigate Enzymatic General Base Catalysis," and Drs. Acey and Enrico Tapavicza received research support from CSUPERB. Moreover, several faculty continued their work on ongoing grants from the National Institutes of Health, Department of Energy and other external agencies.

I am delighted to report that the department received $148,700 from the CSULB Student Excellence Fee Funds toward the purchase of a Prodigy Cryoprobe for our new Bruker 400 MHz NMR. This addition further improves our NMR facility (with a new Bruker 300 MHz NMR purchased in 2012 and a new 400 MHz NMR acquired through an NSF-MRI grant this year). The department also received a 2014 CSULB Alumni Association grant to purchase additional equipment for organic chemistry and physical chemistry laboratories.

I am very pleased that Dr. Deepali Bhandari will be joining us as a new faculty member in the biochemistry division, effective fall 2014. Dr. Bhandari received her Ph.D. from the molecular biology program at Loyola University, Chicago, in 2009 and completed a postdoctoral fellowship at UCSD, working with Drs. Pradipta Gosh (2009-13) and Marilyn Farquhar (2013-14). Dr. Bhandari's research interests include molecular regulation of intracellular membrane traffic.

Last, but not least, Drs. Berryhill, Nakayama, Schwans, Brazier, Mezyk, Garber, Derakhsan, and Thomas Cullen, Nancy Gardner and Andrea Chen made significant contributions to course redesigns and improvements in general chemistry and organic chemistry. Some of these efforts were supported by the CSU Chancellor's Office via Course Redesign grants and by the Melinda and Bill Gates Foundation.

As always, I would like to acknowledge the support from our alumni and friends, which has made a big difference in the quality of our programs. I am very grateful for your patronage. The department looks forward to another great year.

—Dr. Krzysztof Slowinski

Dr. Christopher Brazier

MEET OUR INTERIM CHAIR

Dr. Christopher Brazier has been named interim chair of the Department of Chemistry and Biochemistry. A physical chemist, he joined the faculty in 2001 and served as vice chair of the department from 2011 to 2014. Dr. Kris Slowinski is leaving the chair position to serve as interim associate dean for Academic Programs, Evaluation and Advising. In this position, he will oversee curriculum, enrollment, scheduling, lecturer evaluations and advising, as well as new initiatives for student success.

MEZYK RECEIVES TOP FACULTY AWARD

By Dr. Jeffrey Cohlberg

Dr. Stephen Mezyk was named CSULB's 2014 Outstanding Professor in recognition of his excellence in teaching, research and professional activity.

A native of Australia, Mezyk received his B.S. and Ph.D. degrees from the University of Melbourne. After postdoctoral work at the Universities of Calgary, Notre Dame and Saskatchewan, and research positions at Atomic Energy of Canada and the University of North Carolina at Wilmington, he joined the CSULB faculty in 2001.

Mezyk, who teaches both physical chemistry and general chemistry, is one of the most popular and effective professors in the Department of Chemistry and Biochemistry. Upon receiving the Distinguished Faculty Teaching Award in 2007, he told *Inside CSULB*, "My teaching philosophy is that I don't teach; I help the students learn the material and make sure they are ready for the next courses in their degrees. I don't believe in memorization at all...I allow students to bring their own sheet of paper into exams with whatever material they want written on that sheet. My exam questions are based on application and understanding of the material, not memorizing facts out of the textbook. This approach ensures that students understand the material, which makes them retain it better."

Mezyk has also received acknowledgement for his excellence in research and specifically for his outstanding mentoring of student researchers. A physical chemist with interest in environmental chemistry, Mezyk focuses on the kinetics of free radical reactions, especially those related to the pulse radiolysis of environmental chemical contaminants in wastewater. Other reactions studied include those related to chemical carcinogenesis, cancer treatment and recycling radioactive materials from nuclear waste. He has published over 140 papers, and his research has received support by over $4 million in grants from the Department of Energy, NSF, Water Reuse Foundation and Batelle Energy Sciences.

In his lab, students work on individual research projects, and Mezyk is fully involved with their assignments. His lab consistently attracts some of the best students, many of whom have pursued doctoral degrees in chemistry. Three Outstanding Graduates recognized by the College of Natural Sciences and Mathematics (CNSM) named Mezyk as their Most Valuable Professor. Many of his students travel to the Radiation Laboratory at Notre Dame to collect radiolysis data and then return to CSULB to analyze the results and do supporting work.

His excellence in research and mentoring has garnered Mezyk numerous honors, including the Distinguished Faculty Scholarly and Creative Achievement Award as well as awards for Outstanding Faculty Mentor, Impact Accomplishment of the Year in Research and CNSM's Pretty Darned Good Professor.

Along with teaching and research, Mezyk is a visiting scholar at the University of Notre Dame and a visiting scientist at Idaho National Laboratories, and has remained involved in the American Chemical Society and other scientific organizations.

DISTINGUISHED VISITING LECTURER WOWS AUDIENCE

By Dr. Christopher Brazier

Dr. Richard N. Zare, the Marguerite Blake Wilbur Professor in Natural Science at Stanford University, visited the department on Feb. 26 as the 2014 Allergan Foundation Distinguished Visiting Lecturer. Zare is one of the founders of the field of laser spectroscopy, my own research area of interest.

Like most physical chemists, Zare is intrigued by natural phenomena and always wants to understand why things happen. Such questions often arise in conversations around a table with drinks in hand. However, Zare has taken this a step further and, over the past decade, has published several articles discussing the science of bubbles in alcoholic beverages.

He beguiled the audience with several findings from that research in his general audience presentation "'Shaken and Not Stirred' – Why James Bond Prefers His Vodka Martinis That Way." With the help of live demonstrations and audience participation, he showed how shaking leads to a correctly cooled martini without excessive dilution by melting too much ice. We got to watch how bubbles formed on the glass surface in a glass of Champagne and then grew as they rose through the liquid.

One of the intriguing aspects of a Guinness beer is that sometimes the bubbles appear to fall rather than rise. At first you might think this is impossible, but, as Zare explained, the strong upwelling of bubbles in the center of a freshly poured glass of Guinness leads to a downward flow of beer on the edges. The downward flowing liquid carries bubbles with it so that they actually do fall. Zare's presentation was very entertaining as well as informative, and the large crowd clearly enjoyed it.

Zare's research interests have expanded from laser spectroscopy and dynamics to mass-spectrometry and cell imprinting. His research talk "TB or not TB?" discussed the use of polymers to create imprints of pathogens, in this case *Mycobacterium tuberculosis*. The polymer forms around the pathogen, which is then removed but leaves an imprint that leads the polymer to selectively recognize the pathogen of interest. Zare is hoping to create a simple diagnostic for TB that can be used in the field in developing countries. We hope he is successful.

The audiences, faculty and especially the students who got to meet Dr. Zare were all extremely happy, and this was clearly an excellent event. We are grateful to the Allergan Foundation for its generous sponsorship of the annual Distinguished Lecturer series.

NOBEL CHEMISTRY LAUREATE NEGISHI VISITS CSULB

By Dr. Kensaku Nakayama

Purdue University's Dr. Ei-ichi Negishi presented CSULB's 35th Nobel Laureate Lecture on April 8. Negishi was a co-recipient of the 2010 Nobel Award in Chemistry, along with Drs. Richard F. Heck (University of Delaware) and Akira Suzuki (Hokkaido University in Sapporo, Japan). According to his website, "By creating a more precise method for coupling two different (or same) carbon groups, Negishi created a powerful tool for synthesizing a wide range of useful chemicals used in medicine, agriculture and electronics."

The three scientists' work led to new methods of synthesizing complex organic compounds that have a variety of medical and commercial applications ranging from antibiotics to light-emitting diodes. Negishi focused on developing metal-based reactions called palladium-catalyzed cross-coupling to allow easy synthesis.

Negishi's laureate lecture for the general audience, "Magical Power of d-Block Transition Metals—Past, Present and Future," gave an overview of the structural scope of reactants that can participate in the palladium catalyzed cross-coupling reaction. The traditional non-transition metal nucleophilic reagents, like the Grignard reagent and organoalkali metals, can react with only a limited structural range of alkyl halides without forming substantial amounts of unwanted coupling products.

The Pd-catalyzed coupling reaction greatly expands the range of both the nucleophilic and the electrophilic components of the carbon bond forming reaction, without undesired carbon-carbon bond formation products. Negishi attributes this very special reactivity of palladium, not shared so well with even its congeners such as nickel and platinum, to the favorable interactions between the frontier molecular orbitals of Pd with those of the reacting carbon groups. He gave a very insightful and enlightening discussion on the nature of some of these key orbital interactions.

The afternoon technical lecture was entitled "General and Highly Enantioselective (>99% ee) Catalytic C-C Bond Formation via ZACA Reaction." ZACA is an acronym for Zirconium-Catalyzed Asymmetric Carboalumination of Alkenes, a very rare catalytic, asymmetric C-C bond forming reaction of terminal alkenes. Employing the ZACA procedure in tandem with a subsequent lipase-catalyzed acetylation reaction results in 2-methyl-1-alcanols in >99% enantiomeric purity. The Negishi group has utilized this tandem process in many natural product total syntheses.

This process is also the only one reported thus far that can be used to synthesize 1,3,5,7... polymethylated carbon skeletons with essentially complete stereochemical control. The lecture was truly a tour de force, presented by a chemist whose career was devoted to not only developing an extremely versatile catalytic coupling process, but who also discovered a rare stereoselective carbon-carbon bond forming procedure that will surely become a cornerstone in the field of asymmetric synthesis.

