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CALIFORNIA STATE UNIVERSITY LONG BEACH

# CHEMISTRY & BIOCHEMISTRY

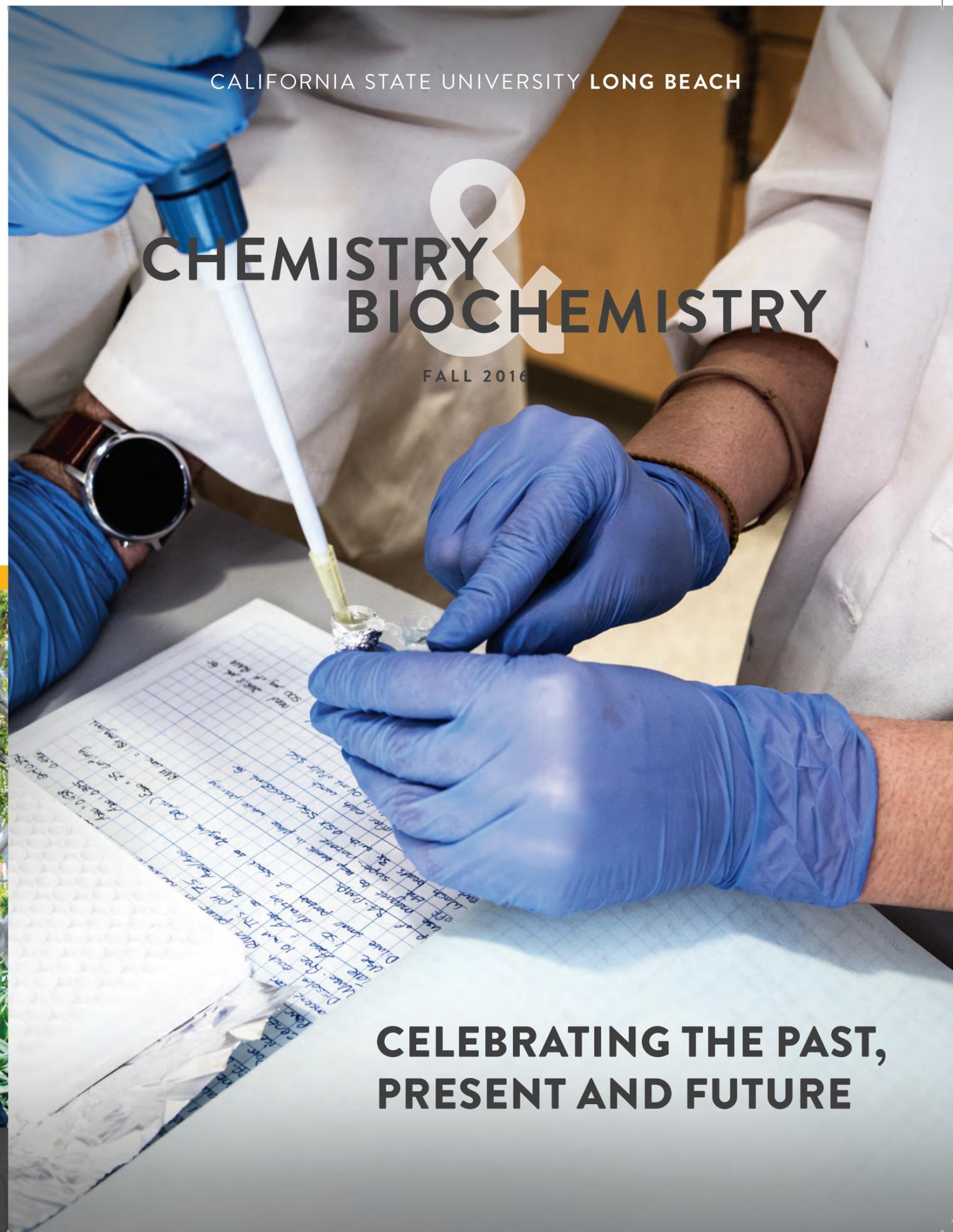
FALL 2016

FOR PAST AND PRESENT STUDENTS AND FRIENDS OF CHEMISTRY AND BIOCHEMISTRY AT CALIFORNIA STATE UNIVERSITY, LONG BEACH.



MEMBERS OF THE 2015-16 GRADUATING CLASS WITH MEMBERS OF THE CHEMISTRY AND BIOCHEMISTRY DEPARTMENT FACULTY.

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**CELEBRATING THE PAST,  
PRESENT AND FUTURE**

## NEW EDITOR OF THE DEPARTMENT NEWSLETTER

For the last several years, Dr. Jeff Cohlberg served as newsletter editor. With Dr. Cohlberg's retirement, Dr. McAbee has assumed editor responsibilities. Dr. McAbee gratefully acknowledges all the newsletter contributions made by department faculty, university staff, and particularly Dr. Brazier without whom publication of the newsletter would not be possible.

## REMARKS BY THE CHAIR



Dr. Chris Brazier

Greetings to all alumni and friends of the Department of Chemistry and Biochemistry. This has been another very successful year for the department with multiple awards received and grants funded along with a continued high level of publication in major journals. The focus of this year's newsletter is the continued strengthening of the materials science program at Cal State Long Beach. Three of our faculty, Young Shon, Shahab Derakhshan, and Xianhui Bu joined with Thomas Gredig and Michael Peterson of Physics to propose a new energy and materials research and education program. Their project was funded by the Keck Foundation and is known as KEMP (Keck Energy Materials Research Program).

The interdisciplinary KEMP grant has supported student research and the creation of a new option in materials science for both B.C. chemistry and B.S. physics students with most of the materials science courses taken together by students from both departments. The new option will appear officially in the 2017 catalog but the classes have been running since Fall 2015. The first group of students is small about five each from chemistry and physics but we expect that to grow significantly once the new option is officially available.

To further develop the materials science program, the department recommended searching for a new faculty member with research interests in materials science. We were very fortunate to hire Hadi Tavassol who joined us after completing postdoctoral studies at Caltech. Tavassol's research uses spectroscopic and electrochemical techniques to probe processes that occur across chemical interfaces with a particular focus on lithium ion batteries, fuel cells and sensors. His research is interdisciplinary applying physical and analytical chemistry techniques to the study of inorganic, organic and bio-materials. Tavassol's teaching will also cross disciplines covering the new materials science classes, physical chemistry and electrochemistry.

The KEMP group grew further with the addition of Fangyuan Tian, whose research focuses on the use of metal organic framework materials for catalysis, gas capture and drug delivery. While Tian is formally classified as an analytical chemist we see that these traditional divisions, especially in research, are becoming increasingly obsolete. The KEMP faculty have also expanded their cooperation with faculty in engineering.

The department faculty have had continued success in obtaining research funding and the two major research grants this year both went to materials science faculty. Prof. Young Shon received a four-year, \$442,000 grant from NIH to study unsupported nanoparticle catalysts that can drive biologically important organic reactions. Professor Shahab Derakhshan received a three-year, \$300,000 grant from NSF to study the impacts of structural and electronic parameters on the properties of heavy element transition metal oxides.

The B.S. chemistry option in materials science is the first new degree program or option in the department since the introduction of the B.S. in biochemistry 30 years ago, but after such a long period without change we are contemplating other new

## HONOR ROLL OF DONORS (JULY 1, 2015 - JUNE 30, 2016)

The student, faculty, and staff community in the Department of Chemistry and Biochemistry extends its heartfelt appreciation for all of the donations received from alumni, friends, corporations, and foundations made to the department this past fiscal year. These funds, totaling \$119,664 this past year, positively impact the entire department community, and we are most grateful for your generosity. We are pleased to acknowledge our individual and corporate/foundation contributors.

### INDIVIDUALS

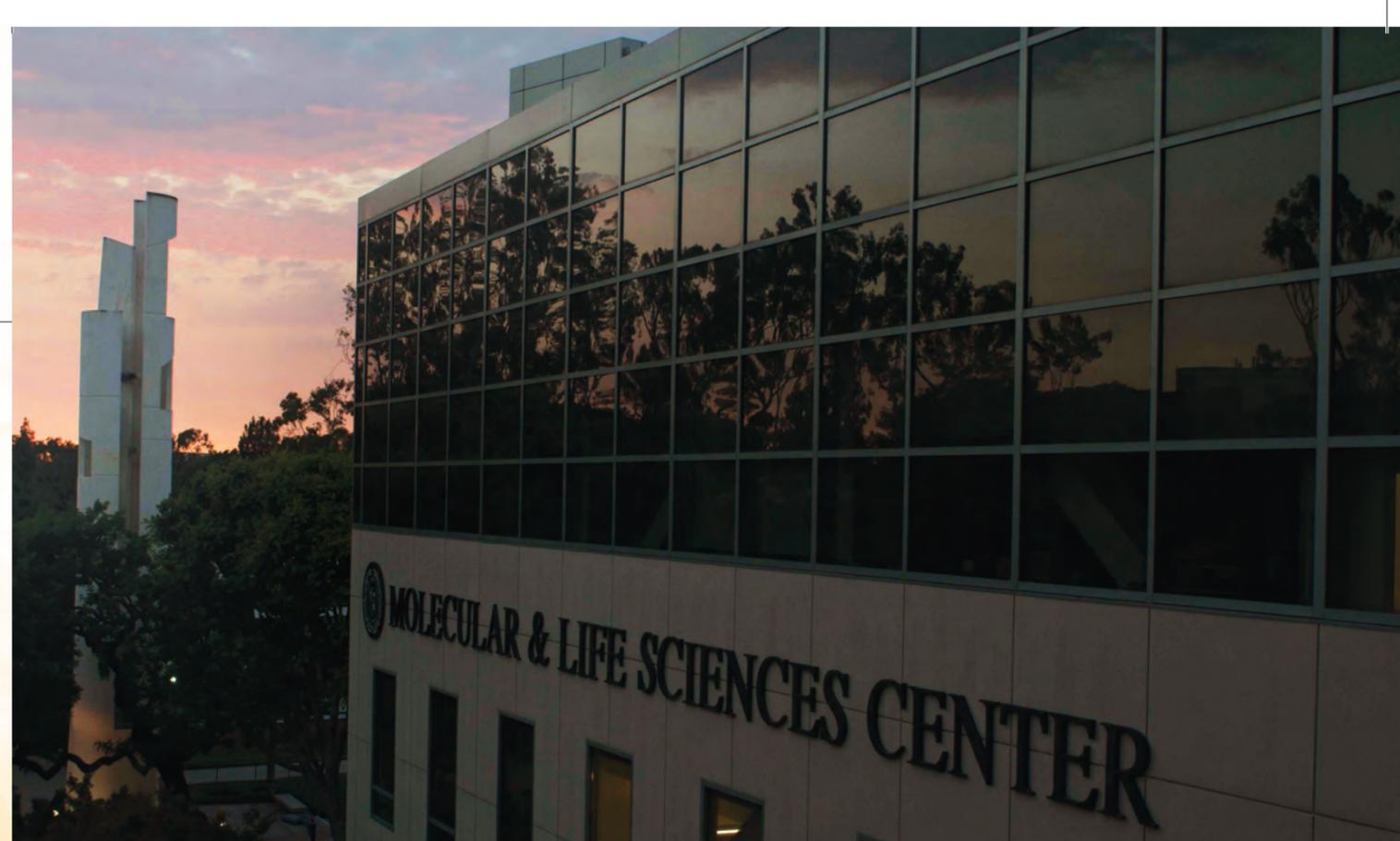
Anonymous (3)  
Cecilia Artiga  
Vilma L. Balbuena  
Elliott Berkihiser '72  
Goorgen Boghossian, PharmD '79  
David Bothman  
Teresa Marsi Bothman  
Claire Bowman  
Reid H. Bowman, PhD '69  
Oliver M. Brown, PhD '66  
Ray Calloway '77  
David A. Chernik '79  
Carol L. Clark '70  
Roger T. Clark, PhD '66  
Jeffrey A. Cohlberg, PhD  
Alan Cunningham, PhD '56  
Navindra J. Deoram '02  
Fred Dorer, PhD '61  
Marilyn Y. Dore '58  
Jean-Bernard Durand, MD '84

