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Catalyst

SPRING/SUMMER 2024 VOLUME 19 • ISSUE 1
COLLEGE OF CHEMISTRY • UNIVERSITY OF CALIFORNIA, BERKELEY

A 21st Century space for 21st Century science

• John Arnold retires as Associate Dean of Undergraduate Affairs • College welcomes new faculty

Catalyst

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ON THE COVER

A 21st Century space for 21st Century science.

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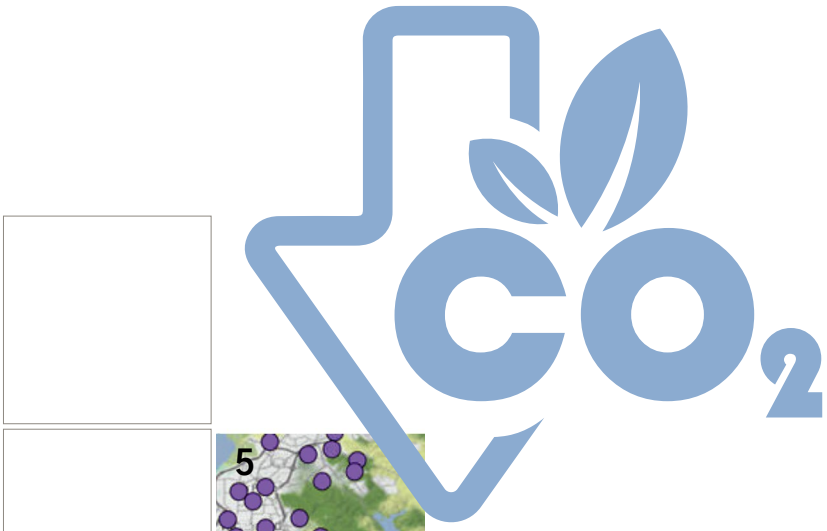

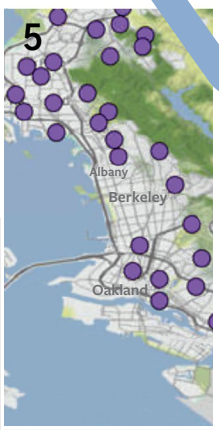

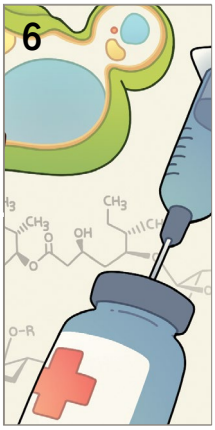

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Heathcock Hall facilities will allow our faculty to prepare the next generation of leaders to push the envelope of knowledge in leading global innovation and exploring new ideas that move us into the science of tomorrow.

A legacy of excellence

As I enter my twelfth year as dean, I remain inspired and humbled to be a part of the legacy of the historic network of preeminent scholars and students that comprise the College of Chemistry. Of course, nothing lasts forever (consider plutonium-239, for example, whose half-life is a mere 24,110 years), and the search for the next dean remains in process. Thus, I have agreed to continue on as dean through fall and longer if need be. Stay tuned for further word on this in a future issue of Catalyst.

We held a ceremonial groundbreaking for Heathcock Hall in early May, a singular milestone achieved with the support of key benefactors, campus leadership, the architectural team from HOK, our contractors, advisory board members, and all of you. Heathcock Hall facilities will allow our faculty to prepare the next generation of leaders to push the envelope of knowledge in leading global innovation and exploring new ideas that move us into the science of tomorrow.

At the annual Dean's Dinner that followed our groundbreaking ceremony, I reflected on what I believe are three pillars of the College of Chemistry's longstanding excellence:

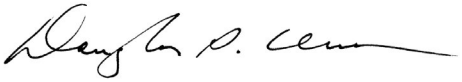
Excellence through Diversity: While there is still much more work to do in this area, the uniformity of the past has been replaced by a more representative group of researchers working in our labs today;

Excellence through Community: Support of the community helped save the college eight years ago from being dissolved as part of the administration's academic realignment plans, and it remains vital to our success at all levels;

and Excellence through Determination: As but one example, our plans for a new building have been in the works for as long as I have been dean, and thanks to collective fortitude, we were able to make this vision a reality.

Excellence through recruitment should also be mentioned, as we have been fortunate to welcome four new faculty members to our college: Professor Shannon Boettcher (highlighted in this issue), who studies electrochemistry and associated energy conversion and storage systems, materials science, and interfacial science; Assistant Professor Bingqing Cheng, who studies theoretical chemistry, physical chemistry, and materials science, with an emphasis on machine learning; Assistant Professor Neil Razdan, who studies heterogeneous catalysis, interfacial electrochemistry, and chemical kinetics; and Assistant Teaching Professor Laura Hirshfield, who focuses on engineering education research by leveraging quantitative and qualitative methods to assess and support equity, inclusion, and wellness within the engineering student experience. I am once again awestruck by the level of accomplishment among our newest colleagues.

Our pillars of excellence are further maintained by the profiles in this issue, including Luisa Dell, chemical engineering undergraduate student working to advance global health as well as increase diversity in STEM education, Ritankar Das and Margaret Chu-Moyer, members of our strong alumni community, and Bobby Sheng, cornerstone donor to Heathcock Hall. I hope you will enjoy reading about these members of our CoC community and the many other noteworthy developments and stories from the college.



DOUGLAS S. CLARK
Dean, College of Chemistry, Gilbert N. Lewis Professor

NEW & NOTABLE

RESEARCH • VIEWS
DISCOVERIES • AWARDS

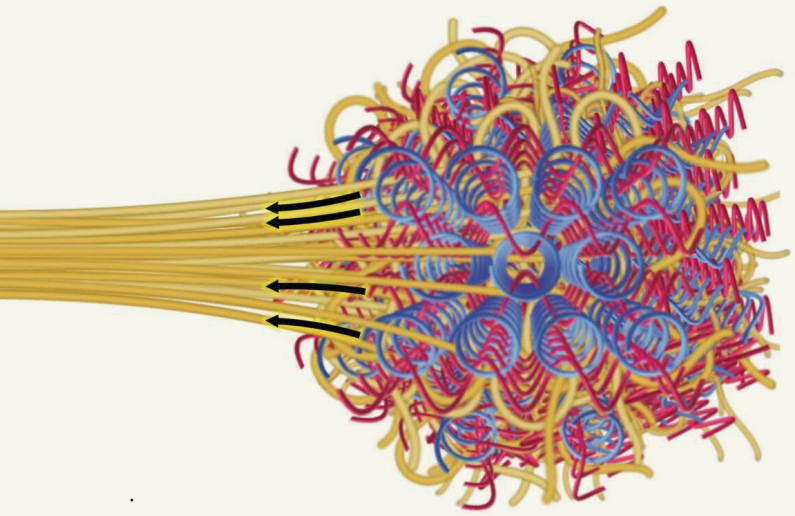
New Pines Center at the College of Chemistry resonates with promise

The Pines Magnetic Resonance Center (PMRC) was launched on November 28, 2023, in honor of Alex Pines, Glenn T. Seaborg Emeritus Professor of Chemistry. The new center advances Berkeley's prominent position in the vital methodology of nuclear magnetic resonance (NMR).