Negishi received his bachelor's degree from the University of Tokyo in 1958. While employed as a research chemist at Teijin, Ltd., he was awarded a Fulbright scholarship to further his studies in the U.S. as one of two awardees selected from over 250 applicants. Upon obtaining his Ph.D. from the University of Pennsylvania in 1963, he joined the research group of Dr. Herbert C. Brown (co-recipient of the 1979 Nobel Award in Chemistry) at Purdue University as a postdoctoral scholar in 1966.

After continuing in the Brown lab as a research assistant in 1968, Negishi accepted a faculty position at Syracuse University, where his lifelong work involving the development of transition-metal catalyzed carbon-carbon bond forming reactions began. In 1979, he was invited back to Purdue University at the full professor rank. In 1999, he became the inaugural H.C. Brown Distinguished Professor of Chemistry.

As an aside, the role that Dr. Brown played as a postdoctoral mentor to both Negishi and Suzuki cannot go without mention. One of Negishi's favorite quotes from his mentor was "from a small acorn grows a mighty oak," meaning from each small but carefully studied step comes a major breakthrough in research.

I was struck with the tremendous energy our Nobel Award speaker possessed, freely conversing with anyone and everyone who cared to exchange words with him. I am certain that there will be more exceptional work that will be reported from his laboratories in the years to come.

NEW FACULTY MEMBER BHANDARI DELVES INTO CELLS

By Anne Ambrose

Cells are a marvel of nature as the building blocks of living organisms.

Eukaryotic cells have a variety of membrane-enclosed internal structures that play important roles in cell function and are of great interest to Dr. Deepali Bhandari, the Department of Chemistry and Biochemistry's newest faculty member, who joined CSULB this fall.

The cell biology course she took as a first-year graduate student at Loyola University Chicago ignited her fascination about the basic building block of life. She learned how simple biochemical assays could answer scientific questions piece by piece and, when put together, how these pieces could unravel the molecular intricacies of complex biological processes.

During her Ph.D. and postdoctoral training, she studied how cells transport proteins to their final destination within or outside the cell by moving them from one organelle to another through membrane bound vesicles and was amazed by the remarkable precision with which cells regulate the intracellular membrane traffic.

Dr. Deepali Bhandari

Her research at Long Beach will look at how cells cope with stress. "Throughout our lifetime, starting with development, our cells are continually exposed to various types of stress. I'm very interested in exploring the molecular mechanisms of how normal cells deal with it and what goes wrong during pathological conditions where cells cannot handle it anymore," she explained.

"My long-term goal is to determine what switches the cell's response from survival to cell death in diseases like Alzheimer's, cardiomyopathy and diabetes, while cancer cells find ways to cope with the situation and even learn to resist chemotherapy. It will be interesting to see if we can apply our understanding of how cancer cells survive stress to remedy clinical manifestations of the other diseases."

Bhandari comes to CSULB from a postdoctoral fellowship at UC San Diego's Department of Cellular and Molecular Medicine. She earned her Ph.D. in molecular biology at Loyola University Chicago and M.S. and B.S. in microbiology at Panjab University, Chandigarh, India. Her recent published articles include "Sit4p/PP6 regulates ER-to-Golgi traffic by controlling the dephosphorylation of COPII coat subunits" in *Molecular Biology of the Cell* and "Sequential interactions with Sec23 control the direction of vesicle traffic" in *Nature*.

She is familiar with CSULB through her husband, Dr. Prashanth Jaikumar, an associate professor in the Department of Physics and Astronomy, and UCSD colleagues who presented seminars on campus and spoke highly of the university.

Moreover, "I think it's the balance between teaching and research that encouraged me to apply here," she said. "I've been inspired by my professors throughout the years, and I feel it's time to give back to the next generation of students. I am very interested in teaching these young, budding scientists who will help me advance my research."

CSULB RANKS #2 IN RCSA RESEARCH FUNDING

California State University, Long Beach (CSULB) ranks #2 nationally and #1 within the CSU in total number of grants awarded from Research Corporation of Science Advancement's (RCSA) Cottrell College Science Award (CCSA) program, with 24 grants allotted to CSULB faculty since 1994.

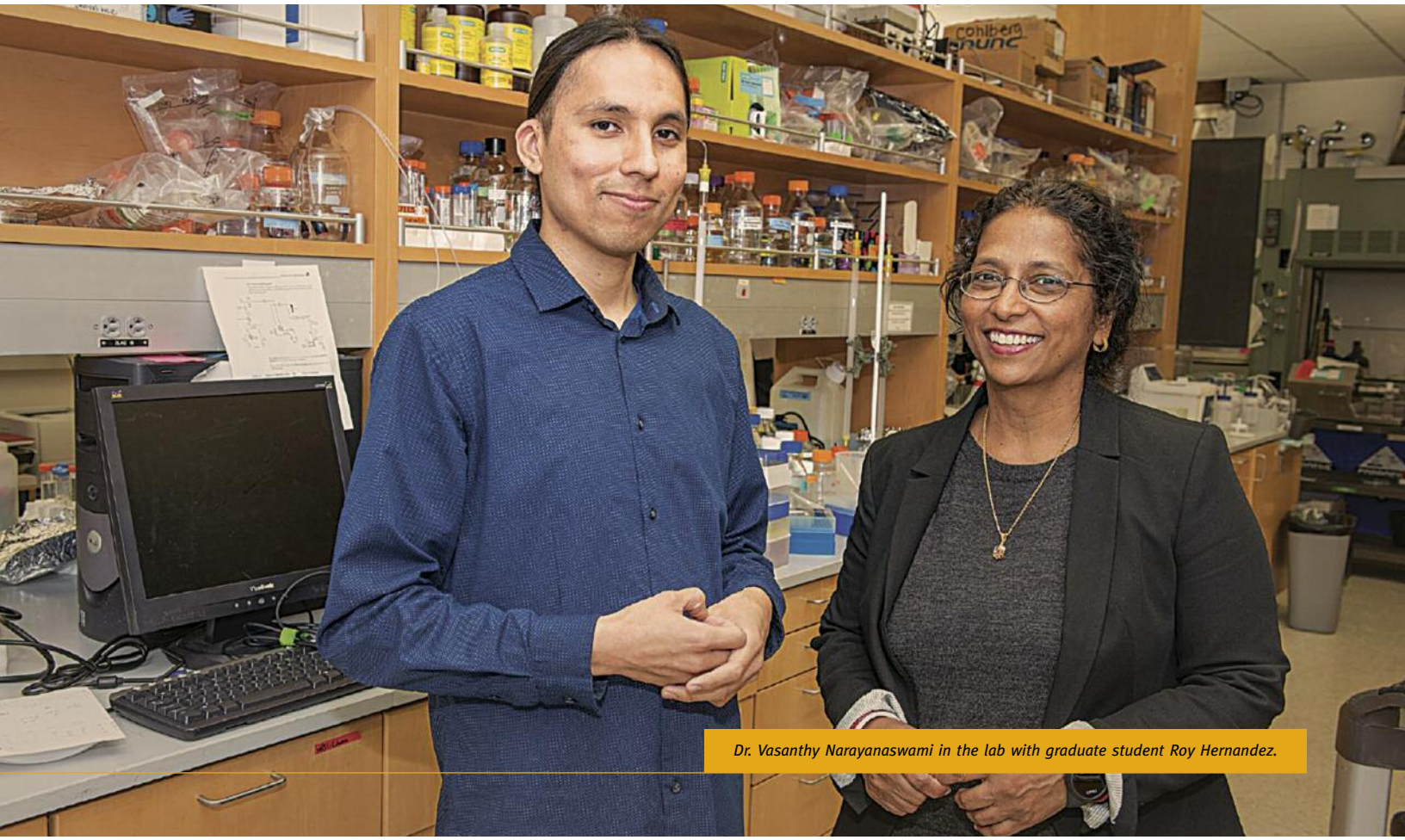
Among U.S. chemistry departments, the University of Wisconsin, Eau Claire, ranks first with 22 grants, CSULB is second with 16 grants, and Western Washington University, Brock University and Illinois State University tie for third place with 14 grants each. Among CSU chemistry departments, CSULB ranks first, with CSU Fullerton coming in second (13 grants), and CSU Northridge and San Francisco State placing third (six grants each).

The following Department of Chemistry and Biochemistry faculty have received CCSA grants since 1994: Douglas McAbee (1999), Lijuan Li (2001), Jeff Cohlberg (2002), Chris Brazier (2003), Michael Myers (2004), Kris Slowinski (2004, 2007), Xianhui Bu (2005), Steve Mezyk (2005, 2007), Kasha Slowinska (2005, 2008), Michael Schramm (2008), Eric Sorin (2008), Shahab Derakhshan (2010) and Jason Schwans (2014).

The Research Corporation of Science Advancement is an important source of external support in the sciences, particularly in chemistry and physics. Its CCSA program, intended for non-Ph.D. granting institutions, provides "seed" funding for significant research with a potential to enhance the professional and scholarly development of early career scientists.

According to RCSA, "A key requirement in all CCSAs is the participation of undergraduate students in meaningful ways in the funded research. The foundation's intent is to inspire in these students a passion for inquiry and discovery, thus nurturing America's next generation of scientists."

In the past 20 years, the organization has awarded almost 1,500 grants to more than 400 public and private universities.