Victor C. Gearhart '72  
Dana Marie Gilchrist '95  
Dot M. Goldish, PhD  
Annette Guerrero '86  
Brad W. House '83  
William H. Hulbrock '70  
Michael J. Locke, PhD '73  
Huong-Anh N. Long MD '81  
Melissa H. Loughney '83  
Irene Marsi  
George B. Mast '70  
Douglas McAbee, PhD  
Timothy J. McGauley '68  
Patrick A. McKay '79  
Kent G. Merryfield, PhD  
Margaret Merryfield, PhD  
David R. Oliver '77  
Cathie M. Overstreet, PhD '04  
Arie A. Passchier, PhD '61  
Deanna L. Passchier '64  
Robert C. Pedersen '76

Mark C. Phillips, DDS '81  
Thanh Dai Quach '89  
Steven R. Rice '83  
Theresa M. Rohr-Kirchgraber, MD '84  
Robert M. Rzasas, PhD '93  
Felicisimo S. Sarno  
Maria "Linda" Sarno '75  
Robert Savenye '74  
Lara H. Spencer '09  
Aron D. Thall '85  
Tuyen Ngoc Tran '13  
Gregory L. Whitaker, MD '90  
Leslie K. Wynston, PhD

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ENGPAC  
NHK Laboratories, Inc  
Research Corporation



# AWARDS & SCHOLARSHIPS

Chemistry and Biochemistry Students 2016

Continued from pg. 22



Mary Taiwo



Jaime Tran

### Maria Erlinda Co Sarno Scholarship

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 **Mary Taiwo**, is meant to recognize and inspire an international graduate student with research interests in compounds leading to therapeutics or prevention of disease.

### David L. Scoggins Memorial Award

This award memorializes David L. Scoggins, a graduate student in the Department of Chemistry at the time of his death in 1969. This award recognizes outstanding scholarship and promise by a chemistry or biochemistry student who intends to pursue a career in one of the health-related professions. **Jaime Tran** is this year's recipient.

### 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. **Lukas Fuentes** 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 2015 recipient is **Peter Nguyen**.

### 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](http://www.csulb.edu/givenow) or by contacting Maryanne Horton, [maryanne.horton@csulb.edu](mailto:maryanne.horton@csulb.edu), 562.985.1687.



Students receiving awards at the Chemistry Department Awards Banquet.



programs, too. A B.A. program in biochemistry has been developed and will start in Fall 2017 if approved at the college and university levels. My thanks to Professors Eric Sorin and Doug McAbee, who along with help from the other biochemists, developed the new degree program. We are also contemplating converting the current Single Subject Chemistry Concentration for prospective chemistry teachers to an option in chemistry education. If you have opinions on the changes to the programs available in the department I would love to hear from you.

Among our many student research award winners I would like to give a special mention to David Russell who recently graduated from the Derakhshan group. David won the Margaret Burbidge award first place for Best Experimental Research by a graduate student for his presentation "Crystal Structure and Magnetic Properties of Novel Double Perovskite  $\text{Ca}_2\text{ScO}_6$ " at the American Physical Society Far West meeting. For a chemistry student competing against physics students from top Ph.D. schools this was an outstanding achievement.

At the University Achievement Awards luncheon this year Brittany Daws was recognized as the Outstanding Undergraduate Research Student. Daws, who has graduated and begun her Ph.D. at UC Berkeley, was a research student with Professor Steve Mezyk who was honored at the same ceremony for Research Impact Accomplishment of the Year. To complete their day, Daws was honored as Outstanding Graduate in CNSM at the Alumni Awards banquet that evening and Mezyk was recognized as the Most Valuable Professor in the college.

The university's Student Excellence Fee program has continued to be a valuable resource for keeping our instructional laboratories up to date with the latest equipment. The organic chemistry laboratories received \$110,000 in funding for new instruments. We will be purchasing two more new infrared spectrometers equipped for attenuated total reflectance to match those acquired last year, so that all organic chemistry students have access to the latest IR instrumentation. In addition, we will be able to purchase an add on mass spectrometer for one of the gas chromatographs purchased last year. This will return GC-MS analysis to the organic labs, the previous GC-MS had failed beyond repair last year. We also received about \$100K for new or replacement equipment in the biochemistry, general chemistry, and analytical chemistry laboratories.

This year we said goodbye to Professors Jeff Cohlberg and Dennis Anjo who entered full retirement after five years in the faculty early retirement program. Professor Stuart Berryhill also retired in January but in August he returned and joined the faculty early retirement program.

Finally, I would like to once again thank our alumni and friends whose continued support provides a critical enhancement to the quality of our programs.

— Dr. Chris Brazier

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 2016

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# DR. SHAHAB DERAKHSHAN: DESIGNING NEW MATERIALS

By Dr. Douglas McAbee

How can sunlight be used to remediate organic pollutants from water? How can thermoelectric generators make cars more fuel efficient? How can we make memory chips that are faster and have greater capacity? Chemistry faculty member Dr. Shahab Derakhshan is working to answer these and related questions by developing novel materials with photo-catalytic, thermoelectric, or magnetic properties.

Through educated guesses and trial and error, novel solid-state compounds are synthesized in the lab and a small fraction of these, if pure, are then analyzed for various physical properties. If the resultant properties are not desirable, then the chemical composition, crystal structure, or electronic properties of the compounds are modified to better match the target applications.

The group led by Dr. Derakhshan is studying a wide range of physical properties such as magnetism, electronic transport and optical properties for energy conversion, energy storage and catalysis. The specific materials include, but are not limited to, thermoelectric materials, which convert heat to electricity and vice versa, light-emitting materials for LED lamps, and photo-catalysts for hydrogen production from water splitting and decontamination of water pollutants.

Eight undergraduate and two graduate students are in his recent research group. Undergraduates normally work with a graduate student until they become independent, at which point then they can tackle a research problem on their own. Dr. Derakhshan attracted most of his undergraduates through his instruction in basic inorganic chemistry

(CHEM 331) and general chemistry (CHEM 111A). His lab has become popular with students, so word-of-mouth endorsements have encouraged many other students to join.

The group is working on several different projects on which students have made significant contributions. Sophia Nguyen, Malinda Tan and David Russell worked on the magnetic frustration v. low-dimensional magnetism problem. This work was the basis of the recent NSF grant (received July 2016). Sophia and Malinda worked on NaCl structure-type systems, and David worked on double perovskites – a calcium titanate-rich compound. Cheryl Sturm (M.S. student, now a Ph.D. student at University of Waterloo) focused on compounds outside of metal oxides (sulfides, selenides).

## COLLEGE AWARDS

CNSM Outstanding Thesis Award in Chemistry & Biochemistry

**Sophia Nguyen**

Graduate Dean's List

**Brittany Daws**

James L. Jensen Research Fellowship

**Trevor Reutershan**

Robert D. Rhodes Award

**Phuc Huu Ba (Sam) Nguyen**

## DEPARTMENTAL HONORS

Graduates:

**David Russel, Andrew Alexopoulos, Rachel Elena**

Undergraduates:

**Brittany Daws, Khang Nguyen, Sean McCoy**

## SPECIAL DEPARTMENTAL AWARDS

American Institute of Chemists Baccalaureate Award

Biochemistry: **Sean McCoy**

Chemistry: **Ali Akil**

American Institute of Chemists Graduate Award

Biochemistry: **Rachel Elena**

Chemistry: **David Russell**

Toni Horalek Award

**Ali Akil**

Outstanding Teaching Associate Award

**Hea-Jin Hong**

## SUBJECT AREA AWARDS

American Chemical Society Analytical Chemistry Award

**Vivian T. Chen**

American Chemical Society Organic Chemistry Award

**Thomas Swihart**

American Chemical Society Polymer Chemistry Award

**Helen Dinh & Zubin Patel**

Analytical Chemistry Award

**Phuc Huu Ba (Sam) Nguyen**

Biochemistry Award

**Lukas Fuentes**

Freshman Chemistry Award

**Grace Yomogida**

Hypercube Award

**Travis Thompson**

Inorganic Chemistry Award

**Ali Akil**

Organic Chemistry Award

**Kevin Vargas & Nicholas Pavlakovich**

Spyros Pathos IV Award

**Adam Grosvirt-Dramen**



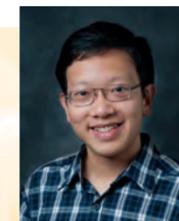
Sophia Nguyen



Brittany Daws



Trevor Reutershan



Phuc (Sam) Nguyen



David Russel



Rachel Elena



Khang Nguyen



Sean McCoy



Ali Akil



Andrew Alexopoulos



Vivian Chen



Thomas Swihart



Helen Dinh



Zubin Patel



Nicholas Pavlakovich



Kevin Vargas



Grace Yomogida



Travis Thompson

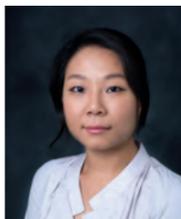


Adam Grosvirt-Dramen

# AWARDS & SCHOLARSHIPS

Chemistry and Biochemistry Students 2016

## ANNUAL AND ENDOWED AWARDS



Hea Jin Hong



Bahareh Haeri

### 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 **Hea Jin Hong & Bahareh Haeri**.

### 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. **Nicole Moulton** received the 2016 award.



Nicole Moulton



Brett Roach

### 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 **Brett Roach**.



Ambreen Tahira



Kristi Shah

### Michael Monahan Memorial Summer Research 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 Corp. In 1985-87, following his retirement, he served as a lecturer in our department. The fellowship supports student research in our department. **Ambreen Tahira & Kriti Shah** are the 2016 recipients.