Read more at: chemistry.berkeley.edu/news/new-pines-center-college-chemistry-resonates-promise

A research has developed "supramolecular ink," a new technology for use in OLED (organic light-emitting diode) displays or other electronic devices. Made of inexpensive, Earth-abundant elements instead of costly scarce metals, supramolecular ink could enable more affordable and environmentally sustainable flat-panel screens and electronic devices.

Read more at: chemistry.berkeley.edu/news/scientists-advance-affordable-sustainable-solution-flat-panel-displays-and-wearable-tech



Molecular weaving makes polymer composites stronger without compromising function

Yaghi Research Group and collaborators discovered how to leverage both porosity and molecular weaving to make polymer composites stronger, tougher, and more resistant to fracture by threading polymer strands through the woven network.

COFs—or covalent organic frameworks, a new class of porous crystals—are connected through strong chemical bonds to form a highly open and structured network. This intricate structure allows them to provide a scaffold for polymer chains to thread or wrap during their formation and strengthen.

Now, thanks to this new research that suggests polymer composites can be made more durable, the applications and uses have wider implications.

Read more at: chemistry.berkeley.edu/news/molecular-weaving-makes-polymer-composites-stronger-without-compromising-function

EVs are lowering Bay Area's carbon footprint

An extensive CO_2 monitoring network set up around the San Francisco Bay Area by an atmospheric chemist from the University of California, Berkeley, has recorded the first evidence that the adoption of electric vehicles is measurably lowering the area's carbon emissions. The network of sensors, most of them in the East Bay, is the brainchild of Ronald Cohen, UC Berkeley professor of chemistry, who envisions inexpensive, publicly funded pollution and carbon dioxide monitors widely distributed around urban areas to pinpoint emission sources and the neighborhoods most affected.

An estimated 70% of global CO_2 emissions come from cities, yet few urban areas have granular data about where those emissions originate.

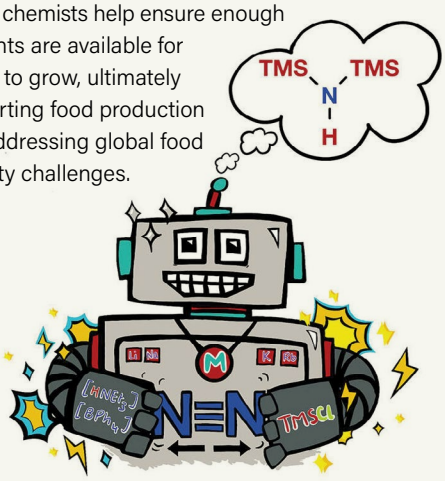
In 2012, Cohen began setting up a Bay Area sensing network that has now grown to more than 80 stations, including seven in San Francisco, that stretches from Sonoma County through Vallejo and down to San Leandro.

Between 2018 and 2022, 57 of the sensors in the Berkeley Environmental Air Quality and CO2 Network (BEACO2N) recorded a small but steady decrease in CO2 emissions—about 1.8% annually—that translates to a 2.6% yearly drop in vehicle emission rates. Looking at California data for electric vehicle adoption—which is very high in the Bay Area—Cohen and graduate student Naomi Asimow concluded that the decrease was due to passenger vehicle electrification.

Read more at: chemistry.berkeley.edu/news/evs-are-lowering-bay-areas-carbon-footprint

First catalytic example of nitrogen reduction by rare earth metals

Professor of Chemistry Polly Arnold and her team have discovered that rare earth metals can form active nitrogen reduction catalysts. By converting nitrogen gas from the air into usable forms, chemists help ensure enough nutrients are available for plants to grow, ultimately supporting food production and addressing global food security challenges.

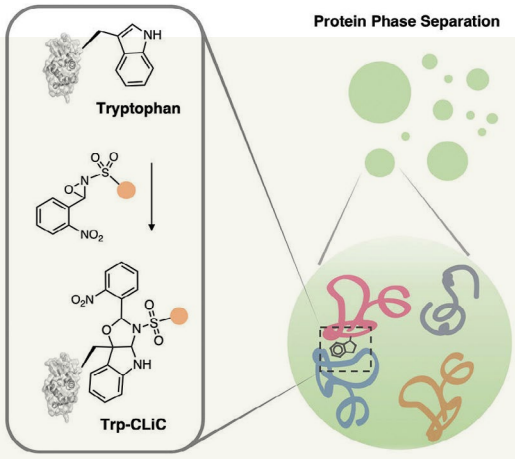


Read more at: chemistry.berkeley.edu/news/first-catalytic-example-nitrogen-reduction-rare-earth-metals

New CRISPR Center brings hope for rare and deadly genetic diseases

Children and adults with rare, deadly genetic diseases have fresh hope for curative therapies, thanks to a new collaboration between the Innovative Genomics Institute (IGI)—made up of experts including those from UC Berkeley—and Danaher Corporation, a global life sciences and diagnostics innovator. The new Danaher-IGI Beacon for CRISPR Cures center will use genome editing to address potentially hundreds of diseases, including rare genetic disorders that have no cure. The goal is to ensure treatments can be developed and brought to patients more quickly and efficiently.

Read more at: chemistry.berkeley.edu/news/new-crispr-center-brings-hope-rare-and-deadly-genetic-diseases



Targeting tryptophan: New technique opens door to novel drug synthesis

University of California, Berkeley, chemists have devised a novel method to selectively tag tryptophan residues within proteins, potentially leading to the development of new types of drugs and engineered proteins, including those that mediate protein-protein interactions.

Led by Professors of Chemistry Christopher Chang and F. Dean Toste, the Berkeley team drew inspiration from nature's synthesis of indole alkaloids, devising an innovative N-sulfonyl oxaziridine reagent. This reagent reacts swiftly and selectively with tryptophan residues, offering a versatile tool for direct protein modification across proteomes without the need for light, electricity, or metal catalysts.