Dr. Vasanthy Narayanaswami in the lab with graduate student Roy Hernandez.

NARAYANASWAMI HONORED AS OUTSTANDING MENTOR

Dr. Vasanthy Narayanaswami, a biochemistry faculty member since 2008, received one of two 2014 CSULB awards as Outstanding Faculty Mentor for Student Engagement in Research, Scholarly and Creative Activity. Her research program on apolipoprotein E, its role in cholesterol metabolism and its relationship to disease has provided research training to a large number of students.

In the last six years, 25 undergraduates and 10 graduate students have participated in research in Narayanaswami's lab. During this period, her lab has produced 10 publications with 10 CSULB student co-authors, including several papers in *Biochemistry*. Her students have authored or co-authored over 80 presentations at professional meetings, including 23 at national and international conferences.

One of the key aspects of student mentoring in Narayanaswami's lab is related to training in responsible conduct of research, and ethics and integrity in academia and research. The students are exposed to discussions on the interrelationship between ethical values and scientific practice, as well as ethical and professional issues and problems facing scientists. These are mandatory sessions that evaluate real and theoretical issues.

Narayanaswami is known for insistently encouraging her students to compete in various awards programs. Her students have received 32 competitive awards, stipends, scholarships and travel awards, amounting to over $100,000 for the research carried out under her mentorship.

Last, but not least, Narayanaswami is very active in seeking external funding for research projects involving undergraduate and graduate students. She currently serves as a PI on an individual NIH research grant, as well as on four additional grants specifically related to educating undergraduate students through research participation: NIH MARC, aimed at increasing the number of underrepresented minority students earning doctorates in biomedical sciences; an NIH/ NHLBI R25 grant, aimed at providing opportunities to undergraduate students to participate in summer research; a Doris Duke Charitable Foundation grant, aimed at providing clinical experience for high school students; and a California Institute of Regenerative Medicine grant for summer research at the Children's Hospital Research Institute in Oakland.

SIGNIFICANT ADVANCES IN THE BU LAB

By Dr. Jeffrey Cohlberg

Important advances are taking place in the design and synthesis of new crystalline porous materials, materials that have potential applications in carbon dioxide sequestration, fuel storage and drug synthesis, thanks to research in Dr. Xianhui Bu's lab.

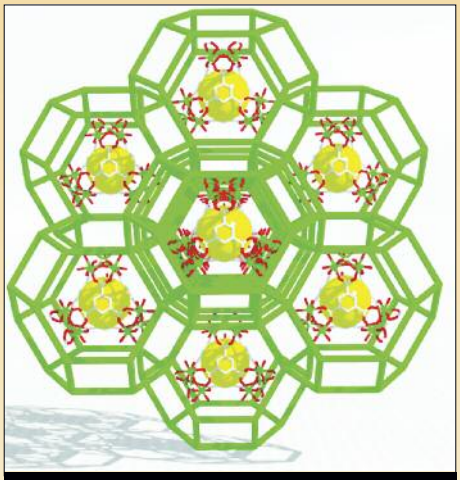
Porous crystals, with cavities large enough to encapsulate small molecules, could be used as storage reservoirs for hydrogen or methane fuel with greater capacity and lower pressures than conventional gas tanks. Or, they could be used to remove carbon dioxide from power plant emissions. But they need to be designed so that they retain the encapsulated gas molecules with high affinity.

Early work on such crystals focused on inorganic compounds like phosphates and silicates, but in the mid-1990s, chemists realized that combining inorganic and organic compounds in Metal Organic Frameworks (MOFs) yields a much greater diversity of structures, with control of the size and chemical environment of the pores yielding new architectures with improved gas sorption properties. Also, metal-ligand interactions have a directionality that allows spontaneous assembly of porous materials without the need for templating agents that may be hard to remove afterwards.

Bu received his Ph.D. in 1991 at State University of New York at Buffalo, where he conducted research using single crystal X-ray diffraction to characterize new conducting organic charge-transfer compounds. While heading the X-ray facility at UC Santa Barbara, he began research on inorganic porous materials in the lab of Galen Stucky, developing phosphate-based mimics of zeolites. Upon arriving at CSULB in 2003, Bu initiated a research program on MOFs. His work has resulted in the synthesis of new substances with unique properties as well as the development of new synthetic methods that can be adapted to the work of others in the field.

A unique contribution of Bu's research is the concept of pore space partitioning. MOFs with large pores can be derivatized to form cage-within-cage structures with smaller pores that have enhanced capacity for binding small gas molecules.

For example, in the indium compound CPM-5 (see figure) each outer In_{24} cage encapsulates a smaller In_{12} cage. Each two adjacent In^{3+} cations in the outer cage are bridged by a benezene-tricarboxylate (BTC^{3-}) anion, with the third carboxylate group of each BTC connecting the outer cage with the inner cage. The electric field between the outer negatively charged cage and the inner positively charged cage enables tighter binding of polar gas molecules, allowing carbon dioxide to be selectively removed from a mixture of CO_2 and nitrogen. Other gases, including methane, are also tightly bound.



3-D structure of CPM-5. Yellow spheres represent the cavities within the inner cages (JACS, 2010,132, 17062-4).

Another application of MOFs is in enantio-selective catalysis or separation. Running organic reactions inside cavities of homochiral MOFs, in which the pores all have the same chirality, can produce enantiopure or enantio-enriched products instead of racemic mixtures. This is especially important in the pharmaceutical industry, where, for many drugs, only a particular stereoisomer is biologically active.

But how can homochiral MOFs be synthesized? Others succeeded only by starting with often-expensive enantiopure building blocks, but Bu's lab discovered that this is not necessary. Note that a chiral molecule can be assembled from nonchiral building blocks. (Think of polyglycine, which has no asymmetric carbons atoms but can form right-or left-handed helices, or α- and β-quartz.)

Bu's group found that the addition of just a small amount of a chiral induction agent (CIA) during formation of an MOF can yield homochiral crystals. Adding a small amount of the nucleotide UMP (with D-ribose) induces formation of homochiral zinc phosphate zeolites. Adding some D-camphoric acid induces formation of homochiral MOFs containing manganese and adamantane-dicarboxylate, while L-camphoric acid induces homochiral MOFs with a different handedness.

The CIA is not incorporated into the MOF, and there has been speculation that the induction agent binds metals in a similar fashion as the bridging compound and participates in an initial nucleation event that directs the course of further MOF assembly.

Many of Bu's publications have been collaborations with the lab of Pingyun Feng at UC Riverside, where gas sorption measurements have been performed. If a current grant proposal is successful, Bu will acquire instrumentation that will enable him to perform these measurements at CSULB. Future plans also include studies of enantioselective catalysis by the new homochiral MOFs.

Bu is the author of over 200 publications, half of them published during his time at CSULB. His work has been supported by grants from NIH, NSF, the Dreyfus Foundation, ACS-PRF and Research Corporation. Honors include an NSF Career Award, a Henry Dreyfus Teacher-Scholar award, a Research Corporation Cottrell College Science Award, the Provost's Award for Impact Accomplishment in Research, and the Distinguished Faculty Scholarly and Creative Achievement Award.

Front row, from left: Roger Acey, Kris Slowinski, Enrico Tapavicza, Eric Marinez, Vas Narayanaswami, Ken Nakayama, Shahab Derakhshan, Jeff Cohlberg, Deepali Bhandari, Paul Weers, Eric Sorin and Michael Schramm. Back row, from left: Jason Schwans, Young Shon and Chris Brazier.

FACULTY REPORTS

Dr. Roger Acey

It was a very interesting year for the group. We have two major projects. One involves a novel metal binding protein (MT) we hope to develop into a "heavy metal sponge" for environmental cleanup applications. The other involves butyrylcholinesterase. Using umbilical cord stem cells, we have shown that the activity of the enzyme is expressed during a very narrow period of neuron development. We are interested in the enzyme's role in normal development and the effects of endocrine disruptors on the process.

Along with Dr. Ken Nakayama, we are also developing a class of butyrylcholinesterase inhibitors as a possible therapeutic for the treatment of neurodegenerative diseases. We have several patents pending on the compounds and recently established a company known as JAL Therapeutics to commercialize the technology.

We have made significant progress this year on both projects. I have been extremely impressed with the efforts of my students, especially with all the new faces. Josh Feng and Phuc "Sam" Nguyen have been instrumental in coordinating the individual activities of both projects. Alex Lyzlov is a new graduate student, and his project involves studying the effect of bisphosphates on butyryl-cholinesterase activity.

Kaycee Villarreal, Nancy Trujillo, Hieu Nguyen and Thomas Hsieh are new undergraduates. Kaycee and Thomas are working on the butyryl-cholinesterase project while Nancy and Hieu are working on the MT project. George Lara, who is is completing his first year of graduate school, is working on a project to localize butyrylcholinesterase in differentiating stem cells. His preliminary results suggest the enzyme is not only bound to the plasma membrane but is also found in the nucleus. We are very excited about these findings.

Sam and Nancy, along with two students from the College of Business Administration, entered the CSUPERB I2P Early-Stage Biotechnology Commercialization Challenge and were voted "Crowd Favorite." I'm trying to expose students to the business aspects of basic science. Josh submitted a poster to ASBMB and was acknowledged as exceptional and asked to give a special presentation. Nancy and Kaycee were awarded Women and Philanthropy scholarships, while Josh and Sam received numerous college and department awards.