### NHK Laboratories, Inc. Scholarship

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, **Tilini Wijeratne**, has the opportunity to complete a course-credit internship at NHK's Santa Fe Springs laboratory.



Tilini Wijeratne

Continued on pg. 24

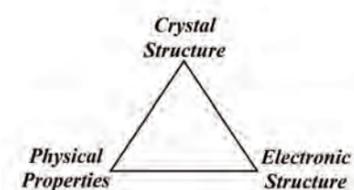


Fig 1. Schematic inter-relationship between crystal structure, electronic structure and physical properties of materials.

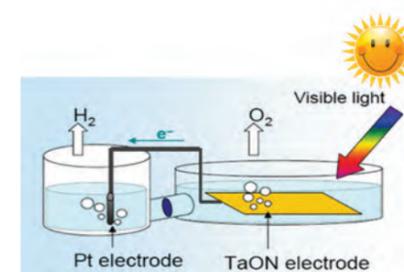


Fig 2. Photocatalytic water splitting using tantalum oxynitride semiconductor.

JoAnna Milam (working collaboratively with both Dr. Derakhshan and Dr. Mezyk currently in a Ph.D. program at USC) is working on the photocatalytic decontamination of organic pollutants in water. Roxanne Jacobs and Charles Bloed are handling development of novel oxynitrides employing green chemistry synthetic schemes. Stephanie Ariza is studying LED materials, while Minue Perez is working on thermoelectric materials. Thinh Tran, Luke Lawson, Araseli Cortez and Zubin Patel are collaborating on development of a new set of magnetic materials, and Yu (Larry) Liang is in collaboration with Professor Ehsan Barjasteh in the Department of Chemical Engineering.

Dr. Derakhshan's development of novel compounds relies heavily on powder X-ray diffraction to examine formation and purity of the synthesized materials. Because nearly all reactions carried out in his lab occur in the solid phase, new compounds cannot be purified from resulting mixtures. To analyze the physical properties of the new compounds, one must have 100 percent pure samples so as not be fooled about interpretation of properties by even small amounts of side products. Thus, development of new compounds for analysis may take hundreds of attempts at subtle variations in the development reaction temperature (600-1400 °C) and various conditions—vacuum or in presence of reactive or

non-reactive gases, reaction duration, composition and ratios of various reactants, among other variables.

The nature of the professor's work is almost by necessity collaborative and currently include the KEMP group in the chemistry and physics departments—Drs. Bu, Shon, Gredig, Peterson—Dr. Mezyk, and colleagues in the College of Engineering. Students from all labs rotate through other KEMP faculty labs to learn basic aspects of material science. Other collaborators from USC, UCSB and national labs elsewhere help characterize various physical properties of novel compounds that Derakhshan's group generates in the lab. This rich collaborative network is a key ingredient in his success in the development and application of new materials.

Dr. Derakhshan was raised in Tehran, Iran. He completed his undergraduate studies at the University of Mazandaran (city of Babolsar on the Caspian Sea), his Ph.D. work at the University of Waterloo (Waterloo, Ontario) in thermoelectric materials, then did post-doctoral studies in magnetic oxides at McMaster University (Hamilton, Ontario). He joined our department as an assistant professor in 2009 and is now an associate professor of inorganic chemistry.

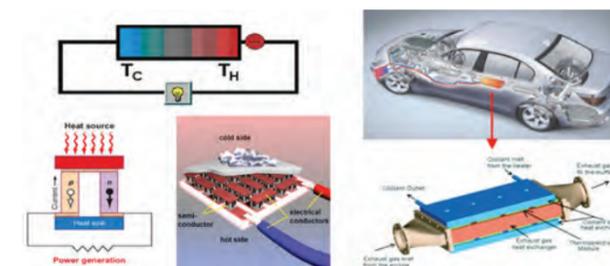


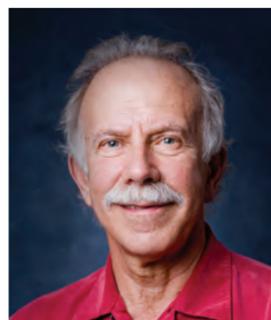
Fig 3. Thermoelectric power generation and thermoelectric modules (left) and electrical power generation in automobiles from waste heat in exhaust system (bottom right)

## DR. ANJO AND DR. COHLBERG RETIRE

By Dr. Douglas McAbee



Dr. Dennis Anjo



Dr. Jeff Cohlberg

Two long-time faculty members in the department, Dr. Dennis Anjo and Dr. Jeff Cohlberg, retired this year after being at the university for 32 and 41 years, respectively.

Dr. Anjo did his undergraduate work at San Francisco State University (B.A. chemistry), and then worked as a research associate while in the M.S. chemistry program at University of California San Francisco. He then completed his Ph.D. in chemistry at Arizona State University. After a short stint as a post-doctoral fellow at ASU, he joined our department faculty in fall of 1984.

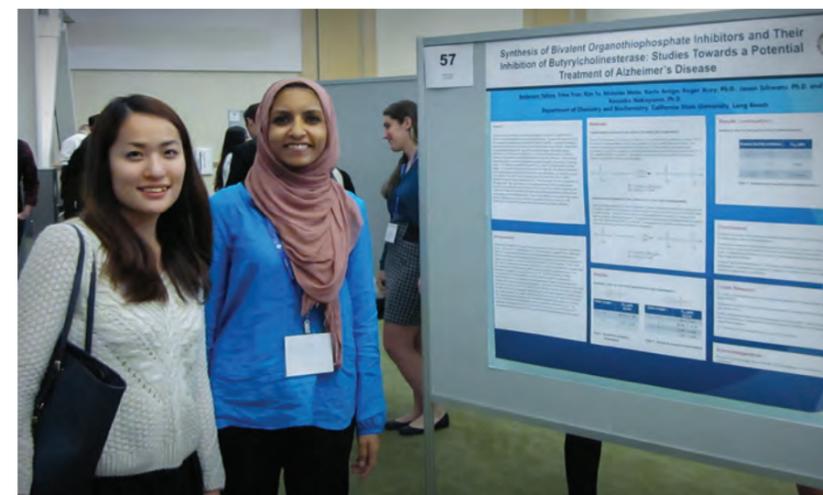
An analytical chemist, Dr. Anjo led an active and productive research group focused on generation and analysis of conductive carbon films. His research was supported by grants from the American Chemical Society-Petroleum Research Fund and by Research Corporation. He trained a large number of research students in his lab who went on to successful careers in research, teaching and medicine. The Whitaker Health Professions Advising Office in the college SAS Center was established with a significant gift from Dr. Greg Whitaker, a former student.

His primary teaching duties were both undergraduate analytical chemistry courses (CHEM 251, 451) and graduate analytical

courses (CHEM 552/553) and graduate colloquium. For a time, he also taught in the general chemistry sequence (CHEM 111A).

Dr. Cohlberg completed his undergraduate work at Cornell University then moved west to do his graduate work in Howard Schachman's lab at UC Berkeley (It was there he met Glenn Nagel, a post-doctoral fellow and future dean of our college). He then moved on to the University of Wisconsin for post-doctoral work in Masayasu Nomura's lab before joining our department in 1975.

Dr. Cohlberg has had a longstanding interest in supramolecular assemblies. As a post-doctoral fellow, he expanded on previous work of Peter Traub and Nomura by reconstituting fully functional 50S ribosomal subunits from constituent ribosomal proteins and RNAs. Later, he worked on understanding the assembly pathway of intermediate filaments (keratins and neurofilaments). After some years, he switched his focus to understanding the molecular basis of amyloid generation by superoxide dismutase. His active lab was supported for many years by grants from the NSF. In 1999, he won the CSUPERB Faculty Research Award for his sustained research excellence (the *Golden Rotor* award!)— the only CSULB faculty member to have received this award (started in 1991). A signature



## ALUMNI GIVING MAKES A DIFFERENCE! YOUR DONATIONS AT WORK

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STUDENT TRAVEL RESEARCH AWARDS

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DEPARTMENTAL HONORS AND SPECIAL AWARDS

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SEMINARS BY DISTINGUISHED VISITING SCIENTISTS IN FALL 2015 AND SPRING 2016 FROM PREEMINENT INSTITUTIONS AS UCSD, CALTECH, UNIVERSITY OF PITTSBURGH, UCLA, AND OTHERS.



Dr. Nathaniel Rosi, Associate Professor of Chemistry at the University of Pittsburgh gave a seminar in March 2016 detailing his work in the development of a new class of metal-organic frameworks—porous materials that can be used in a variety of environmental and biomedical applications. Dr. Rosi's visit was made possible through individual and corporate donations to the department.

### YOU CAN MAKE THE DIFFERENCE IN 2016-17!

To learn more, contact Maryanne Horton, Senior Director of Development, College of Natural Sciences and Mathematics, 562.985.1687, maryanne.horton@csulb.edu.



## MATTHEW LE HUYNH

[OCTOBER 7, 1992 – AUGUST 5, 2016]

By Dr. Tom Maricich

It is with great sadness that we announce the loss of Matthew Huynh. Matthew began his studies in our department in the fall of 2010 and declared his major for a BS in biochemistry in 2011.

He entered the university with a wide variety of advanced placement (AP) credits. Yet in spite of many trials, Matthew maintained a solid B average and completed almost all of his degree requirements.

It was during a pick-up game of basketball with his friends, his leg broke and it was later discovered he had bone cancer.

After returning to CSULB with a prosthesis and cane, Matthew heroically continued his studies and began research in organic chemistry with Dr. Maricich. He was successful in applying SNAAP@isopropylation to naphthalene-2-carboxylic acid and initiated studies with saccharin. His research will be published with the work of other students.

His studies were interrupted again by recurrence of the disease. In spite of all medical treatments and persistent efforts by Matthew, he succumbed. He was a great role model for all of us and will be dearly missed.

The process to award Matthew Huynh's degree posthumously has been initiated by Enrollment Services (Shae Mitchell, Assistant Director – Graduation Evaluation).

# WHAT IS YAKULT, THAT MILKY DRINK IN THOSE TINY BOTTLES?



SAACS leadership council with faculty advisor Dr. Paul Buonora.

By Janis Carr

Shortly before school started, the Student Affiliates of the American Chemical Society (SAACS) took a tour of the Yakult factory in Fountain Valley and discovered the process that goes into making the popular health drink.

The students learned that the probiotic dairy product is made by fermenting a mixture of skimmed milk with a strain of the bacterium *Lactobacillus casei* Shirota. The milk is pasteurized and then heated to a high temperature to kill unwanted bacteria.

The probiotic is then added and left to ferment before its homogenized and finished by adding flavoring and water. Yakult was created by Japanese scientist Minoru Shirota in 1935.

The Cal State Long Beach students then got to sample some of the produce while touring the facility, the club's first tour of the semester.