Read more at: chemistry.berkeley.edu/news/targeting-tryptophan-new-technique-opens-door-novel-drug-synthesis

An adjuvant made in yeast could lower vaccine cost and boost availability

Vaccines save lives, as proven during the recent pandemic, but one component of most vaccines—including the Novavax COVID-19 vaccine—goes unheralded: a molecule or other compound that primes the immune system to mount a more robust defense against infection.

These so-called adjuvants are added in small quantities but have a big effect, particularly in those with fragile immune responses.

Yet, one of the strongest adjuvants, an extract of the Chilean soap bark plant, is so difficult to produce that it costs several millions per kilogram.

Scientists have now wielded the power of synthetic biology to produce the active ingredient of soap bark, a molecule called QS-21, in yeast. Producing compounds like this is not only cheaper, but more environmentally friendly, avoiding many of the toxic chemicals needed to extract the compound from plants.

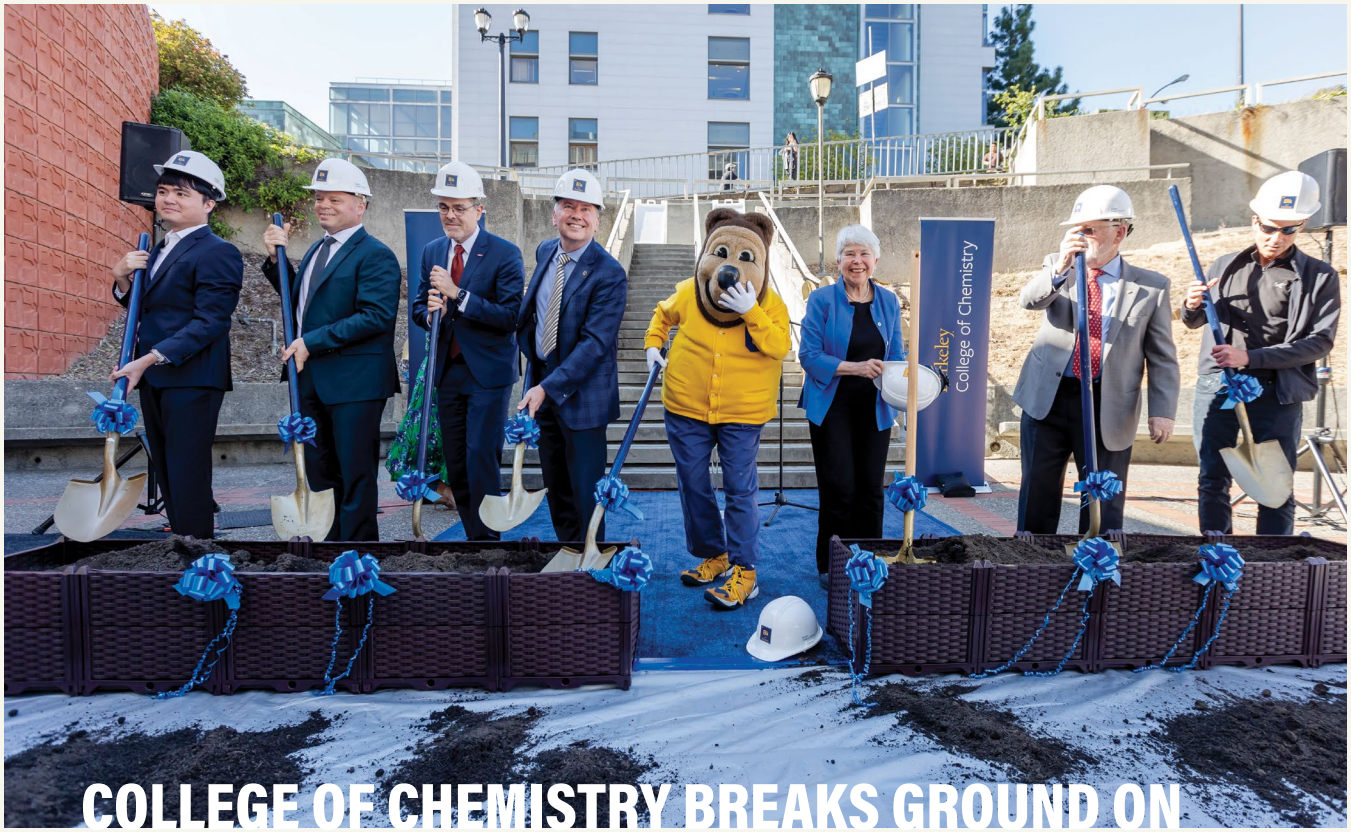
While yields from the process are still small, the feat promises to make one of the most effective adjuvants available more broadly and to lower the cost of vaccines.

Read more at: chemistry.berkeley.edu/news/adjuvant-in-yeast-could-lower-vaccine-cost-and-boost-availability

BELL PERSSON DUEBER YAGHI ABERGEL YANG SCHAFFER XU

Several College of Chemistry faculty members represent a small portion of Berkeley's ecosystem of climate innovators. They, along with many other colleagues, are driving discoveries from the lab to the marketplace, creating startup companies to fast-track the development and deployment of new and creative climate solutions.

Read more at: chemistry.berkeley.edu/news/berkeleys-ecosystem-innovation-entrepreneurship-combats-climate-change



BRITTANY HOSEA-SMALL

COLLEGE OF CHEMISTRY BREAKS GROUND ON NEW STATE-OF-THE-ART BUILDING

UC Berkeley's College of Chemistry celebrated the groundbreaking of its new research and teaching facility, Heathcock Hall, on Thursday, May 2, surrounded by staff, faculty, advisory board members, international benefactors, and even Oski the Bear. The event marked a key milestone towards creating a vibrant hub for new highly interdisciplinary research and education.

As a result of a cornerstone gift of philanthropy from alumnus Terry Rosen (Ph.D., Chemistry '85) and family, Heathcock Hall will be named in honor of renowned organic chemist, former Dean of the College of Chemistry, and Terry's research director, Clayton H. Heathcock.

Reinvigorating the campus' eastern gateway, the roughly 80,000 square foot building will attract rising leaders from around the world to the chemical sciences. It will contain six stories of modern laboratory space to accommodate research in synthetic chemistry, physical chemistry, and chemical and biomolecular engineering. It is the College's first new building project since the completion of Tan Hall in 1997.