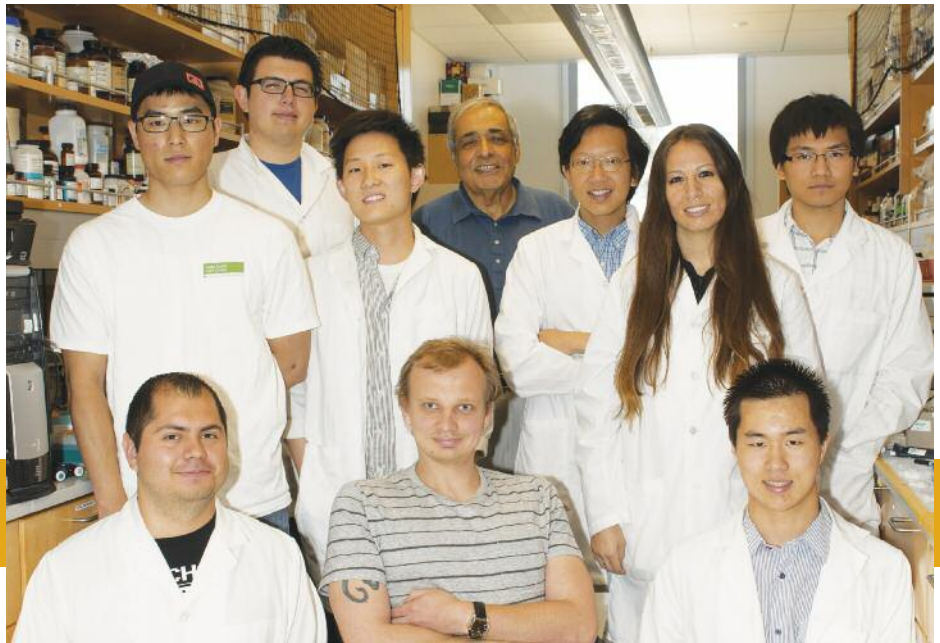
Aaron Ong continues to work with us. I'm very happy to report that Lauren Hartman is finishing up her thesis. Finally, I'm pleased that Gwen Jordaan will be returning to the lab as a full-time research associate. The funding for the position came from a philanthropic donor.

Dr. Paul Buonora

The 2013-14 year was the "Year of Grant Writing" in the Buonora group. The 2013 summer was occupied with work on a task force looking at the university's historical and ongoing commitment to recruitment, retention, training and success of students underrepresented in the sciences (*www.csulb.edu/colleges/cnsm/research/underrepresented.html*). The task force report supports the university's multiple student development grants.

In the fall, along with Dustin Thoman from the Psychology Department, I wrote an NSF Research on Education and Learning grant, looking at the effectiveness of classroom interventions on student retention and advancement in the sciences.

I was also part of a team developing the university's Building Infrastructure Leading to Diversity (BUILD) proposal. If funded, the NIH BUILD grant will make CSULB one of 10 national model universities aiming to increase the diversity of the biomedical and behavioral research workforce and will fundamentally change undergraduate



From left to right. First row: George Lara, Alex Lyzlov and Aaron Ong; second row: Tom Hsieh, Josh Feng, Phuc(Sam) Nguyen, Kaycee Villarreal and Hieu Nguyen; third row : Archie Turner and Dr. Roger Acey.

education for students interested in research careers. The proposal brought together four colleges and the administration in developing a plan to accomplish these goals.

In the fall, I began work, along with Brit Rios-Ellis of the Department of Health Science and Guido Urizar of the Psychology Department, on a BUILD Planning grant, in which we developed a Strengths, Weaknesses, Opportunities and Threats analysis in support of the university BUILD application. Work on the BUILD application itself consumed the first three months of 2014.

Following the BUILD grant writing, I worked on the renewal of the NIH Research Enrichment for Scientific Enhancement (RISE) grant with co-PI Judy Brusslan from the Biological Sciences Department. The university has had a RISE program since 2004, with Marco Lopez as the program director. With Marco opting to focus on his teaching and research, I took over as the program director in fall 2013. In 2014, six RISE students were accepted to Ph.D. programs, and one was admitted to a DPT program and one to a Pharm.D. program.

Within my research group, Jim Brady finished his M.S. thesis on aza-couplings in the synthesis of bicyclic lactams in fall 2013. Tanna Helm completed her B.S. degree in the spring, which included her work on amide synthesis. In news of former group members, Joe Badillo (B.S., 2008) completed his Ph.D. at UC Davis and began a post doctorate at Princeton in early 2014. Reggie Ramirez (B.S., 2012) will be starting Pharm.D. studies at the University of the Pacific in fall 2014.

Dr. Jeffrey Cohlberg

I have now completed three of five years in the Faculty Early Retirement Program, teaching half time. My molecular modeling manual, *Studying Protein and Nucleic Acid Structure with Jmol*, previously accessible only by subscribers to the Portals for the Lehninger and Stryer biochemistry textbooks, will now be available from Freeman for separate purchase in a PDF format, hopefully by the time you read this.

Our alumni of 2002 and later will generally have learned Jmol (or its precursor Rasmol) when they took CHEM 441A. For anyone else, I recommend the exercises in the manual as a painless (maybe even fun) way to master the skill of downloading and displaying 3D structures from the Protein Data Bank.

Dr. Tom Maricich

I am continuing in my lab as a full-time emeritus faculty doing writing and research.

Two undergraduate students, Roy Santos and Faraz Hussein, have been working in my research group, and Anas Al-Qazzaz is assisting in organic synthesis as a part-time research volunteer. Michael Fimbres has completed his M.S. thesis and received his degree this spring. He is also continuing as a research volunteer.

We are studying sulfonimidate alkylation reactions, especially those with isopropyl as the alkylating group. In addition to the predominant *O*-alkylation of phenols, some electrophilic aromatic substitution has been observed. Our work was published last December as a full paper in *Synthesis*. It was co-authored with 18 former students. We celebrated and networked as a group at the Claim Jumper for lunch.

The key reagent, ethyl N-*tert*-butyl-4-nitrobenzenesulfonimidate, reported in our paper, is now available as the "Maricich ethylation reagent" from Aldrich Chemical Company (Catalog #L512311).

I have been in touch with a number of past students this year and would be happy to hear from others to know how you are doing. My e-mail address is tom.maricich@csulb.edu. You can reach me on my cell phone at 562.209.4306.

Dr. Stephen Mezyk

The CSULB Mezyk RadKEM group continued our focus on research this past year and, overall, we had another very productive year, with 10 more published/ in-press research papers and 22 conference presentations by both my research students and me.

As happens every year, some of my research students are graduating. Lauren Olson and DeeAnn Asamoto completed their B.S. in chemistry degrees; Lauren has started full-time employment, while DeeAnn is heading to UC San Diego to begin her Ph.D. Maya Hey finished her B.S. degree in dietetics and food administration and is applying to an M.S. degree program in Italy. Anas Al-Qazzaz successfully defended his M.S. in chemistry degree and is now applying to pharmacy programs.

My continuing M.S. degree students are Shauna Otto, who is quantifying the removal of antibiotic activity in water systems; Ariana Gilmore, who is measuring the chemical efficacy for hydroxyl radicals in destroying beta-lactam antibiotics; Trevor Reutershan, who is studying the absorption of estrogenic steroids onto dissolved organic matter; and Brittney Sjelin, who is investigating chloramine disinfectant reactivity with model organics.

My undergraduate research students are Hailey Sharer, who is looking at the radical-based removal of triclosan from wastewaters; and Nicole Moulton, who is studying the degradation chemistry of nuclear waste extraction ligands. We also welcome to the laboratory Brittany Daws, who will continue our efforts in nitrosamine carcinogenesis; Kylie Dawn, who is quantifying the role of chlorine atoms in advanced oxidation process chemistry; and JoAnna Milan, who in conjunction with Dr. Shahab Derakhshan is synthesizing and characterizing new photocatalysts for wastewater chemical remediation.

Our experimental techniques now span a mixture of accelerators, rapid-mix spectrophotometers, solar simulators and bacterial cultures, which makes for a busy laboratory.

My students' conference presentations were certainly one of our highlights this year, especially our eight presentations at the ACS meeting in Dallas. However, the RadKEM group was also notable for their awards this year. Garrett McKay won the Outstanding Graduate Thesis college award, and DeeAnn received our department's AIC award and Departmental Honors, as well as won the best platform pre-sentation at the AEHS conference in San Diego.

Lauren also received Departmental Honors, plus the Merck award for organic chemistry and a Monahan award. Haley obtained a CSULB Women and Philanthropy award, Shauna received the department Outstanding TA award as well as a Henderson summer research award, and Brittany won the Spyros Pathos award for general chemistry. Brittany and JoAnna also received university summer research fellowships. I am very proud of all of them for their accomplishments!

Lastly, I received the Outstanding Professor of the Year award. I was extremely honored to receive this and gratefully acknowledge the support and efforts of all my collaborators and present/previous research students in helping me during the past decade.

With my upcoming sabbatical in fall 2014, I plan to go to Germany and Sweden to perform experiments, as well as spend some time in Notre Dame and Florida to learn new experimental techniques. I am looking forward to another amazingly successful year!

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First row from left: Dr. Ken Nakayama, Minh Nguyen and Phuong Nguyen.
Second row from left: Jose Hernandez and Joselyn Ochoa (not pictured: Trina Tran).