The first U.S. factory is located in Fountain Valley, where they make both Yakult and Yakult Light. The facility can produce 400,000 bottles a day, every one of them packed with billions of Yakult's exclusive probiotic strain.

The SAACS students got the chance for a little fun in the summer with a kayaking trip to Jellyfish Cove, a great way to relax before the rigors of school got underway.

Jennifer Ramirez and Helen Dinh were elected co-presidents of SAACS last May as a new board was installed.

Michael Chin is this year's vice president, Heidi Beshay is secretary and Zubin Patel is treasurer. Public relations will be handled by Danielle Pulido.

Annabelle Cantu is the academic chair, while Nicholas Nieto is the outreach chair. Fundraising and membership will be headed by Jocelyn Ochoa.

Congratulations to the new SAACS board as they have several goals set for this year. Among the tasks SAACS is planning is to create agendas for board and officer meetings; set a budget; make sure meetings are well-organized, and receive and reply to feedback from faculty, officers, advisors and members that will help the board develop ways to improve meetings.

The board also will be looking to create community outreach events, such as experimental demonstrations at local schools.

SAACS held its annual Science Safari during the summer, where members conducted experiments to show incoming freshmen the exciting world of science in an effort to recruit new club members.

SAACS routinely holds demonstrations and workshops for students of all grade levels and takes its members on field trips and tours, in addition to its biweekly meetings that feature guest speakers. By joining SAACS, members gain hands-on and networking opportunities in the chemical sciences to reach their educational and career goals.

The club scrapbook was showcased as well, giving freshmen an inside look to events the club has done as well as a preview for what is yet to come.

highlight during this time was the annual meeting of the *International Consortium on Superoxide Dismutase & Amyotrophic Lateral Sclerosis*, which Dr. Cohlberg organized and hosted at Cal State Long Beach in 2006.

Dr. Cohlberg's primary teaching duties were undergraduate biochemistry lecture and lab (CHEM 441A/B, 443). He also developed and taught a graduate course in physical biochemistry (CHEM 545) for many years, and taught in the graduate biochemistry core course (CHEM 541). Along with Dr. Roger Acey and Dr. Margie Merryfield, he helped develop the biochemistry lab manual that has been used for more than two decades in CHEM 443. He also developed a Jmol exercise workbook that is part of the CHEM 441A curriculum.

Both professors said the level and expectations for faculty-led research have increased greatly from when they first started at CSULB. They also said that the level of support for research equipment also has increased. Dr. Cohlberg said that his "start-up" package consisted of one Beckman preparative high-speed rotor and an old analytical centrifuge inherited from Caltech (albeit, the instrument on which was done the original Meselson-Stahl experiment confirming that DNA replication was semi-conservative). One common element, however, has been the

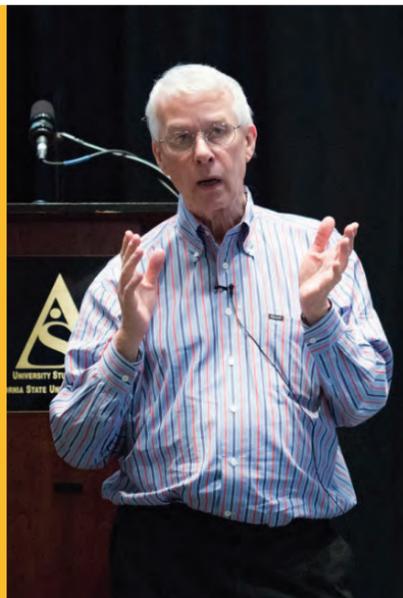
high quality of the students in our programs. Dr. Cohlberg said, "When the B.S. biochemistry program was added, there was a large increase in the number of students in the department, but we've always seemed to attract very good students to our majors." Dr. Anjo added that the CSULB campus has always enjoyed a diverse student body. "The ethnic diversity of students on campus was really attractive to me and was a factor that led me to choose CSULB over some other schools," he said.

Both men mentioned the department enjoys strong collegiality among its faculty. Dr. Anjo said that the analytical chemists in the department when he arrived—Van Lieu and Gene Kalbus—helped him get his lab established and that equipment donations from Henry Po and Ed Harris were extremely helpful. When Dr. Cohlberg came on board in 1975, biochemists in the department included Jack Berry, Lou Perlgut, Don Simonson (a charter faculty member in the department), and Les Wynston. That core group developed the B.S. biochemistry program for the department. Both men said Ken Marsi as department chair was always a big help and strong supporter of their teaching and research activities. Many years later, Dr. Cohlberg served as department chair (2008-2011), which he says was "a privilege and a huge learning

experience and wonderful opportunity to help make the department better."

Dr. Anjo said he will spend his retirement years with his family and plans to travel. Dr. Cohlberg said he will devote more time to his music (he is an accomplished pianist and member of a trio ensemble), become more active in social or political advocacy, and finally catch up on his professional journal reading.

None of the current full time faculty in the department have never known a time when Dr. Anjo and Dr. Cohlberg were not faculty colleagues. Both have been excellent instructors to thousands of students over the years and wonderful colleagues. They will be sorely missed, and we wish them all the best.



## FROM HIS FIRST CHEMISTRY SET TO THE NOBEL PRIZE – SIR RICHARD ROBERTS SHARES THE HIGHLIGHTS OF HIS SCIENTIFIC JOURNEY

By Dr. Deepali Bhandari

Nobel Prize Recipient Sir Richard Roberts visited campus in March to deliver CNSM's 37th Nobel Laureate Lecture. Sir Roberts shared the 1993 Nobel Prize with Dr. Phillip Sharp for their groundbreaking discovery of split genes and mRNA splicing.

In his lecture titled "The Path to the Nobel Prize," Sir Roberts detailed his scientific journey from his first chemistry set to the Nobel Prize, acknowledging the teachers and colleagues who inspired and helped him along the way.

As a child, Sir Roberts was (and still is) very interested in solving puzzles, and wanted to become a detective. His love for science was first ignited when his father gave him a chemistry set as a Christmas present. He received his early education in Bath, England before moving to the University of Sheffield where he obtained a B.S. in Chemistry in 1965 and a Ph.D. in Organic Chemistry in 1968. He then moved to the United States for his post-doctoral work with Dr. Jack Strominger at Harvard University, afterward accepting a position at the Cold Spring Harbor Laboratory (CSHL), New York.

It was at CSHL where he made the Nobel Prize winning discovery while studying the genetic material of the common cold virus, adenovirus, whose genes display similarities to those in higher organisms. At the time, genes were considered continuous segments within the long double-stranded DNA molecules. This simple picture of gene structure completely changed when in 1977 Sir Roberts and Dr. Sharp independently

discovered that genes could be discontinuous, that is, a given gene could be present as several, well-separated segments. Shortly thereafter, it was proved that split genes are frequent in higher organisms, including human beings. Roberts' and Sharp's discovery of split genes has been of tremendous fundamental importance for understanding gene expression and processing impacting both basic and translational biological research.

In addition to the discovery of split genes, Sir Roberts is also famous for his pioneering research involving the discovery, isolation and characterization of enzymes called restriction endonucleases. Inspired by a seminar given by Dr. Dan Nathans describing Endonuclease R - an enzyme that could cleave DNA at specific sites - Sir Roberts set out to systematically search for more restriction endonucleases with different specificities. Availability of these enzymes helped revolutionize the field of molecular cloning and these enzymes have since become essential and irreplaceable biological tools utilized daily in molecular biology research worldwide. Sir Roberts' keen interest in studying bacterial restriction-modification system also shaped most of the rest of his scientific career, which he elaborated on in his technical lecture on "Bacterial Methylozymes."

Sir Roberts is currently the Chief Scientific Officer of New England Biolabs (NEB), the industry leader in the discovery and production of enzymes for molecular biology applications. He is also one of the

first researchers to utilize computational biology for genetic studies. His current research interests focus on using bioinformatics and genomics to find new enzyme activities and to improve the functional annotation of genomes. He is also the founder and moderator of REBASE, a database of information about restriction enzymes and their associated methyltransferases.

Sir Roberts has served on numerous scientific advisory boards and holds several honorary degrees including Doctor of Medicine degrees from the University of Uppsala and Bath University, and Doctor of Science degrees from Sheffield and Derby University. He is a member of several societies including the American Society for Microbiology, the American Academy of Arts and Sciences, and the American Academy of Microbiology. In recognition of his numerous contributions to science, he received knighthood at the Queen of England's birthday honors in 2008.

Sir Roberts is a true pioneer of research and an inspiration to anyone who has a passion and the grit to follow it. I really enjoyed many of the quotes he made during his seminar, but the one that struck a chord was: "Follow your passion and make a career out of it." I think it is the key to a happy and successful life. I am sure his life-story inspired and motivated many students to follow their passion and seek their own path to discovery.

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## DAWS AND MEZYK RECOGNIZED FOR OUTSTANDING ACCOMPLISHMENTS

By Dr. Douglas McAbee



Two members of the department community—Brittany Daws and Dr. Stephen Mezyk—were recognized this past year by the university for their outstanding accomplishments. These recognitions are doubly remarkable in that Ms. Daws was part of Dr. Mezyk's research team for the past three years.

A biochemistry major, Ms. Daws was named the 2016 Outstanding Graduate for the College of Natural Sciences and Mathematics. This is the most prestigious distinction given by the college and the university Alumni Association, and is awarded to the college undergraduate who best embodies the highest ideals of the college for academic and research excellence. She was also named the Outstanding Undergraduate Research Student for 2016 by the Office of Research and Sponsored Programs.

Dr. Mezyk, professor of physical chemistry, received the Alumni Association Most Valuable Professor award, courtesy of Ms. Daws' selection plus the CSULB Provost's Impact Accomplishment of the Year in Research, Scholarly, and Creative Activity award in 2016. Dr. Mezyk attributes his receipt of the latter award largely to a unique set of events and circumstances he was in for an 18-month non-teaching period starting in January 2015. His extended sabbatical leave gave him time to write and ultimately receive two large research grants from the Department of Energy's Nuclear Energy Universities Program totaling \$1.6 million. The sabbatical also allowed him to work closely with his undergraduate and M.S. students on various research projects, carry out a number of data-collection trips

to the Radiation Lab at the University of Notre Dame, and spend valuable time working with his collaborators, including Dr. Jay LaVerne (Notre Dame). The grants also allowed him to hire two post-doctoral fellows, Drs. Gregory Horne and Christian Larsson, both of whom work full-time on the funded projects. Several publications have been forthcoming from this research.

Early on in her career at CSULB, Ms. Daws switched her major from Criminal Justice to science on the advice of her teaching associate in general chemistry, who happened to be a student in the Mezyk lab. She eventually changed majors and began working in the Mezyk lab herself. She said there were numerous connections between her coursework and the research she was doing in the lab, which made both all the more interesting. She began by working on examining the reaction kinetics of radical-induced nitrosamine breakdown in water. She also worked on several other related projects in the lab, most recently examining the breakdown products and pathways of *neonicotinoids*—a family of heavily-used insecticides that target insects that eat agronomically important plants but which also induce unwanted collateral damage on pollinators, particularly honey bees. Altogether, Ms. Daws worked three years in Dr. Mezyk's lab and has been a co-author on a number of publications and national meeting presentations. She began her Ph.D. work at UC Berkeley this fall in the biochemistry and molecular biology program.