The modular, environmentally efficient, state-of-the art facility was brought to life by architectural firm HOK, and will have views of the Campanile, Memorial Glade and the San Francisco Bay.

"The Chemistry program has a long and storied history at the University of California, Berkeley. We are honored to collaborate with the faculty and leadership to design a thoughtful new addition to this renowned campus," said Paul Woolford, FAIA, Design Principal with HOK.

Among the attendees was Chancellor Carol Christ, who acknowledged the generosity that brought the project to life.

"We truly couldn't have gotten to this point without the generous support of Terry, Clayton and the college's generous benefactors, many of whom are here today," she said. "In many ways, Heathcock Hall reflects the current state of higher education, which has become more expansive than ever before. We're charged with preparing our students for a world that is increasingly interconnected and where the pace of change has quickened."

The groundbreaking also included remarks from Doug Clark, Dean of the college.

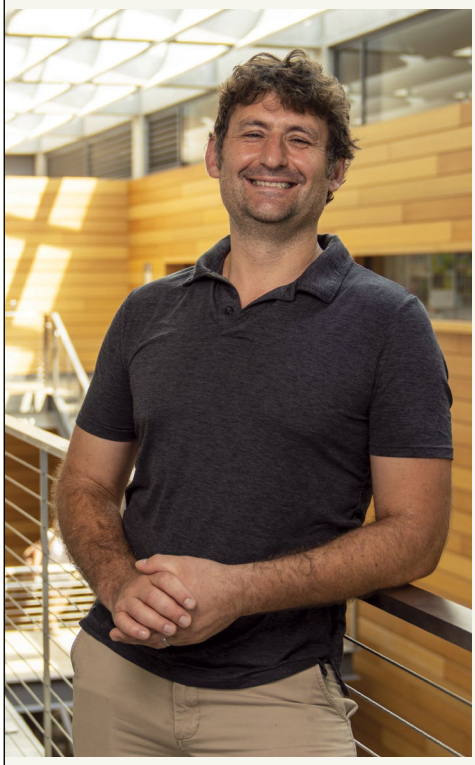
"For more than 150 years, many of the most promising discoveries across the disciplines of chemistry and chemical engineering have emerged in the halls of the College of Chemistry," he said, in his opening remarks. "Imagine a world where these scholars have even greater flexibility and freedom to advance highly innovative, translational science resulting in new, exciting discoveries."

Read more at: chemistry.berkeley.edu/news/college-chemistry-breaks-ground-new-state-art-building-heathcock-hall

New Berkeley electrochemistry program to tackle green energy challenges and more

Nationally recognized electrochemist Shannon Boettcher joined the Berkeley faculty this year to lead the new Center for Electrochemical Science, Engineering, and Technology (CESET).

BY SARAH C.P. WILLIAMS



When he's feeling especially optimistic, chemist and engineer Shannon Boettcher thinks that, one day, the oil, gas, and petrochemical industries in the United States will be replaced by a massive electrochemical industry. Electrochemists like Boettcher study how chemical reactions can be driven with electrical energy, or used to generate or store electrical energy, and their work has implications in developing clean, renewable energy.

For the electrochemical industry to take off, however, will require not only advances in electrochemical technologies but also a purposeful growth of education and infrastructure around electrochemistry, Boettcher says. He's ready to move forward on all those fronts.

To that end, Boettcher—who joined Berkeley this year as the Vermeulen Chair in Chemical and Biomolecular Engineering and Chemistry—founded the new Center for Electrochemical Science, Engineering, and Technology (CESET). CESET aims to bring together Berkeley researchers, students and industry partners to tackle fundamental electrochemistry research, technology creation, and education and workforce development.

Boettcher received his undergraduate degree in chemistry from the University of Oregon and his graduate degree from the University of California, Santa Barbara, and has long been motivated by the practical applications of his research. As a postdoctoral research fellow with Nathan Lewis at Caltech, Boettcher helped develop new microscale arrays of silicon wires to convert solar energy into fuel.

"I made an intentional choice to steer my research right towards the heart of energy conversion and photoelectrochemistry," says Boettcher. "I have a general interest in technology development and I wanted to do something that contributed to solving the energy crisis and creating renewable energy technologies."

In the last 14 years at the University of Oregon, Boettcher's research team dramatically improved bipolar membranes that are used to split water into acid and base components—a critical step in many systems that aim to capture carbon dioxide from the atmosphere.

"We started asking very fundamental questions about how water reacts with surfaces and how to optimize the reactions," Boettcher explains. "As we got more mechanistic insight into the process, it let us build a next-generation membrane far superior to existing technology."

A small manufacturing company is now beginning to produce the membranes designed by Boettcher's team—at the same time the researchers continue work on their deeper understanding and optimization.

Boettcher says that his efforts often involve breaking down the basic science of a technology in order to improve it.

"I don't like to optimize things until I know the design principles," he says. "I always push my students to understand the mechanism behind something as they start to try to make it work better."

Another technology that his lab has tackled this way: electrolyzers, which use electricity to split water into separate hydrogen and oxygen molecules. The hydrogen produced by this process can be used for heavy duty transport, aviation, and long-term energy storage. His lab group collaborates with multiple commercial electrolyzer manufacturers to ensure that their findings and developments have quick implications in industry.

At Berkeley, Boettcher plans to continue his work on bipolar membranes and electrolyzers, as well as expand in new directions—like using electrochemical driving forces to control higher temperature thermochemical reactions.

Boettcher says that Berkeley has all the ingredients to lead the field of electrochemistry in the coming years.

Boettcher hopes that, through CESET, Berkeley will train the next generation of scientists to integrate electrochemistry into their research—whether they come from an engineering, physics or chemistry background.

Aditi Krishnapriyan: **A Two-Way Street Between Physics and Machine Learning**

BY SARAH C.P. WILLIAMS

To model systems that change over time and space—in fields from physics and chemistry to economics and computer science—researchers use partial differential equations. These equations are powerful tools for predicting dynamic changes. However, they are also notoriously complex and difficult to solve.

Aditi Krishnapriyan, who joined the faculty as an assistant professor in Chemical and Biomolecular Engineering in January, is developing machine learning methods that can solve partial differential equations to tackle these kinds of complicated simulations. She calls the connection between machine learning and science "a two-way street". She uses physics knowledge to improve machine learning methods, and machine learning methods to tackle challenges in physics and chemistry.

"It's an exciting area because there's so much to be done," says Krishnapriyan. "I'm building a group with expertise across both computer science and the physical sciences, so we can aim to iterate and make progress much more quickly."