FACULTY**REPORTS**

Continued from pg. 11

Dr. Ken Nakayama

Our ongoing work with Dr. Roger Acey's group on the cholinesterases has developed into additional collaborative efforts with Dr. Jason Schwans's research group over the past year. Dr. Eric Sorin continues to assist us through his expertise in computational chemistry.

Undergraduates in my group also made strong contributions to our work. Silvia Cervantes and Tina Vo synthesized several bivalent inhibitors. Silvia is now finishing her first year in the M.S. biochemistry and molecular biology program at USC's Keck School of Medicine, and Tina is employed with Precision Aerospace Corporation.

We have completed a small library of these compounds, and their inhibition studies have turned out to be extremely interesting. We have also finished a more extensive study involving the monovalent inhibitors with the aid of Dr. Schwans's group.

Joining my group during this academic year were Mihn Nguyen, Phuong Nguyen and Tracy Osaji, who have contributed towards the synthesis of several organophosphorus compounds.

Meanwhile, the M.S. degree students were the main drivers of individual projects by solving many technical problems along the way. Trina Tran completed her final year in our M.S. chemistry degree program. She will be defending her thesis during fall 2014. Kim Tu defended her M.S. degree thesis during summer 2013. She was accepted to several Ph.D. programs including UC Davis and University of Illinois, Urbana-Champaign, but she began her studies at UC Irvine in fall 2013.

I have been involved in teaching the advanced organic laboratory course (CHEM 420) since fall 2007. Every semester, I try to incorporate reactions from the literature into the course curriculum to give students an opportunity to apply their sophomore organic knowledge to modern synthetic methods in the lecture and lab.

I've also continued to teach the CHEM 322 series, the two-semester organic chemistry lecture sequence for bioscience majors. The course has its own challenges, but I continue to enjoy applying Dr. Don Paulson's (retired, Cal State L.A.) active learning strategy and interacting with my colleagues over pedagogy.

Dr. Vas Narayanaswami

I am pleased to welcome graduate students Alexandra Donovan and Skyler Chuang and undergraduate researchers Siobanth Cruz, Chelsi Heiner-Melancon, Rowan Mostafa and Jaime Tran to our lab.

In spring 2014, Shweta Kothari and I participated in the 2014 Biophysical Society Meeting in San Francisco, where Shweta had a poster presentation. She was awarded the 2014 Biophysical Society Student Travel Award.

Patricia Nguyen, an undergraduate student from our lab, won the 2014 Howell-CSUPERB Research Scholar award to carry out fluorescence polarization analysis of the lipoprotein-binding domain of apoE. She and I attended the delightful Doris A. Howell Foundation quarterly Luncheon Lecture Series at the La Jolla Country Club, where we had the opportunity to meet with Dr. Howell. The Doris A. Howell Foundation for Women's Health Research funds undergraduate student researchers.

Charina Fabilane, another undergraduate student in our lab, received the 2014 Women & Philanthropy award for her project entitled "Can age-related oxidative stress modification of 'good cholesterol' lead to dysfunctional HDL?" She was recognized for her success during a charming reception at the Earl Burns Miller Japanese Garden. Women & Philanthropy provides scholarships for students to support scientific research.

Dr. Michael Schramm

"Everything I do is for the host." - Rūmī

Molecular recognition is the study of molecules' interactions. At its essence are energy levels "weaker than covalent." Truly, this is a paradigm of host and guest. How does the guest treat the host? Of course it does something, as together they arrive at an energetic minimum. Hydrogen bonding, metal coordination and the hydrophobic effect are some of these forces enticing one to another and filling empty space, which nature simply will not allow. We find crucial interactions in nature predicated on non-covalent interactions, and our research uses these as a design principle to develop new molecules that are compatible with and capable of regulating biological function.

Sewwandi Ratnayake (expected to complete an M.S. degree in the 2014-15 academic year) has made great progress in developing a new class of BODIPY fluorophores that contain ester groups. We hope to use these to afford new, water soluble BODIPYs that can be attached to biomolecules. Annabelle Cantu joined this project in summer 2014.

Dr. Birendra Adhikari, Sahar Roshandel (expected to complete an M.S. degree in the 2014-15 academic year) and Ayu Fujii (graduated with a B.S. degree in spring 2014) have developed synthetic small molecule receptors that transport fluorophores and drug molecules across membranes (Adhikari, Fujii, *European Journal of Organic Chemistry*, 2014, 2972-9). We have demonstrated that this behavior exists in unilamellar vesicles and efforts continue with our Dr. Roger Acey and Dr. Richard Hooley from UC Riverside in cells (Acey, Hooley, et. al., *J. Am. Chem. Soc.*, 2013, 135 (19), 7090-3).

Dr. Adhikari has also demonstrated a new calix[6]arene host-guest complex with Pb, Sr and Ba (Adhikari, *Chem. Commun.*, 2014, 50 (15), 1903-5). A follow-up with Dr. Shahab Derakhshan will describe aspects of this work that provide new opportunities for environmental remediation.

Makan Kaviani (graduated with an M.S. degree in spring 2014) published our first

report on a new approach to enantioenriched polylol and polylol amines (Kaviani, *Tetrahedron Let*., 2013, 54, 5014-17). Alexander To is pursuing this work making polyamine polyols more efficiently. Carolyn Hua joined this project in summer 2014.

Finally, I will take sabbatical during the academic year, departing January 2015 for three months to work in New Zealand with my colleague James Crowley to make "functional metallosupramolecular architectures." Once this is complete, I will set sail for Japan for three months to work with my colleague Tetsuo Iwasawa on "silicon functionalized cavitands and chemical microbalances." The year will be rounded out at Pacifichem 2015, where I'll report on these results. Hope to see you there!

From left: Undergraduate student Nixon Corpuz works with Dr. Jason Schwans analyzing his recent peptide synthesis data.

Dr. Jason Schwans

Our lab is focused on understanding enzyme function. Enzymes are essential for life, endowing the speed and specificity of chemical transformations required for living systems. Understanding how enzymes work has been central to our understanding of biology and has been instrumental in the design of enzymes that act as drugs.

A longstanding question is: How are enzymes extraordinarily better catalysts than molecules created in the lab when enzymes use the same chemical groups as these laboratory molecules? We are currently investigating what distinguishes general acid/base catalysis on an enzyme compared to small molecule catalyst created in the lab. We chose general acid/base catalysis for our studies, as the proton transfer catalyzed by general acid/base catalysis is a hallmark of biological reactions. We use standard biochemical approaches such as site-directed mutagenesis and X-ray crystallography to study the effects of making mutations on enzyme activity. In addition, we use the power of organic chemistry to synthesize new amino acids and nucleotides not found in nature (unnatural amino acids and nucleotides) to perform experiments that would not be possible using routine biochemical approaches.

Four graduate and 10 undergraduate students are currently involved in several research projects investigating enzyme function. Before we can perform many of the desired biochemical experiments, we must first synthesize the unnatural amino acids. Several students are involved in synthesizing these analogs: Alex Colla, Matthew Garay and Dagoberto Ramos are developing an approach to synthesize and incorporate a series of unnatural tyrosine analogs in proteins; Vannalyn Abille is developing an approach to enzymatically synthesize multiring tyrosine analogs; and Nixon Corpuz is synthesizing a sulfur containing analog of aspartic acid.

On the biochemistry side, biochemical studies are already underway using two enzymes: triose phosphate isomerase and ribonuclease A. Elise van Fossen, Bess Biscocho, Marvin Huynhle and Genessis Mercado are investigating the role of general base catalysis in triose phosphate isomerase. Weilee Chen and Nathan Alade are conducting experiments to investigate the catalytic importance of active site interactions in ribonuclease A. In addition, Elvis Arteaga, Eric Armas and Jeanette Gonzalez are evaluating inhibitors of butyrylcholinesterase in collaboration with Drs. Ken Nakayama and Roger Acey.

Dr. Young Shon

After being away from teaching lectures for two semesters, I returned to teach CHEM 522, Special Topics in Organic Chemistry, focusing on the chemistry and applications of polymers and nanoparticles, in spring 2014. I thoroughly enjoyed teaching this class, and was able to learn interesting science and find new research questions from the rapidly evolving area of nanoscience.

Our research group was able to maintain their productivity by publishing three research papers in this past year. These articles were published in *ACS Applied Materials & Interfaces, RSC Advances* and *Advances in Nano Research*, co-authored by several students including Diego Gavia (a former graduate student who is in a Ph.D. program at UCLA), Jordan Koeppen (a former undergraduate who is in a Ph.D. program at UC Riverside), Judy Shon (a former high school volunteer student who is a freshman at Caltech), Van Truong (a former undergraduate who was admitted to Fairfax Hospital's CLS program) and May Maung (a former undergraduate who is an M.S. degree candidate in our group).

Our group has continued our NIH-funded multifunctional biomarker research synthesizing dendron-capped gold nanoparticles and evaluating the cytotoxicity and cell permeability of these nanoparticles. The cell uptake studies demonstrated the size-dependent internalization of nanoparticles in vesicles rather than the nucleus. A graduate student, Suprit Deol, who is planning to defend his thesis work by the end of this summer, and an undergraduate, Nisala Weerasuriya, led this research together and presented their progress at the Western Regional Meeting of the American Chemical Society, the Annual Biomedical Research Conference for Minority Students and the Student Research Symposium at CSULB.

Serena Low and Hanqing Pan, who joined our research group as graduate students in 2013, have been working on the research project "synthesis and catalysis of engineered two-dimensional nanoparticle hybrids." Hanqing is planning to join the Department of Chemistry at New Mexico

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Tech for her Ph.D. studies when she completes her thesis this summer.