Dr. Mezyk acknowledged the role of high quality students like Ms. Daws is a crucial ingredient for the success of his research program. In his experience, Mezyk said her attitude, ability, work ethic and receptivity to faculty guidance and input are attributes that separate successful research students. He said that more academically proficient students do not take advantage of research opportunities available to them.

Both stressed the importance of research experience as an undergraduate. Ms. Daws the many benefits of working as a member of a research team, especially the trips to the Radiation Lab at Notre Dame that entailed several long days of intense activity of data collection and demanded that each student in the research team focus on what had to be done and how to use their limited time most efficiently. Teamwork was also important during the post-trip data analysis and research writing.

When asked what she would say to a high school student coming to university, Ms. Daws said, "Don't be intimidated about what you think you can or cannot do. Reach for high goals and make connections to people on campus. Do what you enjoy and what you're good at, and don't be afraid to try your hand at different stuff." All in all, great advice. We congratulate Ms. Daws and Dr. Mezyk for their outstanding accomplishments and wish them success in their future endeavors.



## TAVASSOL BRINGS CLEAN ENERGY EFFORT TO CSULB

By Janis Carr

Left alone in his middle school science laboratory, Hadi Tavassol would test the instruments, peer into microscopes and check out the periodic table. He found fascinating the microscopic world of cells and molecules, an attraction that eventually led him into a career in biochemistry.

Tavassol brings his expertise in electrochemistry to Cal State Long Beach this year, where as an assistant professor, he plans on continuing his research on the fundamental understanding and design of the processes across chemical interfaces. The scientist wants to key in on how the chemical interfaces relate to advanced electrochemical devices, such as fuel cells and Lithium-ion batteries, those tiny things that power cell phones, laptops and electric cars.

"All renewable devices use some sort of electrochemistry," Tavassol said. "I did research on fuel cells and batteries and fuel cells are good replacement for combustion engines and they don't have a carbon footprint if you can find a clean hydrogen source."

"The mobile revolution happened because of the lithium batteries. Before that, the electronics were there but you had to plug them in. Batteries, because it was a very useful product, people started using them on large-scale products but there was a lack of knowledge in the basics of the battery. So what I did in my Ph.D. was to look at the fundamental understanding of those things and find ways to improve it."

Pegged by his high school chemistry teacher as a future chemist, Tavassol focused on quantitative chemistry in high school then applied chemistry at the Sharif University of Technology in his homeland of Iran. He continued his studies at Northern Illinois University, where he received his Master of Science in Analytical Chemistry and completed his Ph.D. in 2014 at the University of Illinois Urbana-Champaign. His thesis focused on the interfacial processes in Lithium-ion batteries, and as a postdoctoral scholar, Tavassol worked on O<sub>2</sub> reduction catalysis in the CsH<sub>2</sub>PO<sub>4</sub> solid electrolyte system.

Tavassol said it wasn't until he moved to the United States from oil-rich Iran that he realized the need to find alternative fuel sources.

"Especially in our region (in Iran), oil was the main energy source for everything because we have a bunch of it," Tavassol said. "Then when I came here, part of it was, I thought that if we could find renewable sources of energy, it would help our region and promote peace."

"There is a lot of conflict because of the oil and maybe if they (Western countries) didn't need it, they wouldn't be fighting over it."

The more Tavassol studied the renewable energy issue, the more he realized that the Earth's problems extended beyond the oil fields.

"I understood there are bigger problems facing our planet and how it depends on how we are using our energy," he said. "That actually prompted me to focus on energy and electrochemistry is the way to do it."

At CSULB, Tavassol wants to introduce the students to his world that will allow them to work on interdisciplinary projects involving the use of laser spectroscopy and electrochemical instrumentation for in situ analysis of chemical systems.

When he's not teaching, Tavassol hopes to continue his research on energy matters as it pertains to the biological systems, proteins and the transfer of electrons and protons in the body.

"Students are really interested in biological systems," Tavassol said. "It's really natural. Everyone wakes up wondering how the body works. It is a very natural place that everyone is interested in."



Dr. Fangyuan Tian's research group.

theoretical paper on excited state dynamics of cyclohexadiene (Cyclohexadiene Revisited: A Time-Resolved Photoelectron Spectroscopy and ab Initio Study, Oliver Schalk, Ting Geng, Travis Thompson, Noel Baluyot, Richard D. Thomas, Enrico Tapavicza, and Tony Hansson, *J. Phys. Chem. A*, 2016, 120 (15), pp 2320–2329).

Several students presented their work at various conferences. Cecilia Cisneros followed Wilberth Narvaez in winning the best poster award in physical chemistry at the Southern California Undergraduate research conference Long Beach for her work on the excited state dynamics of tachysterol.

Travis Thompson received the Hypercube computational chemistry award for his computer program to calculate time-resolved photoelectron pump-probe spectra. Dr. Tapavicza presented our work on the theoretical simulation of pump-probe spectra and vitamin D at the Pacificchem in Honolulu, at the first Southern California Theoretical Chemistry Conference in San Diego, and at the IMAMPC in Le Havre, France.

Furthermore, we received the BUILD small equipment and computer grant, which allowed us to extend our LINUX cluster to a total of 256 CPUs. The cluster is running non-stop and more results are to come.

### DR. FANGYUAN TIAN

I have survived my first year at CSULB, an exciting and busy time for me and my lab.

My main teaching duties were the Instrumental Methods of Analysis (CHEM451) lecture and lab, courses that I really enjoy teaching. This past year, we set up our new lab, which was

the greatest achievement for us. My research group recruited two graduate students and eight undergraduate students. I submitted eight grant proposals to both internal and external funding opportunities, thus far we have obtained financial support from the CNSM college and CSUPERB.

A paper about methanol adsorption on zeolitic imidazolate framework-8 thin film was published on *Langmuir* (DOI: 10.1021/acs.langmuir.5b04455), and I presented the work at the 251st ACS meeting in San Diego.

I'm pleased to report that our two abstracts about metal organic framework (MOF) for drug delivery and thin film fabrication have been accepted for the MOF-2016 International Conference, at which two graduate students will present posters this fall. This year, I'm looking forward to publishing work my students are doing now. I hope it will be a productive year for our research group.

### DR. PAUL WEERS

The Weers research group 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, and is funded by a SC3 grant from the National Institutes of Health.

Our group said farewell to Rachel Elena, who graduated with a M.S. Biochemistry degree, and MARC student Daniel Sallee, who earned a B.S. chemistry degree and is on his way to the Oregon Health and Science University to pursue his Ph.D. in Biomedical Engineering. Former undergraduate student James Horn joined the M.S. Biochemistry program, while Jesse Tran became a research assistant in our group.

Two new undergraduate students joined our team, BUILD associate Angela Tran and Tilini Wijeratne who received the 2016 CSULB Student Summer Research Award. Beckman Scholar Lukas Fuentes spent most of his summer at the Rockefeller University, New York for the undergraduate research fellowship program. Calvin Voong and Leesa Kakutani will continue in the RISE and BUILD program, respectively. Other continuing members are Kriti Shah, Hea Jin Hong, Kan Cong, and Bahareh Haeri and I hope that we have another successful year together.

Our group published four papers, of which two were collaboration projects with Dr. Karin Crowhurst (CSU Northridge) and Dr. Elke Lohmeier-Vogel (University of Calgary, Canada). Several students made valuable contributions and earned (co)authorship on publications: Daisy Martinon, Jake Thistle, Johana Rodriguez (MARC), Nejiuwa Ibe (MARC), James Horn, and Pankaj Dwivedi. We attended many scientific meetings to present our research findings: ABRCAMS, Seattle (Daniel Sallee); CSUPERB, Orange County (Hea Jin Hong, Kriti Shah, Daniel Sallee); Biophysical Society, Los Angeles (Lukas Fuentes, Rachel Elena); American Society for Biochemistry and Molecular Biology, San Diego (Hea Jin Hong, Kriti Shah); Atherosclerosis, Thrombosis and Vascular Biology, Nashville, Tennessee (James Horn, Paul Weers); European Atherosclerosis Society, Innsbruck, Austria (Paul Weers).

Congratulations to all lab members who won prizes at the 2016 department award banquet. There were many.

Germany, as our external partner. This program engages CSU faculty in external biotechnology-related partnerships.

I also received the 2015-2016 Professors around the Globe award, a CSULB Global Faculty Incentive Grants Program offered by the International Education and Global Engagement, College of Continuing and Professional Education. This encourages faculty engagement in the globalization efforts by CSULB and strengthens its global mission and campus internationalization. Together these awards allowed me to focus on research activities, seminar and conference presentations and writing research manuscripts for publication in scientific journals during my sabbatical.

For the research activities, I was down in the trenches (actually back to the bench) humbly re-learning my basic pipetting, gel loading, immunoblotting and cell culturing skills. I explored the HDL proteome world, crossed the blood brain barrier and initiated new collaborations.

Using a general theme of "How We Use Greek Mythology to Overcome Barriers and Stress to Understand the Structure, Function and Application of Apolipoprotein E", I was delighted to share the work done by my group in Long Beach in top labs in Europe in three invited seminars at the IBMT, UZH and at the Structure and Function of Biological Membranes Group, Free University Brussels, Belgium, and, in three conference presentations at the Barriers to the CNS conference at Parador de Oropesa, Spain; the European Lipoprotein Club, Tutzing, Germany; and, the European Atherosclerosis Society, Innsbruck, Austria. Without exception, our work was well-received, which underscores the quality and hard work done by our students at The Beach. I am very proud of my students!

During my sabbatical, I sought some quiet time to meditate in the Swiss, Austrian and Italian Alps at a time when Europe was going through an unsettling time fraught with political, economic and cultural uncertainties, refugee crisis and heightened security. I felt like a million dollars on top of the world-actually "Top of Europe" while at the Jungfrauoch in the Swiss Alps- the majesty and serenity in stark contrast to the world at its feet below.

All in all, it was an enriching experience with new avenues to venture into upon my return to Long Beach. I feel rejuvenated and revitalized, and look forward to the upcoming academic year at The Beach.

#### DR. JASON SCHWANS

This past year was an exciting and productive time in our lab. We are continuing our investigations of how enzymes work and are currently pursuing four major projects:

1. Using the enzyme triosephosphate isomerase, we are taking several different approaches to evaluate the catalytic contribution from conserved non-active site residues and substrate binding;
2. Continuing our collaboration with Drs. Nakayama and Sorin investigating inhibition of cholinesterases;
3. Dissecting the catalytic role of active site interactions in the enzyme ribonuclease A; and
4. Continuing our synthesis of amino acids not found in nature, unnatural amino acids for use in biochemical studies.