Before joining the College, Krishnapriyan was an Alvarez Fellow in Lawrence Berkeley National Laboratory's Computational Research Division.

MODELING MATERIALS

At UC Santa Barbara, she started her undergraduate education intending to focus on chemistry. After two years she added a second major: physics.

While some of her classmates enjoyed the experimental aspects of physics and chemistry, Krishnapriyan was drawn to the theoretical side. She joined a research lab studying condensed matter and solid-state physics and began research using fundamental physics equations to model the properties of the materials.

"I enjoyed doing the theory work where I could start out thinking through my ideas mathematically with pencil and paper, but then be able to verify everything with computer simulations," she says.

INTEGRATING MACHINE LEARNING

While in graduate school at Stanford, she also became particularly interested in how emerging machine learning methods could improve current scientific models. The methods at the time, however, fell short for the sort of problems she wanted to solve.

As part of her Ph.D., Krishnapriyan developed machine learning models that would capture the geometric and topological information of molecules and materials.

During graduate school, Krishnapriyan thought about working in industry, using her physics-inspired machine learning models to tackle broad scientific problems. This included working at Google and at Toyota Research Institute. She enjoyed the experiences in industry and and underscored the importance of scientists knowing how to code themselves.

Then, she was awarded the prestigious Luis W. Alvarez Fellowship in Computing Sciences to work as a postdoctoral fellow at Lawrence Berkeley National Laboratory.

AN INTERDISCIPLINARY LAB

Krishnapriyan was attracted to Berkeley, she says, by the plethora of interdisciplinary research. Being among a diverse collection of researchers helps to provide her with fodder for improving her machine learning models and finding ways to apply them to new types of scientific problems.

Her lab focuses on developing new machine learning methods for scientific problems, ranging from developing neural network architectures to better training procedures and evaluations. She believes that these systematic strategies will allow machine learning to bridge the gap between models and the real world. Ultimately, she hopes her models will help scientists use machine learning in a more useful and accurate way.

"I am hoping the methods I develop will make it easier for scientists to take these new methods and get more suitable answers."

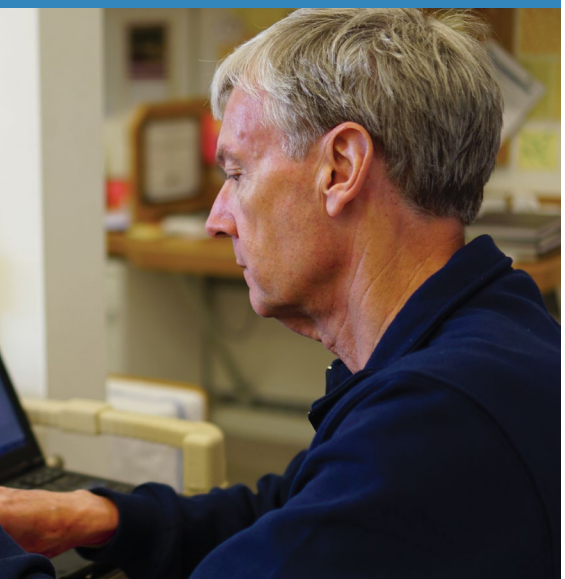
DENNIS GALLOWAY

John **Arnold**

A JOURNEY FROM THE LAB TO LEADERSHIP

BY MELANIE KROL

Sailing through Chemistry



In 1989, Dr. John Arnold walked into his UC Berkeley office for the first time. Scanning the room, he saw an old desk, a new chair, a telephone, a pad of paper, a pencil, and a stapler. From those humble beginnings, he set to work building his chemistry group from the ground up.

But John was certainly no stranger to setting out on a new adventure. Born into a family of builders as the youngest of four, he and his siblings were expected to leave school and join the family business at age 16.

It seemed John's course was set—to be a tiler. The only problem? He didn't have any interest in tiling. He'd always been a very curious child—asking constant questions and always wanting answers. A natural-born researcher, he dreamt of a different kind of life path characterized by adventure.

So instead of following the predetermined path, he took a different road. John began working in a plastics factory because it would pay for his continuing education. John took four years of night school at a tech college and absolutely loved it. After that, the company offered to support a co-op degree, enabling him to attend a university.

There, John was in heaven. He couldn't believe that people got paid to ask questions, study, and learn all day. Turns out this taste of heaven would be a foreshadowing of his future career.

A couple of years later, John accepted an invitation to complete his Ph.D. in San Diego. There he met Don Tilley, who would later go on to also work at UC Berkeley. Soon after, he enjoyed a postdoctoral experience in London with his "personal chemistry hero" Sir Geoffrey Wilkinson. His next stop? A professor at UC Berkeley's College of Chemistry.

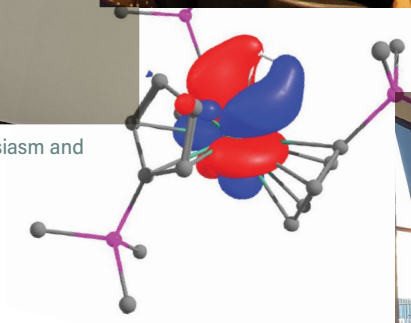
John never thought he'd get that job. He never thought he'd get tenure. He certainly never thought he'd teach for 35 years. Going from being a "pseudo high school dropout" to becoming a Berkeley professor all feels like a bit of a fairy tale to him—and certainly the adventure of a lifetime.

In addition to his adventures in teaching and research, John faithfully served as Undergraduate Dean from 2017-2024. After turning down the position a couple of times, some conversations with College of Chemistry Dean Doug Clark assured John that he would be given the space needed to try new ideas, make the position more entrepreneurial in nature, and focus on creative ways to serve undergraduates.

The lasting marks of his transformative leadership can be seen in many ways. Under his leadership, Berkeley's Center for Green Chemistry—a collaborative effort that aims to advance green chemistry through interdisciplinary scholarship—was awarded a $3.4 million dollar training grant from the National Science Foundation. In 2018, his lab group was awarded the Excellence in Laboratory Safety Award. And during his tenure, the College of Chemistry was consistently ranked as the #1 global university in chemistry.

MICHAEL BARNES

Arnold was often praised for his enthusiasm and passion when teaching to students.



COURTESY OF THE COLLEGE OF CHEMISTRY

Fellow faculty member Shannon Ciston spoke about John's multifaceted impact: "John's deep appreciation for the diversity of student experiences has made [him] an excellent champion for College of Chemistry students from all backgrounds. His creativity in creating opportunities for our students to engage in research and co-curricular experiences has enriched the lives of many students and our community as a whole. His love of chemistry is infectious, and keeps students and faculty/staff alike connected to a sense of wonder and inspiration."