A graduate student, Linh Nguyen, and several undergraduates, Chris Salazar, Tommy Dinh, and Johnston Nguyen, are working on the chemical catalysis of various unsupported nanoparticles to understand the role of surface immobilized ligands on catalytic activity of nanoparticles. Hanqing, May, Chris and Johnston have all had opportunities to present their research in regional scientific conferences mentioned above. I have been continuously serving as an editorial board member for the *Journal of Nanoparticles* and was newly elected as the same for *Advances in Chemistry*.

Dr. Eric Sorin

While I experienced the horse race that comes with teaching three courses simultaneously for the first time, nearly all Sorin lab researchers were out hunting down employment or making big decisions regarding graduate school opportunities, and it was thus quite an exciting year for us. Recent graduate Amethyst Radcliffe (B.S., physics) took a position with PPG Aerospace, where she's thrilled to be working in the industrial R&D sector. Graduate Erik Carpio (B.S., biology) has moved east to enter the new M.D. program at my under-graduate alma mater, UC Riverside.

Phuc La (B.S., biochemistry), graduate and winner of last year's CNSM Rhodes Award, will be entering the Pharm.D. program at USC this fall, and his classmates, B.S. degree in biochemistry graduates Samantha Cao and Lynn Nguyen, are off to Arizona and Florida to study occupational therapy and pharmacy, respectively. Finally, computer science major David Gaskins also flew the coop this year after landing an internship at IBM, which he now calls home.

Indeed, a mass exodus from the Sorin lab has made room for a number of young researchers to fill empty seats this year. Graduate Walter Alvarado (B.S., physics) has returned from a gig in industry to pursue his M.S. thesis work, which will focus on simulation of massive biomolecular systems, while Raghu Immaneni (M.S., computer science) has stepped in to help with systems administration this year.

Ji Won Kim and Cayla Rodia (upper class, B.S. degree, biochemistry) have also joined us this year, as have several of their younger peers, including Dakota Rochelle, Analisa Garcia and Yessica Gomez. Danou Veasna and Joceline Pereira (B.S., chemical engineering) have also joined the lab recently, rounding out our summer lineup.

Front row from left: Yessica Gomez, Joceline Pereira, Analisa Garcia, Danou Veasna and Cayla Rodia. Back row from left: Khai Nguyen, Walter Alvarado, Prof. Eric J. Sorin, Ji Won Lee, Dakota Rochelle and Raghu Nandan Immaneni.

Senior lab member Khai Nguyen (B.S., biochemistry, computer science minor) won this year's Hypercube Award for Computational Chemistry as well as a 2014 CSULB Student Summer Research Award, which has kept him in the lab all summer, to my great pleasure. He has taken over the lab's day-to-day operations and is now mentoring all of the bright, new research students mentioned above.

Although research has greatly slowed for us this year, our successes have been many, and I want to congratulate all of our recently departed alumni for their tremendous work in the lab over the last few years and the future accomplishments they have in store! All in all, this has been the largest personnel shakeup our lab has seen yet, but one that has already provided a rich, diverse and productive young group with which to tackle the next couple of years!

Dr. Paul Weers

The research program in the Weers research laboratory investigates the antimicrobial properties and lipid binding interaction of apolipoproteins, proteins that play a critical role in the transport of lipids in the human body. Last year, Cindy Pratt (finally!) and Anna Smith graduated with a master's degree in biochemistry.

Rachel Elena, Lukas Fuentes, Dominique Harris, Daniel Sallee (MARC student), Andrew Shaw and Cody Weaver joined the lab, and we hope to learn more about their research accomplishments soon. James Horn, Jesse Tran and Kan Cong have become senior lab members and made excellent progress with their projects. James and Eugenia Maravilla presented their work at the annual CSUPERB meeting in Santa Clara, Calif.

MARC student Nnejiuwa Ibe has been a valuable member of the lab, presenting his work at CSUPERB and ASBMB meetings, and teaching other members of the lab the ins and outs of apolipoprotein research. He graduated in May 2014 and will continue his education as a Ph.D. student at UCSF. He surely will be missed.

M.S. degree student Wendy Beck graduated in summer 2013 and recently generated new mutant proteins, arguably holding the world record in engineering the most mutations in apolipoproteins. In fall 2014, she will join the Ph.D. program at Cornell. We were happy to hear that former student Pankaj Dwivedi passed his qualifying exam and is on his way to a Ph.D. degree in cancer biology at the University of Cincinnati.

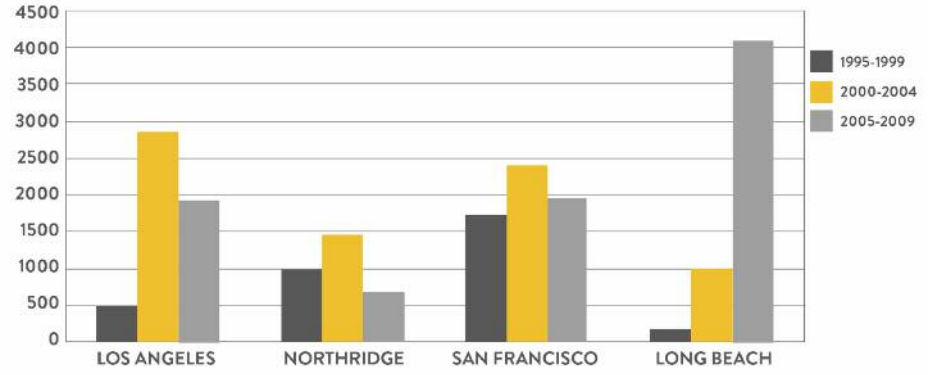
A CSU LEADER IN RESEARCH PRODUCTIVITY

By Dr. Krzysztof Slowinski

Recent data show that our department leads CSU chemistry and biochemistry departments in the number of research publications and the number of citations of our publicaions in the literature. The Department of Chemistry and Bio-chemistry's Vision Statement describes teaching and research as "equal and essential components to the education of our students." We view research experience as a cornerstone of the education in chemistry and biochemistry. Since 1995, our faculty has published more than 300 peer-reviewed research articles based fully or partly on research performed on campus.

Peer-reviewed journal articles from CSU chemistry and biochemistry departments (based on Web of Science™, June 2014).

Based on the analysis of data obtained from the science citation index via Web of Science™, June 2014, it is clear that our department has made amazing progress in terms of research productivity. The number of peer-reviewed publications originating from the department has increased 15-fold between 1995-99 and 2010-14. We are clearly a CSU leader in this area. Even more revealing is the analysis of citations of the published papers, which demonstrates the impact of research discovery at CSULB.



Citations of research papers published within the indicated timeframe (based on Web of Science™, June 2014).

CSULB chemistry and biochemistry research papers published between 2005 and 2009 received over 4,000 citations in primary literature to date. This is more than twice the number of citations received by our two closest competitors, Cal State L.A. and San Francisco State, for the same time period.

Most importantly, our undergraduate and graduate students play an integral part in these research efforts. For example, in 2013, the department faculty published a total of 28 peer-reviewed papers indexed by science citation index, and 16 of them were co-authored by over 50 students. Laboratory research under supervision of faculty members provides invaluable experience in problem solving, teamwork, scientific writing and literature analysis. Students involved in the research process create new knowledge and communicate this knowledge to the research community by participating in writing publications and preparing presentations.

Our department's experience, as well as data provided by NIH and NSF, demonstrates that research promotes critical, analytical and creative thinking, which invariably motivates undergraduates to continue their education and pursue challenging careers.

2013-14 RESEARCH PUBLICATIONS for Department Faculty

Dr. Xianhui Bu

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Dr. Shahab Derakhshan

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Dr. Lijuan Li

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Dr. Tom Maricich

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Dr. Vasanthy Narayanaswami

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Dr. Jason Schwans

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Dr. Young Shon

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M.S. THESES

Anas L. Al-Qazzaz
"A Kinetic Study of the Radiolytic Degradation of Phthalates in Aqueous Solutions" • **Advisor: Dr. Stephen Mezyk**

Wendy H.J. Beck
"Apolipoprotein A-I Antimicrobial Properties: Role of Lysine Residues in Lipopolysaccharide Binding"
• **Advisor: Dr. Paul Weers**

Bernard F. Brady
"Lessons Learned in the Synthesis of a Diversity-Oriented Library of Phosphodiesterase Inhibitors"
• **Advisor: Dr. Paul Buonora**

Andrew J. Clough
"Synthesis and Crystal Structure Determination of Novel Lithium Metal-Organic Frameworks"
• **Advisor: Dr. Xianhui Bu**

Thomas D. Cullen
"Hydroxyl Radical Reaction and Lanthanide Ion Complexation Kinetics of DTPA" • **Advisor: Dr. Stephen Mezyk**

Derrick A. Diego
"Synthesis and Characterization of Iron Dinitrosyl Complexes with Nitrogen Containing Chelating Ligands"
• **Advisor: Dr. Lijuan Li**

Michael P. Fimbres
"Competitive Sulfonimidate Alkylations of Phenols"
• **Advisor: Dr. Tom Maricich**

Diego J. Gavia
"Controlling Surface Ligand Density and Core Size of Nanoparticle Catalysts Synthesized by Employing Sodium S-Alkanethiosulfates as Ligand Precursors"
• **Advisor: Dr. Young-Seok Shon**