The lab has been a full and buzzing place this past year with multiple talented students. Three M.S. biochemistry students graduated from the lab (Alex Colla, Weilee Chen, and Nessa Seangmany), and several undergraduate students (Ana Chan,

Jeannette Gonzalez, Anna Nguyen and Tracy Osaji) graduated with degrees in biochemistry, chemistry or biology. The current cohort in the lab continues to make significant progress in all their projects and I anticipate they will continue in their success throughout the coming year. In addition, studies by Jeannette Gonzalez and Jennifer Ramirez in evaluating a new direction of cholinesterase inhibitors led to a manuscript currently under review.

In addition to the work in the lab, it was a busy and interesting year in the classroom. I continued my involvement in teaching the organic chemistry series, part of the biochemistry class for first-year graduate students, and one of the several sections of a class to help first-year students in science enhance their study skills and learn about the resources available in the College.

In Spring 2015, I taught a new graduate course titled, "Organic Mechanisms in Biology." This course focused on learning about enzyme mechanisms and regulation. It was great to see the interest of the 23 students and exciting to interact with all to discuss current and historical literature regarding our understanding of enzyme function.

#### DR. ENRICO TAPAVICZA

This past year, my research group was highly productive. Noel Baluyot and Travis Thompson published our combined experimental/



## DR. ERIC V. ANSLYN, 2016 ALLERGAN DISTINGUISHED VISITING LECTURER

By Dr. Eric Marinez

Allergan Distinguished Lecturer Dr. Eric V. Anslyn, the Norman Hackerman Professor of Chemistry and a University Distinguished Teaching Professor at the University of Texas at Austin, visited the department last February.

Professor Anslyn is renowned for his research that involves applying physical organic chemistry principles for use in supramolecular chemistry for the development of enzyme mimics and synthetic receptors. Much of Dr. Anslyn's work has led to the development of practical molecular sensors. In 2007, he coined a new research area called "Supramolecular Analytical Chemistry" that exploits the dynamic exchange of synthetic chemical structures that create assemblies which result in signal modulations upon addition of analytes. These assemblies can be as simple as 1:1 host/guest structures created from noncovalent or covalent bonds as well as higher order assemblies.

He gave two lectures during his visit, a general presentation on "Mimicking the Senses of Taste and Smell." His approach mimics the mammalian system for the senses of taste and smell that uses a set of semi-specific receptors that are biased towards classes of chemical entities, and are not directed to specific individual chemicals. He presented how a pattern of response from a large suite of these receptors trains the mammal to recognize a flavor or odor.

In the latter part of his first lecture, Anslyn described how his general approach to sensing can be mimicked with simple synthetic organic receptors coupled with chemometric techniques. Dr. Anslyn showcased how his technique represents a marriage of supramolecular chemistry with chemometrics and provided examples being applied in biochemical and beverage analyses.

In his second, more technical, presentation was the "Supramolecular Methods for the Rapid Determination of Enantiomeric Excess." Recent work from his group has a large program devoted to creating a new paradigm for measuring enantiomeric excess (ee) using rapid optical analyses that is aimed to transition away from the slower chiral chromatographic analyses. The need for increasingly user-friendly and rapid assays for ee determination is due to the advent of parallel synthesis protocols for asymmetric reaction discovery and optimization that may require hundreds to thousands of assays per day. His research lab creates very simple synthetic receptors or assemblies that are targeted to classes of chiral functional groups, and records absorbance or circular dichroism spectra for diastereomeric or enantiomeric complex formation. Dr. Anslyn showcased the new approach by performing analysis where the ee values of 96 crude reaction mixtures can be read within 10 minutes to two hours depending upon the particular assay. He quickly established a rapport with students he met by showcasing his passion for research and undergraduate education.

Dr. Anslyn was born in Los Angeles and raised in Northridge. He attended Cal State Northridge, where he received his B.S. in chemistry in 1982, and conducted undergraduate research with emeritus faculty Dr. Edward Rosenberg. He then attended the California Institute of Technology for his doctoral work under the direction of Dr. Robert Grubbs, receiving his Ph.D. in Organic Chemistry in 1987 for his work on the mechanistic and theoretical studies of olefin metathesis and ring opening metathesis polymerizations catalyzed by group IV and VI metals. From 1982 to 1989, he was a

National Science Foundation post-doctoral associate at Columbia University, working with Dr. Ronald Breslow where he conducted research on mechanistic studies of Ribonuclease A mimics.

Starting his independent research career at University of Texas in 1989, Dr. Anslyn has earned numerous awards as a prominent teacher-scholar including the Molecular Sensors and Molecular Logic Gate Czarnik Award, the ACS Edward Leete Award for Excellence in Teaching and Research in Organic Chemistry, the Izatt-Christensen Award in Macrocyclic and Supramolecular Chemistry, the ACS Cope Scholar Award, the University of Texas Regent's Teaching Award, and the Jean Holloway Award for Excellence in Teaching.

He is an elected member to the Academy of Distinguished Teachers and to the American Association for the Advancement of Science. He serves as an Associate Editor of the Journal of the American Chemical Society (JACS) and is the co-author with Dr. Dennis Dougherty of the graduate textbook, *Modern Physical Organic Chemistry*.

The Allergan Distinguished Lecturer event was funded by a generous gift from the Allergan Foundation. The Department of Chemistry and Biochemistry are grateful to the Allergan Foundation for their continued support of the Distinguished Visiting Lecturer program, which annually provides our students, faculty, and guests with the opportunity to hear and engage with a distinguished researcher in chemistry and biochemistry.



Dr. Shahab Derakhshan's research group.

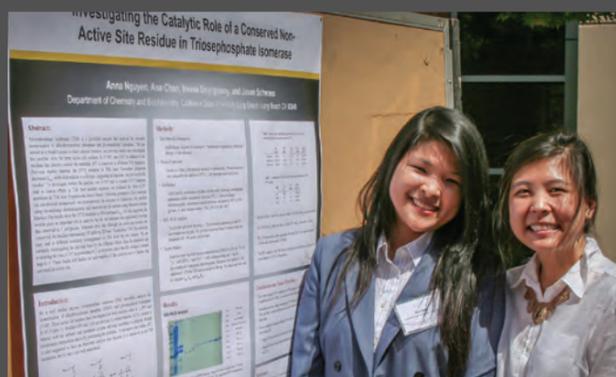


# CSU LONG BEACH HOSTS THE 2016 SOUTHERN CALIFORNIA UNDERGRADUATE RESEARCH CONFERENCE

CONFERENCE CO-CHAIRS: PROFESSOR AND DEPT. CHAIR CHRIS BRAZIER AND SAACS CO-CHAIRS ANNABELLE CANTU AND LORI DIGAL

Cal State Long Beach welcomed students last spring to the Southern California Undergraduate Research Conference (SCURC). The conference was jointly hosted by the Department of Chemistry and Biochemistry and student club, Student Affiliates of the American Chemical Society (SAACS) and sponsored by the Southern California section of ACS. SCURC is the premier chemistry research conference for undergraduates in southern California and is held annually on different campuses across the region. The meeting was hosted by UC San Diego in 2015 and will be at UCLA in 2017. SCURC is coordinated by Henry Abrash, Professor Emeritus of CSU Northridge. Abrash maintains a mailing list of all research active faculty in the region which is incredibly helpful in soliciting students to present and publicizing the event.

Professor Eric Sorin, with help from Danny Ames of CNSM on the abstract submission form, created a webpage for the conference <http://chemistry.csulb.edu/scurc.html>. We were pleased by the high quality of the submissions and ended up with 28 oral presentations and 96 posters. The presentations were divided into the following areas of chemistry: Analytical and Environmental, Biochemistry, Chemical Education, Inorganic and Materials, Organic, Physical and Theoretical. Our students represented a wide variety of campuses from across southern California, including the CSU campuses at Long Beach, Dominguez Hills, Pomona, Fullerton, Northridge, Channel Islands, Los Angeles, Bakersfield, San Bernardino and San Marcos, and the College of the Desert. The UC campuses at Los Angeles, Riverside, and Irvine had multiple presenters and we had representation from numerous private colleges including Loyola Marymount, Mount Saint Mary's, Pomona College, UC San Diego, Pepperdine, Chapman, USC, Whittier College, University of La Verne and Westmont College. Including presenters, co-presenters, and student and faculty attendees, there were about 240 people at the conference.



Also leaving was Charina Fabilane, who wanted to gear herself for medical school after graduation; Patricia Nguyen, who will attend Pharmacy School, Pacific University, Oregon School of Pharmacy in Fall 2016; Jamie Tran, who will start his Dental program at UCLA in Fall 2016, and Tuyen Tran who moved on to the Edward Via College of Osteopathic Medicine, Auburn, AL, starting Fall 2016. We wish them the very best in all their future endeavors; they will be missed.

Moving on, we are pleased to welcome graduate students Noor Bala and Mary Kehinde Taiwo, and undergraduate students Jonathan Balcazar, an LSAMP Fellow; Patricia Figueroa and Tina Nguyen, both BUILD Associates, and Gracie Yomogida to our lab.

As seen in the picture below, students in my lab have been extremely busy juggling their coursework and research with life outside the lab. From their productivity, I doubt if the latter was even part of the equation. In support of this statement, I am pleased to note three publications, involving undergraduate and graduate students, were presented in a shark-studded environment. For example, Skylar Chuang presented his work on reconstituted HDL loaded with gold nanoparticles at the 250th ACS National Meeting in Boston, MA, August 2015 as an oral presentation, and at the American Heart Association ATVB Council meeting in Nashville, TN, May 2016 in a poster format.

Alexandra Donovan presented her work on the analysis of the unfolding of apoE in poster format at the 60th Annual Meeting of the Biophysical Society in Los Angeles, CA, February 2016, and at the 2015 ABRCMS, in Seattle, WA, November 2015.

Other major accomplishments by students in the lab: Skylar Chuang won first place in the Physical and Mathematical Sciences-Graduate category at the 29th Annual CSU Student Research Competition held in San Bernardino, May 2015, for his work on the Role of Nanogold-apoE3 Reconstituted Vesicles as Potential Drug Delivery Systems.

Alexandra Donovan was admitted to the Neuroscience graduate program, USC. She was also selected as an NIH RISE trainee.

Mary Kehinde Taiwo won the 2015-2016 Maria Erlinda Co Sarno Scholarship, offered by our department. The award recognizes an international graduate student with research interests in compounds leading to therapeutics or prevention of disease.

Jonathan Balcazar was selected as an NSF-LSAMP Fellow, an award that allows undergraduate students to be engaged in research.