When taking a closer look at his research work, one can see that infectious sense of wonder. From day one, he and his students have always been involved in "super creative chemistry," largely in the realm of inorganic and organometallic chemistry. They've "created fascinating molecules and discovered interesting reactions" the whole duration of his tenure.

John authored and co-authored hundreds of publications about this research, collaborating with a wide breadth of researchers and students. These publications reflect both creativity and diversity in the areas of bond activation, spectroscopic and computational studies of metal complexes, and the synthesis of multi-metallic compounds.

When asked about any research he's particularly proud of, John shared, "I can't recall having too many favorites over the years as I liked all of them!" His first paper with Don Tilley, however, does stand out to him for both sentimental reasons and for containing some "especially cool chemistry."

Even with these impressive accomplishments, John remains humble, giving credit and gratitude to others. When talking about his papers, he noted that "the coolest part of it all [was] watching my coworkers take rough ideas and run with them—they are the ones who should get the attention."

This humility and support of others perfectly represents how his legacy reaches beyond his titles, awards, and prolific

collection of research. Lead College Advisor and Peer Services Program Director Shamaya Pellum said she "[had] never met a senior leader and educator as kind and uplifting as John Arnold. He truly wants everyone to succeed and wants the best for students—even if that means that they do not stay in the College of Chemistry."

From giving his cell number to parents, to supporting student research, to mentoring undergraduates, he always sought ways to give back to the people around him and contribute to student success—especially amongst undergraduates.

In fact, Maura Daly, Director of Undergraduate Services for the College of Chemistry, observed in John a "seemingly bottomless commitment to our undergrad students" and under his leadership saw "a clear shift in the College toward a heightened interest in and support for undergrads."

John eagerly expressed his admiration for those undergraduate students. While it's common for graduate students to get quite a lot of attention due to their research efforts, John saw the bigger picture and shared his feelings of pride for the undergrads as well.

Graduate student Joe Brackbill experienced John's support firsthand, despite John's title as Undergraduate Dean, and shared: "John has been a kinder mentor than I could have hoped for. He has supported me through the hardest years of my life. He's always happy to talk, to answer a question, or to train someone in a new technique."

When anyone asks John what it's like to work at Berkeley he tells them that, "Berkeley is really about the people." He admits that sometimes when outsiders think of a prestigious institution, they get the image of a cold environment with unfeeling people. This has been far from John's experience. In Berkeley, he found a warm community that's been nothing but friendly, helpful, and supportive.

For the past 35 years, the Berkeley community has experienced those exact same qualities in John. Someone warm, friendly, helpful, and supportive. Someone with true academic brilliance and prestige, but also never too busy to come alongside a student or co-worker in need of support.

So what's next for John? His adventure is not even close to being over. While he says he will miss the college and the people, he's also looking forward to tackling some other life goals with that defining curiosity and wonder. He's started writing again and pens around 600 words every morning. He's excited to get back into photography and travel more with his wife. And his biggest goal for the next couple of years? Sailing around the world.

When asked if he would write a book about his new adventures, he responds with a humble shrug and a slight twinkle in his eyes, "I won't rule it out."

ELEMENTAL LEADERSHIP:

Roya Maboudian

announced as new Associate Dean of Undergraduate Affairs

The College of Chemistry is pleased to announce the new Associate Dean of Undergraduate Affairs, Roya Maboudian. Since 1993, Roya has consistently exemplified excellence in research, teaching, service, and leadership.

Her research "aims to expand our understanding of materials, surfaces, and interfaces and to apply this knowledge to make advances in a number of technologically emerging and societally critical areas." These endeavors have resulted in significant scientific and technological breakthroughs, as well as many awards and honors.

She has also been a dedicated and effective teacher and mentor to many generations of undergraduate and graduate students, and postdoctoral scholars, receiving the departmental awards for Excellent in Teaching.

In addition to her academic accomplishments, Roya brings a wealth of service and leadership experience into the role. She has been involved in several campus-wide and departmental committees including the Budget and Interdepartmental Relations Committee and the Committee on Undergraduate Scholarships, Honors, & Financial Aid. She is also the first woman to serve as Associate Dean of Undergraduate Affairs at the College of Chemistry.

The College of Chemistry Dean, Douglas Clark calls Roya "an exceptional fit for this position" and is "confident our undergraduate students will thrive under her guidance and leadership."

We welcome Roya into this new role with open arms and great anticipation for the ways she will continue to shape Berkeley's legacy of excellence and service to undergraduates.

Ritankar Das: **Chemistry as an economic powerhouse**

BY VERONICA BARTELL

Das attributes much of his success to great mentorships—those on campus that helped him figure out his future path and those in other areas that helped him determine his priorities.

When Ritankar Das (B.S. Bioengineering and Chem Bio; M.S. Biomed Engineering) talks about his time at UC Berkeley, he is modest and unassuming, but the mark he made as a student was evident. While at the College of Chemistry, Das formed a campus chapter of the American Chemical Society, founded the Berkeley Chemical Review research journal, and pursued a double major in bioengineering and chemical biology. At just 18 years old, he was the youngest person in over a hundred years to win the University Medal, and the first student from the College of Chemistry in 58 years to win the award.

The University Medal, which has been around since 1871, is presented to an individual whose career has significantly benefited the public, surpassing the conventional expectations of tradition, rank, or direct service to Berkeley.ity.

"I was so fortunate to get that award—and then I found out that I had to give a speech [at commencement] right after Steve Wozniak," said Das. "Had I known that I'm not sure that I would have..." he joked. "It was a great honor, and I was very excited [to be a part of] getting representation for the College of Chemistry."

Following graduation, Das went to England—first to Oxford, where he studied computer vision and got a master's degree in biomedical engineering. He then went on to pursue a Ph.D. in chemistry as a Gates-Cambridge scholar, working on applications of machine learning in energy landscapes.

But ultimately, his heart was in entrepreneurship.

Das dropped out and started a company in California where he could apply his learnings in machine learning to healthcare. In 2017, he created Dascena, a machine learning diagnostic algorithm company that targets early disease intervention to improve patient care outcomes.

In 2022, Das sold Dascena, with the company having reached over a million patients, but by then, he had moved on to his next venture: BlueWillow—an AI image generation platform with a vibrant artist community.