Lauren R. Holloway
"Synthesis and Investigation of Novel Dinitrosyl-Iron Complexes of Bis-Phosphine Ligands: Potential Nitric Oxide Delivery Compounds" • **Advisor: Dr. Lijuan Li**

Makan Kaviani Joupari
"Preparation of Enantioenriched Polyols and Polyol Amines and Multiplying the Catalytic Output of Reactions"
• **Advisor: Dr. Michael Schramm**

Sea H. Kim
"Reconstituted HDL Containing Apolipoprotein E3 Is a Potential 'Nanovehicle' for Transport and Targeted Delivery of Bioflavonoids" • **Advisor: Dr. Vasanthy Narayanaswami**

Garrett J. McKay
"Reactivity of the Hydroxyl Radical with Organic Matter"
• **Advisor: Dr. Stephen Mezyk**

Mona Oumais
"Synthesis and Characterization of Helical Peptide-Based Drug Carriers" • **Advisor: Dr. Katarzyna Slowinska**

Jose I. Ruiz
"The First Spectroscopic Observations of Germanium Carbide" • **Advisor: Dr. Christopher Brazier**

Anna L. Smith
"Structural and Functional Analysis of the Mini-Helix in Locusta Migratoria Apolipophorin III" • **Advisor: Dr. Paul Weers**

Kim Ngan Thi Tu
"Novel Bivalent Organophosphates as Inhibitors of Butyryl-Cholinesterase - Compounds with Potential for Treatment of Alzheimer's Disease and Studies in the Development of Asymmetric Catalytic Kabachnik-Fields Reaction"
• **Advisor: Dr. Kensaku Nakayama**

Christopher M. Walowski
"Using Phenyl Amide Triserine Lactone Receptors in Anion Recognition Studies" • **Advisor: Dr. Eric Marinez**

SAACS

By Donnella Cardwell

SAACS fall 2013-spring 2014 Executive Council. Left to right: Donnella Cardwell (co-president), Tanna Helm (secretary), Jacqueline Dominguez (co-president/public relations), Chelsi Heiner-Melancon (vice president/historian) and James Horn (treasurer).

The 2013-14 school year was another successful time for the Student Affiliates of the American Chemical Society at The Beach.

One goal of ours was to increase the number of active members in the club. After participating in the Associated Students, Inc. Week of Welcome, we recruited so many new members that, by the first meeting, there were over 50 new and returning people that attended. We kept the numbers high by holding our usual pizza and bowling social and by offering different opportunities for our members.

At the end of the last school year, SAACS received a grant from the ACS, which was used to purchase supplies for our Science Showcase Program. We made a presentation to a large group of eight-grade AVID students, conducting some simple but interesting experiments that included Styrofoam dissolving in acetone and making dry-ice bubbles. After the demonstration, SAACS members joined the middle school students for lunch to provide them the opportunity to ask questions and talk about school and personal issues in a more relaxed setting. The children were grateful to be able to talk to us, and their early passion for science put smiles on our faces. We also used the grant to purchase "Bill Nye the Science Guy" videos, which will be distributed to low-income elementary schools during future outreach opportunities.

SAACS kept up with its usual fundraising by hosting its biannual Garb Sale to sell lab coats, goggles and ACS study guides for beginning through advanced chemistry students. We also held our weekly Friday Coffee & Donut Hour for faculty, staff and students to come grab a bite to eat and mingle with each other. On top of that, we held our periodic table cupcake bake sales for National Chemistry Week in October and Earth Day in April, which are always a success when it comes to fundraising and advertising our club.

This club already has many exciting plans for the upcoming school year, including different tours and outreaches. We hope to keep expanding our Science Showcase Program and continue showing our members all the great opportunities available in the chemistry and biochemistry field. SAACS would not have been possible this year without the support from our advisors Dr. Michael Schramm and Dr. Paul Buonora, and all the help from Joyce Kunishima, Ray Grace, Cynthia Ybarra, Irma Sanchez and Xiao Wong. We thank you all so much for everything you have contributed to our club.

For the 2014-15 school year, SAACS will be passed down to a brand new board. I would like to congratulate Co-Presidents Chelsi Heiner and Genessis Mercado, Vice President Sheri Satterfield, Treasurer James Collins, Secretary Lily Dang, Historian Danielle Jackson and Public Relations Officer Annabelle Cantu. I know these bright individuals will make great leaders and keep SAACS going strong.

Alumni Giving Makes a Difference!

YOUR DONATIONS AT WORK

14 Student Research Travel Awards

Fourteen undergraduate and graduate students received awards of up to $500 each in support of their participation in national and international meetings.

Roy Hernandez presented his poster "Conformational Analysis of Human Apolipoprotein E3 by Fluorescence Polarization Spectroscopy and Hydrogen/Deuterium Exchange Coupled to Mass Spectrometry" at the Gordon Research Conference and Seminar (Lipoprotein Metabolism), June 2012, Waterville Valley, N.H.

14 Departmental Honors and Special Awards

For outstanding service, teaching associate, thesis, baccalaureate and post-baccalaureate candidates.

9 Scholarship Awards

Ranging from $1,000 to $5,000.

8 Summer Research Awards

Supported students in 10 weeks of faculty-mentored summer research.

25 Seminars by Distinguished Visiting Scientists

From such prestigious institutions as Caltech, UCLA, Stanford, USC and Purdue.

Dr. Richard N. Zare, the Marguerite Blake Wilbur Professor in Natural Science at Stanford University, made two presentations as the Allergan Foundation Distinguished Lecturer.

YOU CAN MAKE THE DIFFERENCE IN 2014-15!

Your gifts determine how rich an educational experience we can provide to our students. The department relies exclusively on private contributions to support these key educational enrichment activities for students:

- Summer Research Program
- Student Research Travel Fund
- Department Awards and Scholarships

Please give online at **www.csulb.edu/givenow** to enrich the life of a student by supporting one of the department priorities above. Your gift really does make a difference!

HERNANDEZ WINS TOP CSULB STUDENT RESEARCH AWARD

By Dr. Jeffrey Cohlberg

Roy Hernandez, a graduate student of biochemistry conducting research in Dr. Vas Narayanaswami's lab, won CSULB's 2014 award for Outstanding Research and Creative Activity by a Graduate Student.

Hernandez's thesis project involved characterizing the structural changes that occur during the sequential unfolding of apolipoprotein E3 (apoE3), the most common form of apoE, a protein found in many circulating lipoproteins that plays a key role in cholesterol transport and homeostasis.

Hernandez attached the fluorescent probe IAEDANS selectively to each of the seven helices of the protein. This allowed him to measure the stability of each helix by following changes in fluorescence polarization as a function of the concentration of guanidinium chloride, a protein-denaturing agent. He also spent two summers in Dr. Claudia Maier's lab at Oregon State University, where he probed the relative accessibility of different regions of apoE3 by measuring their rates of hydrogen/ deuterium exchange as monitored by mass spectrometry of apoE3 peptides.

Hernandez's results have led to a model for the sequence of events during the unfolding of apoE3, which may be similar to those involved in the interaction of apoE3 with cholesterol. He will be the first author of two manuscripts, which are in preparation, describing this work. His results have already been presented in a talk at the 2012 Gordon Research Seminar on Lipoprotein Metabolism and a poster at the 2012 meeting of the Biophysical Society.

Upon completing his thesis research, Hernandez enrolled in the university's Stem Cell Training Program, from which he recently received his biotechnology certificate. As part of this program, he worked in Dr. Yanhong Shi's lab at the City of Hope National Cancer Institute, where he has taken patient-derived induced pluripotent stem cells and caused them to differentiate into astrocytes as part of a project to model Alexander disease, a neurodegenerative disorder.

Before arriving at CSULB in 2010, Hernandez received a B.S. degree in chemistry and a B.A. degree in biology at CSU San Bernardino, where he co-authored a paper on solid-state NMR of proteins. Upon completion of a Ph.D. program, he wants to become an academic researcher so he can make a difference in the lives of future generations.

AWARDS & SCHOLARSHIPS

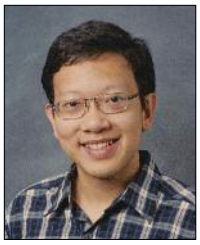
Chemistry and Biochemistry Students 2014

ANNUAL AND ENDOWED AWARDS

Joshua Feng

Shauna Otto

Ezekiel Gonzales-Fernadez



Phuc (Sam) Nguyen

Elise Van Fossen

Sewwandi Ratnayake

Khue Nguyen

Robert B. Henderson Award

Dr. Robert B. Henderson, a distinguished scientist and teacher of organic and general chemistry, was a founding member of the Department of Chemistry and Biochemistry and taught from 1955-82. The award is given to students best exemplifying Henderson's scholarship and commitment to the profession of chemistry. This year's recipients are **Joshua Feng, Shauna Otto** and **Ezekiel Gonzalez-Fernandez.**

Kenneth L. Marsi Scholarship

Dr. Kenneth L. Marsi was a distinguished scientist and teacher of organic chemistry, who served superbly as department chair for 21 years. The $2,500 scholarships are used to defray registration fees of outstanding junior and senior chemistry or biochemistry majors. **Phuc (Sam) Nguyen** received the 2014 award.