Jaime Tran won the 2015 Howell-CSUPERB Research Scholar award to carry out conformational analysis of apoE3 in HDL. The Doris A. Howell Foundation for Women's Health Research funds undergraduate student researchers engaged in research involving women's health. Jaime was also the recipient of the 2015-2016 David L. Scoggins Memorial Award, a Departmental award given to an outstanding graduating student who plans to continue graduate work in a health-related profession.

One of the major highlights during this period was my sabbatical in Fall 2015 that I spent in Germany and Switzerland. I prepared myself by taking German 101 on campus the spring before my departure to brush up my spoken and written German. Being a student brought out the competitive "I want an A" spirit in me. In addition to learning the language, sitting in the class as a student I experienced the powerful impact that an instructor has on student learning. I had a fantastic instructor, a graduate student, whose wit and personality made German sound charming. Learning basics of German allowed me to interact with people, both socially and professionally, and to immerse myself culturally during my sabbatical.

I was at the Fraunhofer-Institut für Biomedizinische Technik (IBMT), St. Ingbert/Sulzbach, Germany, investigating the ability of apoE-coated AuNP to cross the blood brain barrier. I also spent a short period of time at the (UniversitätsSpital) University Hospital of Zurich (UZH), Zurich, Switzerland examining the transendothelial transport of HDL.

Related to the collaboration I initiated with these labs, I received the 2015 CSUPERB Entrepreneurial Joint Venture Matching Grant Program with Dr. Young-Seok Shon, Organic Chemist from our department, as the Co-PI, and Dr. Hagen von Briesen, IBMT, St. Ingbert,

## M.S. THESES

### MASTER OF SCIENCE BIOCHEMISTRY

#### Weilee Chen

Thesis: Investigating the Catalytic Role of an Active Site Lysine in the Ribonuclease A Active Site

• Advisor: Dr. Jason Schwans

#### Alexander Joseph Colla

Thesis: Development of an Efficient Approach for the Incorporation of a Series of Fluorotyrosines in Peptides Shweta Kothari

Advisor: Dr. Jason Schwans

#### Rachel Ellena

Thesis: Antimicrobial and Lipid Binding Properties of the C-Terminal Domain of Apolipoprotein A-I Determined Using a Novel Apolipoprotein III/Apolipoprotein A-I (179-243) Chimera

• Advisor: Dr. Paul Weers

#### Myungeun Oh

Thesis: Temperature Controlled Cellular Internalization of Hybrid Peptides

• Advisor: Dr. Kasha Slowinska

#### Kai Han Tu

Thesis: Temperature controlled cellular internalization of hybrid peptides

• Advisor: Dr. Kasha Slowinska



Dr. Vasanthy Narayanaswami's research group.

The work has been generously supported by Dr. Ken Ishida.

For those wondering about former Buonora group members, Joe Badillo is currently in a post doc at Princeton and will be pursuing faculty positions in the fall. Melissa (né-Flores) Turcotte has moved back to the area after receiving her Ph.D. at Penn and is working at a community college in a faculty position. Mariko Yokokora completed her Pharm.D. at UCSF. Philip Campos will be started DO training at Western University in the fall. Congratulations of all of them.

### DR. TOM MARICICH

Thanks to support from the department faculty, I will be continuing my writing and research in PH2 until next year because PH2 will not be renovated until fall 2017 at the earliest.

Seven undergraduate students (Hiep Nguyen, Faraz Hussein, Marie Donato, Kate Korotkova, Ian Fitzpatrick, Jose Corral and Julian Martinez) have worked in my research group this year and are joined by five newcomers (Robert Crowley, Gurshan Singh, Briana Lee, Brian Vieane and Emily Berardino). Some have graduated or moved on. Dr. Tang is continuing as a volunteer.

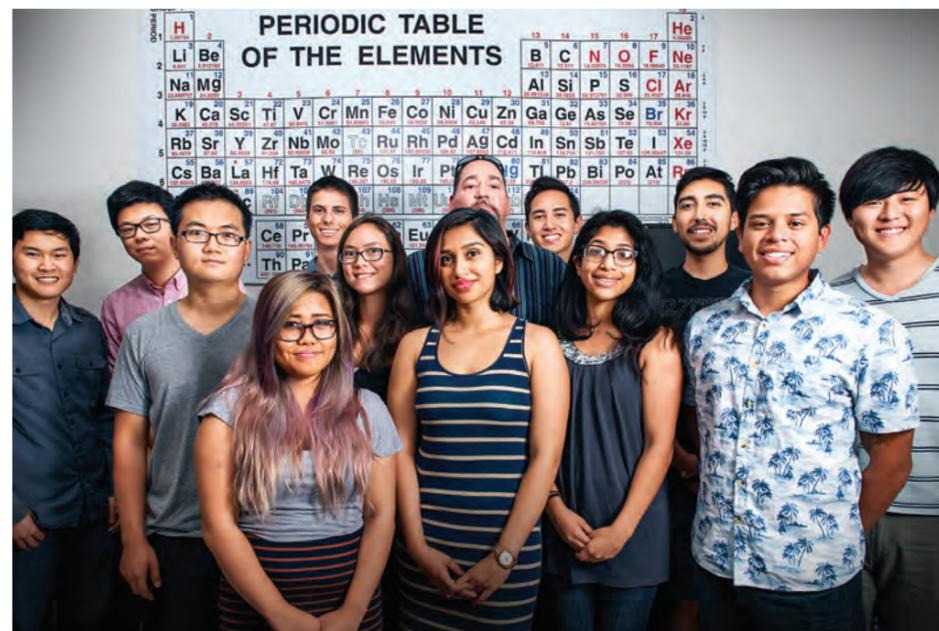
We are continuing our studies of SNAAP® (Substitution Nucleophilic of Acids, Alcohols and Phenols) isopropyl sulfonimidate alkylation reactions. SNAAP was registered as a trademark by the U.S. Patent and Trademark Office on June 7, 2016. Our students presented their results at several research symposia and at the ACS National Meeting in San Diego.

I recently visited Yale University and had a great meeting with Professor Martin Saunders, who was on my Ph.D. thesis committee. He is still teaching full time and writing. At 85, he is sharp and vigorous, and introduced a new course on isotopes. He's a great role model for an emeritus professor. I have also been in touch with some of our alumni and would be happy to hear from others.

My email address is tom.maricich@csulb.edu. You can reach me on my cell phone at 562.209.4306.

### STEPHEN MEZYK

The CSULB Mezyk RadKEM group research slowed a little this year, as I continued my sabbatical efforts of writing multiple Department of Energy grants and traveled continuously



Dr. Eric Sorin's research group.

to work and attend conferences around the world. However, we still had another very productive year, with eight more published/in-progress research papers and 19 conference presentations (and 12 more anticipated by the end of this year) by both myself and my research students.

There was more turnover in the research group, with Shauna Otto (M.S., biochemistry), Brittney Sjinin (M.S., biochemistry) and Madison Hanson (B.S., environmental science and policy) finishing during the year, and Ariana Gilmore (M.S., chemistry) and JoAnna Milam (M.S., chemistry) who completed this summer.

My continuing M.S. student is Trevor Reutershan, who is studying the absorption of estrogenic steroids onto dissolved organic matter, and who is now joined by Jennifer Castillo and Tin Do this semester. My ongoing undergraduate research students are Nicole Moulton, who is studying the degradation chemistry of nuclear waste extraction ligands; Brittany Daws, who is continuing our efforts in nitrosamine carcinogenesis; Kylie Couch and Christopher Rice, who are quantifying the role of chlorine atoms in advanced oxidation processes; Amiruddin Lechner, studying bromine atom aqueous chemistry; Jamie Gleason, investigating the production of nitric oxide in oxidized nitro-samines; and newcomers Nicholas Pavlakovich and Stephanie Arciva. Our experimental efforts, using accelerators, rapid-mix spectrophotometers, solar simulators and bacterial cultures, make for a very busy laboratory.

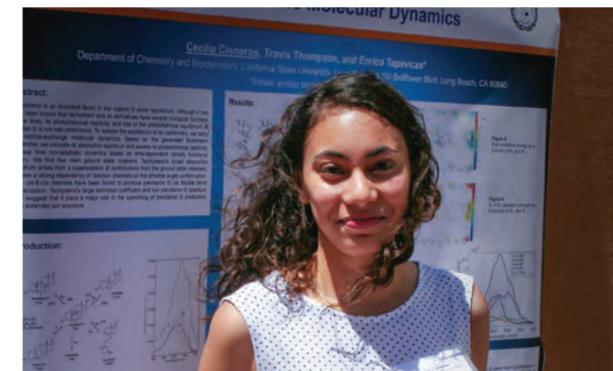
The RadKEM group was especially notable for their conference publications and research-based scholarships this year. Brittany received a Beckman Scholars scholarship, and she and Kylie also received Women and Philanthropy awards. Trevor received the department Outstanding Teaching Assistant Award, and he, Brittany and Kylie also obtained CSULB summer research scholarships. I am very proud of all my students for their accomplishments, which really assists in helping me get this research done!

It is always gratifying to hear of my past research students' current successes, and this was another great year. Casandra Cox finished her postdoc at Harvard and joined BASF; Devin Doud completed his Ph.D. at Cornell and is a postdoctoral fellow at the Joint Genome Institute; Thomas Neubauer completed his Ph.D. at UC Riverside; and Charlie Hirsch finished her Ph.D. at UC Irvine. I'm confident they will continue to impress the world with all their accomplishments.

As always, I am looking forward to another amazingly successful (and hopefully grant-funded) year!

### DR. VASANTHY NARAYANASWAMI

In 2015-2016, the Vas Lab bid a fond farewell to Shweta Kothari, who defended her thesis "Examination of the Molecular Organization of Lipid-Associated Apolipoprotein E3 By Fluorescence Spectroscopy and Cross-Linking Analysis" and took up a research position at the Department of Neurology, Cedars Sinai Hospital.



Oral presentations were divided into three sessions in the Hall of Science lecture halls, each chaired by a faculty volunteer. Two volunteer judges reviewed each oral session and each research area in both poster sessions to determine the best posters and presentations. This was not easy as there were many excellent talks and posters. While Long Beach students won two awards, students from Cal State Fullerton did by far the best winning six of the 14 awards. All the sessions had excellent attendance and the audience appreciated what these excellent students had accomplished.