He has since sold BlueWillow to LimeWire, and is now focused on Forta Health, a family-powered autism therapy startup, whose primary focus is improving access to therapy for those with autism spectrum disorder using its artificial intelligence algorithm paired with family-mediated therapy.

Das attributes much of his success to great mentorships—those on campus that helped him figure out his future path and those in other areas that helped him determine his priorities. He was also hugely inspired by Dr. P. Roy Vagelos, a celebrated scientist, businessman, and philanthropist, who was president and CEO of the American pharmaceutical company Merck & Co.

"Dr. Vagelos has lived a terrific life, and has impacted many others, mine included. His integration of science and business showcased how one could catalyze positive societal change, influencing my entrepreneurial path. Notably, his initiative at Merck, ensuring free global access to ivermectin, saved the sight of hundreds of millions, serving as a testament to his altruism. He has also helped many folks in the sciences and in medicine access education," said Das. "That's actually a big part of [why I got] involved with the campus and especially the College of Chemistry [as an alumni]. I think that opportunity should be there for future generations."

Das took that inspiration and gave his first gift, a contribution of $1.25 million, to the College of Chemistry in 2023.

"It's such a great environment," he said when talking about the College. "You'll find people who are highly supportive, who are driven and motivated, with a broad range of skills, who ultimately teach you a specific way to think that you will take with you no matter what you decide to do."

His passion for the College is evident—and it's clear that while he believes access to higher education in general is important, his belief in the College itself is a major driving force in his generosity.

Today, Das continues to do his research, continues his plans to give back to the College, and continues to put his trust in the people that make up the College of Chemistry.

Margaret Chu-Moyer: **The elemental rise of an alum**

BY VERONICA BARTELL

Chemist Margaret Chu-Moyer (B.S. '87, Chem; Ph.D. '89, Org Chem, Yale), a member of the Advisory Board of the College of Chemistry, remembers wondering how medicines worked early in life. "I remember thinking, 'I take medicine and I am well; what is that about?'" she says with a small smile. "In junior high I [also] used to wonder about the big words on my shampoo bottle."

The leap she has since made from wondering to becoming a medicinal chemist, someone who designs and makes molecules for medicinal applications, is no small feat. And while she credits her journey to the foundation of people who provided support along the way—her high school chemistry teacher, her Berkeley professor Henry Rapoport and Yale professor Samuel Danishefsky and even her husband, Mikel Moyer (Ph.D. '86)—it's clear that Chu-Moyer's focus and vision were the driving forces behind her success.

Chu-Moyer started her college journey at Berkeley in 1983. Nervous about her initial performance in Chem 1, she thought, "Am I really cut out to be a chemist?" She found herself volunteering at a pharmacy on campus and ultimately doing research in Professor Rapoport's lab over the summer after deciding to study organic chemistry. "I really enjoyed the representation of molecules with what I call a different language—and how to name them and put them together. At the same time, I didn't know then that it had anything to do with drug discovery."

She continued to do research in Professor Rapoport's lab through her junior year, the following summer and senior year and began to understand that these organic molecules could be characterized as therapeutics. It was in Professor Rapoport's group that she met her now husband, who also was interested in medicinal chemistry.

After leaving Berkeley, Chu-Moyer earned her Ph.D. and went on to pursue an opportunity at Pfizer that would last 16 years. Today, she is VP, Research, at Amgen and head of small-molecule therapeutic discovery and research technologies. But when she looks back at how her life has changed most significantly and what she is most proud of, she mentions two things: first, her personal accomplishments.

"[My husband and I] were married in 1987, and I could see where chemistry could go because of him, but our total syntheses include our 3 sons, and now they are going on to their own careers," she said proudly.

Of their sons, one is an MD, one is a fourth-year student pursuing his MD, and the youngest has been accepted into a chemical biology graduate program. The biology is strong in the family when it comes to medicine and chemistry.

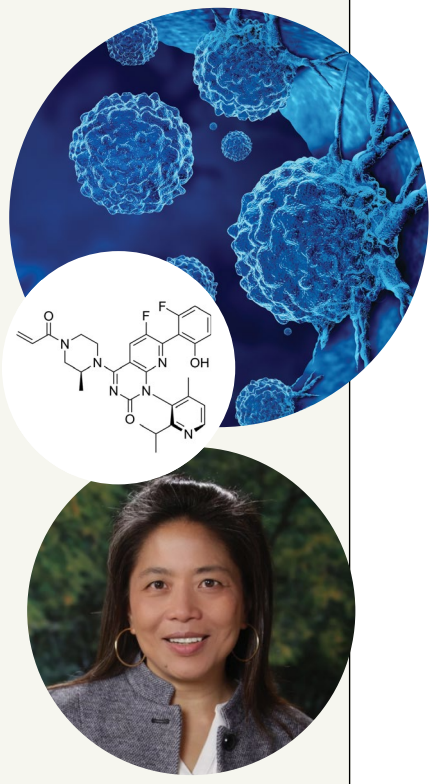
Secondly, she discusses her professional accomplishments. "I'm really proud of the grounding I got at Berkeley, followed by working for a Berkeley alum in a lab and ultimately [a career in] inventing therapeutics through small-molecule drug discovery for devastating diseases like cancer, cardiovascular disease and inflammation."

Chu-Moyer's group was responsible for discovering the small-molecule KRAS G12C inhibitor, AMG 510/sotorasib, which can be used to treat a variety of solid tumors. AMG 510/sotorasib entered clinical trials in June 2019 and was granted accelerated approval in the U.S. in May 2021 as LUMAKRAS® for the treatment of KRAS G12C-mutated locally advanced or metastatic non-small-cell lung cancer.

Patients are at the forefront of what Chu-Moyer and her team focus on when developing a therapeutic. "We're trying to solve very difficult problems, and there are a lot of criteria. Many things must come together to invent the actual therapeutic," she said.

Chu-Moyer reflects on personal experiences frequently when it comes to her work affecting those around her. Hearing from a friend or colleague about a family member who has renewed hope or whose quality of life has improved as the result of a drug she has helped invent is a feeling she can't quite describe, but Chu-Moyer is humbly disbelieving.

"It's very gratifying to know that our molecules are improving patient lives. From my teenage years wondering about medicines to actually inventing medicines ... this is what it is all about."



Patients are at the forefront of what Chu-Moyer and her team focus on when developing a therapeutic.

CBE student Luisa Dell awarded Gates Cambridge Scholarship

This fall, Dell will attend Cambridge University in the UK to study antibiotic resistant urinary tract infections.