McAbee-Overstreet Fellowship

The McAbee-Overstreet Fellowship was established by a donation from Dr. Cathie Overstreet, who received her M.S. degree in biochemistry at CSULB in 2004 under the supervision of Dr. Doug McAbee and went on to a Ph.D. in molecular biology at UC Irvine. It recognizes a graduate student for excellence in scholarship and commitment to research, and this year was presented to **Elise Van Fossen.**

Michael Monahan Fellowship

The Michael Monahan Fellowship was established through a generous bequest from Dr. Monahan (B.S., chemistry, 1963), who was a member of the faculty at the Salk Institute, a senior research scientist at Beckman Instruments, and the founder and president of California Medicinal Chemistry Corporation. In 1985-87, following his retirement, he served as a lecturer in our department. The fellowship supports student research in our department. **Sewwandi Ratnayake** and **Lauren Olson** are the 2014 recipient.

NHK Laboratories, Inc. Biochemistry & Organic Chemistry Award

NHK Laboratories is a family-owned, private label contract manufacturer of vitamins, minerals, herbs, nutritional supplements and over-the-counter pharmaceuticals. Along with the $1,000 NHK scholarship, this year's recipient, **Khue Nguyen**, has the opportunity to complete a course-credit internship at NHK's Santa Fe Springs laboratory.

COLLEGE AWARDS

CNSM Outstanding Thesis Award in Chemistry & Biochemistry
Garret McKay
G2 Software Systems Scholarship
Kaylee Smith
Graduate Dean's List
Makan Kaviani
James L. Jensen Research Fellowship
Phuc (Sam) Nguyen
Phi Beta Kappa Inductee
Nicole Hanson
Robert D. Rhodes Award
Joseph Swabeck

DEPARTMENTAL HONORS

Graduates:
Derrick Diego, Makan Kaviani, Christopher Walowski
Undergraduates:
DeeAnn Asamoto, Joshua Feng, Lauren Olson

SPECIAL DEPARTMENTAL AWARDS

American Chemical Society Analytical Chemistry Award
Alfredo Serrano
American Chemical Society Organic Chemistry Award
Undergraduate: **Joshua Feng**
American Institute of Chemists Baccalaureate Award
Biochemistry: **Joshua Feng**
Chemistry: **DeeAnn Asamoto**
American Institute of Chemists Graduate Award
Biochemistry: **Roy Hernandez**
Chemistry: **Derrick Diego**
Toni Horalek Award
Makan Kaviani
Outstanding Teaching Associate Award
Shauna Otto
Sewwandi Ratnayake
David L. Scoggins Memorial Award
Nicole Hanson

SUBJECT AREA AWARDS

American Chemical Society Polymer Chemistry Award
Bradley Croslin
Analytical Chemistry Award
Joseph Swabeck
Biochemistry Award
Nicole Hanson
Freshman Chemistry Award
Jakob Brouwer
Hypercube Award
Khai Nguyen
Inorganic Chemistry Award
Joseph Swabeck
Merck Award in Organic Chemistry
Lauren Olson
Organic Chemistry Award
Jaime Tran
Spyros Pathos IV Award
Brittany Daws


Garret McKay


Makan Kaviani


Joseph Swabeck


Derrick Diego


Christopher Walowski


Lauren Olson


DeeAnn Asamoto


Roy Hernandez


Bradley Croslin


Nicole Hanson


Jakob Brouwer


Khai Nguyen


Brittany Daws


Jaime Tran

Continued on pg. 22, Awards & Scholarships

AWARDS & SCHOLARSHIPS

Chemistry and Biochemistry Students 2014

Continued from pg. 20

Alexander Donovan

Sahar Roshandel

Kaylee Smith

Tania Chandiluhur

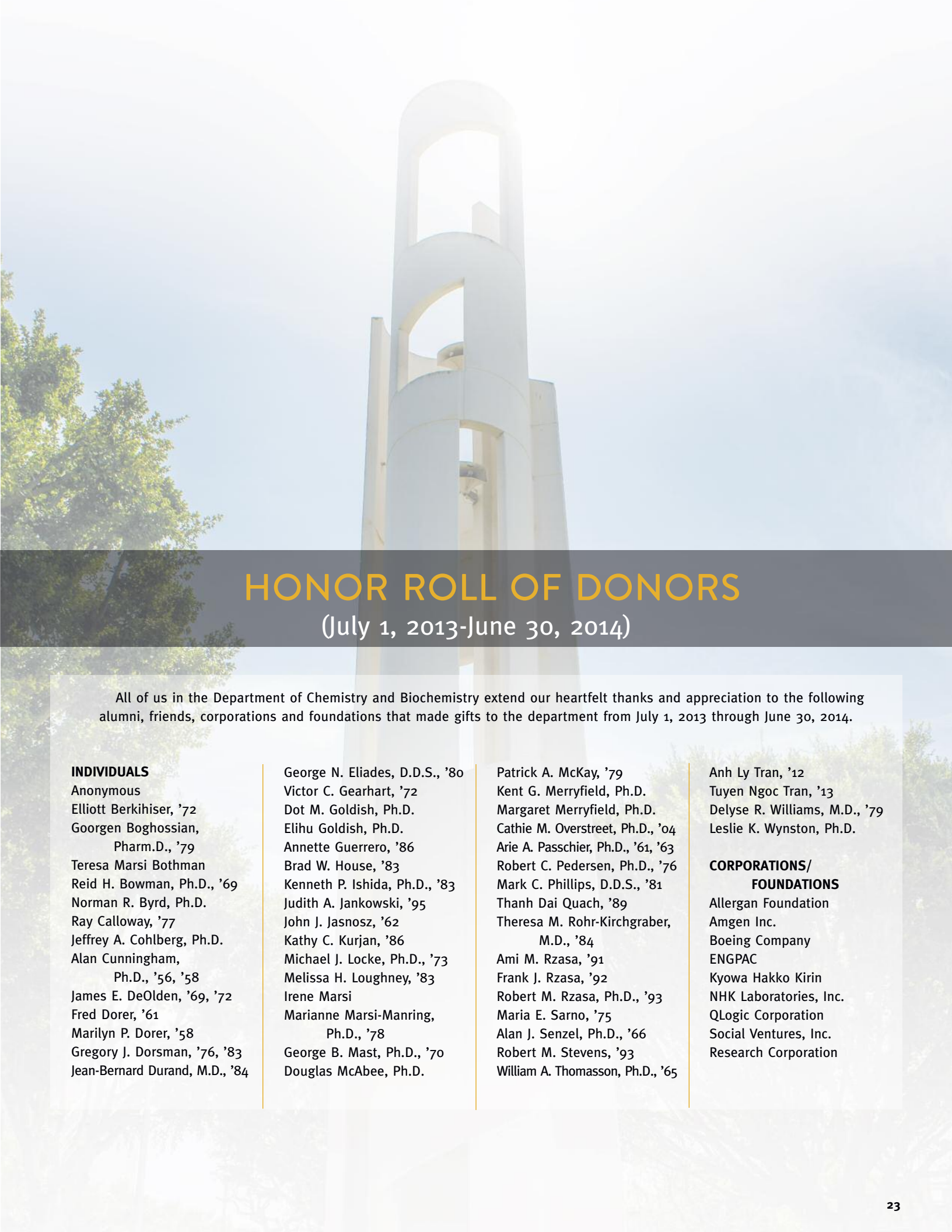
Louis M. Perlgut Scholarship
Dr. Louis M. Perlgut, professor of biochemistry in the department from 1965-82, taught the biochemistry courses for both science majors and nursing students, and supervised both undergraduate and graduate research. He was instrumental in launching the M.S. biochemistry program. This scholarship defrays the tuition expenses of a graduate student in biochemistry. This year, a $1,000 scholarship was presented to **Alexandra Donovan**.

Maria Erlinda Co Sarno Scholarship in Chemistry
After a highly successful career as a chemist at Baxter Healthcare, Maria Erlinda Co Sarno (M.S., chemistry, 1975) became a U.S. patent attorney serving small businesses and independent inventors. The award, which was presented this year to **Sahar Roshandel**, is meant to recognize and inspire an international graduate student with research interests in compounds leading to therapeutics or prevention of disease.

John H. Stern Award in Physical Chemistry
Dr. John H. Stern, a distinguished teacher of physical and general chemistry in our department from 1957-87, was internationally known for his work in solution thermodynamics and author of many publications in that field. **Kaylee Smith** received this year's award.

Leslie K. Wynston Scholarship
Dr. Leslie K. Wynston was a biochemistry professor in the department (1965-98), who served as chair of the Pre-Professions Health Advisory Committee and was active in the Association of Advisors for the Health Professions. The $1,500 award recognizes an outstanding junior who is pursuing a B.S. in biochemistry and planning to enter a health-related professional school the following year. The 2014 recipient is **Tania Chandiluhur**.

Contributions to Student Award Funds Are Welcome
The department welcomes contributions to support these awards. When you make your donation to the department, you may specify that it go to the Wynston, Stern, Marsi, Henderson, McAbee-Overstreet, Sarno or Monahan fund, or general scholarship fund. Les Wynston particularly welcomes donations that will enable him to increase the amount of the annual Leslie K. Wynston Scholarship and ultimately to endow it. Contributions to the department can be made at www.csulb.edu/givenow or returned in the enclosed envelope.



HONOR ROLL OF DONORS

(July 1, 2013-June 30, 2014)

All of us in the Department of Chemistry and Biochemistry extend our heartfelt thanks and appreciation to the following alumni, friends, corporations and foundations that made gifts to the department from July 1, 2013 through June 30, 2014.

INDIVIDUALS

Anonymous
Elliott Berkihiser, '72
Goorgen Boghossian, Pharm.D., '79
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