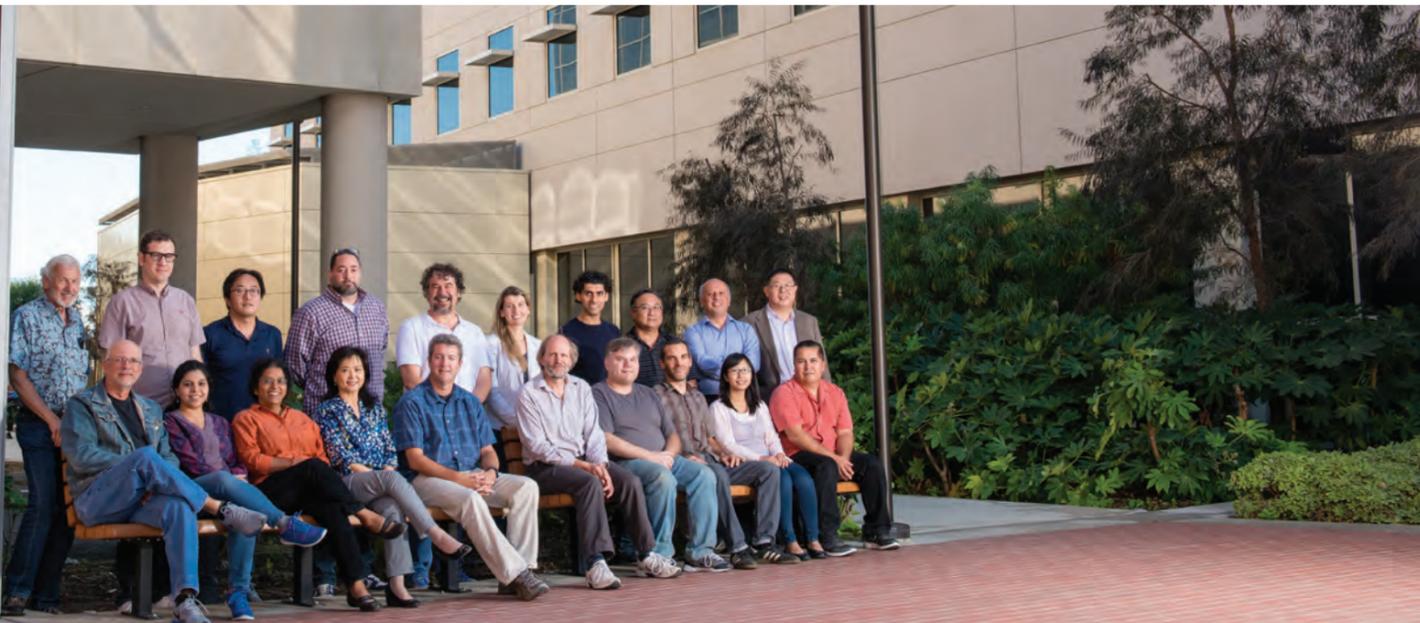
The conference was capped off by an incredibly entertaining and informative Keynote Address titled "Revvng and Listening to Your Cell's Molecular Machines" by Dr. Greg Weiss of UC Irvine. Dr. Weiss studies how cells physically move biomolecules around whether to relay messages, repel attacks, or maintain the cell structures. He uses the world's smallest microphone, developed by his colleague Professor Phil Collins, to listen to the motions

of biomolecules. The different stages of any biochemical process have their own distinct sounds. They used their understanding of the sounds that proteins make to develop a vortex fluid device that effectively "uncooks" a hard-boiled egg. Dr. Weiss's talk was greatly appreciated and induced lots of questions from the audience.

A raffle was held at the end for chemistry beer glasses or coffee mugs. Students were awarded prizes for the best talks or posters and every student received a personalized certificate along with a prize bag with a chemistry tee-shirt, mug and other chemistry-themed goodies.

I would like to thank all the SAACS officers and members for their help in staging the conference. The event would not have been possible without them or the volunteer session chairs and judges. This was an inspiring event for chemistry and biochemistry students from across the region.

Oral Presentation Awardees	Poster Presentation Awardees
<ul style="list-style-type: none"> <li>Brittany Daws, CSU Long Beach</li> <li>Ashley Le-Pham, CSU Fullerton</li> <li>Vahe Baboosian, UC Irvine</li> <li>Savannah Lewis, CSU Fullerton</li> <li>Robert Ontiveros, CSU Fullerton</li> <li>Green Ahn, USC</li> </ul>	<ul style="list-style-type: none"> <li>Lisa Kam, USC</li> <li>Chidinma Abanobi, CSU Fullerton</li> <li>Stephany Kdeiss, CSU Fullerton</li> <li>Andrew Lew, UCLA</li> <li>Stacy Guzman, CSU Fullerton</li> <li>Cecilia Cisneros, CSU Long Beach</li> <li>Samantha Freitag, CSU Channel Islands</li> <li>Marian Sagoe, UC Irvine</li> </ul>



## FACULTY REPORTS

### DR. ROGER ACEY

It has been an interesting year for the group. There are currently 14 CSULB students, two Bridges' students—Martha Guererro and Daniel Jaramillo—and one volunteer, Jesse Mendoza, in the group.

We still have two major projects in the lab, one involving a novel metal binding protein (MT) that selectively binds toxic and precious metals. We have developed a prototype device, (i.e., heavy metal sponge) for environmental clean-up applications. Gwen has cloned a chimeric form of MT that retains the metal binding property of the molecule. We also have developed a fermentation procedure for making hundreds of mg of the chimeric protein and Sam and Hieu have been able to work out the chemistry for putting the MT on a solid support. Gwen, Sam and Hieu have been the driving force for the project.

Lani Mendoza and Hye Rin Hur, a BUILD student, have been helping to express and evaluate the metal binding capability of the chimeric MT. Maureen Dougherty and Laura Plascencia worked on applications of our protein for recovering metal from e-waste. Laura has graduated and Maureen is spending the summer in England as part of the MIRT

Program. We have submitted two patents pending describing the technology.

Hilary continues to study how to adapt the technology for removing mercury-based preservatives from flu vaccine.

The other project involves butyrylcholinesterase. We are interested in the enzyme's role in normal neuron development and the effects of endocrine disruptors on the process. Josh Feng has clearly shown that the stem cells exposed to levels of phthalate ester and BPA found in plastic water bottles change the protein expression profiles of the cells. I think we have stumbled on a mechanism that might account for the dramatic rise in autism and I now have taken all the plastic out of my house.

John is now a graduate student in the department. Along with Dr. 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 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. Show Takenaka is a continuing graduate student. His project involves studying the effect of bisphosphates on butyrylcholinesterase activity. He recently was able to show that compounds having inhibitory activity induce subtle changes in the conformation of the protein.

Kaycee Villarreal is also working on the butyrylcholinesterase project. We hope to initiate an animal study with these compounds this summer. The idea is to determine if these compounds inhibit the formation of neurotoxic  $\beta$ -amyloid protein in a mouse model for Alzheimer's disease. George Lara is completing his thesis research. His project is to localize butyrylcholinesterase in differentiating stem cells. He has clearly shown that the enzyme is predominately localized to the nucleus in these cells. We are very excited about these findings.

I am happy to report that Archie Turner graduated and is gainfully employed and Sam will begin a Ph.D. program at the University of Washington in the fall.

Finally, as part of a student's experience in my lab, I'm trying to expose them to how one adapts the results of basic research to real life commercial applications.

### DR. DEEPALI BHANDARI

This has been another very exciting year for me and my students. We made great progress toward initiating and validating new projects, obtaining seed grants and presenting our work at various meetings the past two semesters. My research program focuses on understanding molecular basis of cell survival and migration, two cellular phenotypes that play crucial roles in various normal and pathophysiological (such as cancer, diabetes, neurodegeneration) processes. We have many projects underway in the lab at the moment – all with a central theme of understanding involvement of the signaling molecule G-protein interacting vesicle

associated protein (GIV) and the kinase Cyclin-dependent kinase 5 (CDK5) in cellular physiology. Based on the preliminary results, I applied for and received two seed grants—the 2015-2016 BUILD Research Stimulation Grant and the 2016-2017 ORSP Internal Grant Award. We published a manuscript in PNAS based on the work I initiated at UCSD and finished here at Cal State Long Beach with the help of student Adam Maddox. I also gave an invited research talk at my alma mater - Panjab University Chandigarh, India.

My students presented their research at several regional/national meetings including the CSUPERB annual symposium, Latino Health Equity Conference, ACS Western Regional meeting, Binghamton University Research Symposium & Graduate School Application Retreat, ACS Southern California Undergraduate Research Conference (SCURC), ADSE Young Researchers Conference and the 6th Annual Meeting of Biophysical Society in addition to the local CNSM research symposium. Undergraduate students Rosanna Calderon and Andrew Lozano won second prize at the ADSE Young Researchers Conference for their poster presentation. Rosanna also received the 2016-2018 RISE M.S. to Ph.D. fellowship to do her masters thesis in my laboratory. Graduate students Brett Roach and Peter Nguyen received the prestigious McAbee-Overstreet Graduate Research Scholarship and Wynston Award in Biochemistry, respectively.

Our group has grown bigger and we welcomed four new students to our lab – graduate student Clariss Limso, HSI STEM Summer Bridge student Johana Aviles and BUILD associates Greg Kouris and Jordan Ngo. Overall, it was a very productive and great year for us and I owe big thanks to my students for their hard work and long hours spent in the lab generating data. Here's to another successful year and many more. *Go Beach!*

### DR. PAUL BUONORA

Last academic year marked a significant change in my career as I spent most of my time focused on the BUILD and RISE grants funded through the National Institutes of Health.

In the BUILD program, we created a research curriculum for Cal State Long Beach that will help move research from an extra-curricular to a curricular activity to better prepare students for careers in research and for graduate study. One of the courses we created was Scientific Research Communication that I taught in the fall. The curriculum also includes Research Career Exploration, Introduction to Research Methods, and Advanced Research Methods courses. Looking to 2016-17, I will be teaching the graduate Catalysis in Organic Chemistry class in the fall.

I have maintained my research group, although at a smaller size. Undergraduates Linda Ung and Dustin Nguyen continued their cyclocondensation work. A new graduate student, Josh Cosgrove will be starting lab work on aromatic acylation via C-H activation soon.

## M.S. THESES

### MASTER OF SCIENCE CHEMISTRY

**Andrew D. Alexopoulos**  
Thesis: Peptide-Supported Organometallic Catalyst for Dual Transformations Under Ambient Aqueous Conditions  
• Advisor: Dr. Kasha Slowinska

**ChloeYingxin Hu**  
Thesis: Synthesis, Characterization and Biological Evaluation of Paclitaxel- Hybrid Peptide Conjugates

**May S. Maung**  
Thesis: Controlling Activity of Ligand-Capped Palladium Nanoparticle Catalysts: Effects of Thiolate Ligand Structure  
• Advisor: Dr. Young-Seok Shon

**David D. Russell**  
Thesis: Design, Synthesis, Crystal Structure and Magnetic Properties of Novel Osmium-Based B-Site Ordered Double Perovskites  
• Advisor: Dr. Shahab Derakhshan

**Trina Tran**  
Thesis: Aryl Dibutyl Phosphates (ADBP), Racemic and Enantiomerically Enriched Alkyl Aryl Cholinyl Phosphates (ACPs), and Tetraalkyl Bisphosphates: Their Synthesis and Study as Organophosphorus Inhibitors of Butyrylcholinesterase  
• Advisor: Dr. Ken Nakayama



Dr. Roger Acey's research group.