BY SARAH C.P. WILLIAMS

CBE undergraduate student Luisa Dell is among just 25 students in the nation—and the only studying chemical engineering—to receive a Gates Cambridge Scholarship. The award will cover the full cost of attendance for the University of Cambridge, UK, where Dell plans to study antibiotic-resistant urinary tract infections, a growing public health threat.

"I feel incredibly honored to receive this scholarship," says Dell. "I'm a Latina and a transfer student. These extra barriers can make it harder to achieve things like this and so I hope I can show other students with similar backgrounds that they can do it too."

Dell grew up in Monterey, CA, and attended Monterey Peninsula College before transferring to Berkeley between her sophomore and junior year. She always liked science and math but didn't have a clear idea of what she wanted to study until a chemistry professor showed her the fascinating research going on at the intersection of chemistry, biology and engineering.

At Berkeley, Dell has carried out research in the Keasling Lab, which uses synthetic biology approaches to engineer microbes to produce drugs, chemicals and fuels. Dell's work in the lab focused specifically on engineering yeast to make cancer drugs normally made in plants. Dell has also worked in the Zhang Lab and participated in summer research programs at Johns Hopkins University and the Massachusetts Institute of Technology—work which was honored with a national "Future Leaders in Chemical Engineering" award.

Dell was aided in her Gates Cambridge application by the Office of Undergraduate Research & Scholarships (OURS), which works individually with undergraduates to pursue competitive scholarships.

"We help students think about how to present themselves in a way that highlights the best of their accomplishments," says Alicia Hayes, Associate Director of National Scholarships and Experiential Fellowships at OURS. "We have so many fabulous students like Luisa and we want them to get recognized."

For the Gates Cambridge Scholarship, Dell had to not only present her past experiences and participate in interviews, but also propose a research project for her time at Cambridge. She had recently learned that there was a shortage of treatments for urinary tract infections (UTI) and thought her experiences working in synthetic biology and natural products discovery labs at Berkeley could help her tackle this issue. So she developed a research proposal to discover new, alternative antibiotics for UTIs.

Dell becomes the 25th Berkeley student to receive a Gates Cambridge Scholarship in the 23 years of the program's existence.

In recent months, Dell also won a National Science Foundation Graduate Research Fellowship in recognition of her achievements as an undergraduate.

"I think Berkeley has taught me to be a more resilient researcher and make me more determined to reach my goals," says Dell. "I've had immense support from mentors, people in the Keasling lab, and the OURS office, helping me become a more competitive applicant for these awards."

Q&A

Bobby Sheng envisions a future of collaboration at the College of Chemistry

BY ELIZABETH COSTELLO

Bora Pharmaceuticals CEO Bobby Sheng '94, along with his wife Charlotte Kuo, recently made a significant gift to support Heathcock Hall, the new state-of-the art facility that will house UC Berkeley's College of Chemistry. Construction on the new building, which will be located at Gayley Road and University Drive, is scheduled to begin this year. To honor this generous commitment, the first floor of Heathcock Hall will be named Sheng Commons.

On November 8, at the Regent Hotel in Taipei, Taiwan, a group of UC Berkeley friends and alums gathered to celebrate the signing of the gift agreement. There, Sheng sat down with Lauren Haney, the College of Chemistry's senior assistant dean of development, for a conversation about his engagement with Berkeley, his decision to support Heathcock Hall, and why it is important to gather Berkeley alums in every corner of the world. Below we share a lightly edited version of their conversation.

LAUREN HANEY: Tell us a bit about your background and what led you to attend Berkeley.

BOBBY SHENG: I grew up in Orange County. I visited one summer, and I was just in awe of the campus. What stood out was the diversity, how everybody just kind of accepted everybody for who they were. As an undergrad, I loved the way everybody co-existed together.

One of the biggest clubs in Berkeley at the time was the Young Republicans Club, believe it or not. We had People's Park, nudist rallies, conservative rallies, and everybody just coexisted.

LH: That's awesome. So what led to your decision to support the College of Chemistry in Heathcock Hall with this gift? And when you envision Sheng Commons, what do you see?

BS: Well, obviously the College of Chemistry is one of the most prestigious colleges, I would say in the world, but especially in the chemistry community. But the reason why I'm so honored to contribute to the College of Chemistry is that I felt it was imperative to continue that legacy, and considering how competitive it is now as a public university, I think we need to contribute as much as we can. Specifically, we need to keep it at the forefront of the next generation of innovation, which is definitely in chemistry and biochemistry. We talk about AI, but the continuation of humanity really relies on the next generation of innovators, who are hopefully going to gather in a place like Sheng Commons.

LH: Great! Tell us a bit about serving as president of the Berkeley Club of Taiwan. What are some of the highlights of your experience with the club and why is it important to gather Berkeley alums and friends in Taiwan?

BS: Okay, I think for that question, I want to start with this gift would not have existed without the Berkeley Club of Taiwan. I think it's really important for any institution, but especially Berkeley, with the success of all of our alumni, to continue to reach out and let them know that the alumni community is the extension of their college experience. What I experienced was the leaders before me bringing me into the alumni association and helping me understand where Berkeley is now and understand my role as an alum. That's what the alumni association does. It allows us to have a commonality amongst each other and it's almost a fraternity in a way.

LH: Is there anyone in particular in the Berkeley Club of Taiwan or at Berkeley or in general in your life who influenced you to make this particular gift to the college?

BS: Oh, easy. Steve Pan. He's been my personal friend for more than thirty years. When I started branching out into the business that I have now, he was my mentor. He guided me through the process. He said, you can be the president of this Berkeley club. He is the sole reason, to be honest with you.

LH: What advice would you offer to young people, including Berkeley students, who seek to emulate your career or follow a similar path?

BS: For Berkeley? Students, tap into the network! It's not as, I would say, organized or as chummy as a lot of the Ivy Leagues may be. But there are people like me, like Steve, and all the presidents that really have an affiliation with and an affinity for Berkeley. So, reach out to that organizer, that network will guide you in your career path. Just like Steve guided me, I'm guiding some young students. But for young people in general, I would say I would never consider myself successful. It's a journey. Success is sort of an endpoint, which you don't really have in business. But I would say number one, always believe in yourself. A key phrase that I have had on my computer every day for the last fifteen years, since I started Bora, was why not me?

This is a condensed version of the story. Read the full story at : light.berkeley.edu/o/bobby-sheng-envisions-a-future-of-collaboration-at-the-college-of-chemistry/

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