

# CHEMIGRAM

2018



BRIGHAM YOUNG UNIVERSITY  
Department of Chemistry and Biochemistry

# Content



Letter from the Chair	01
2017 At-A-Glance	02
Faculty Research	03
University Awards	07
Mentored Undergraduate Research	08
Annual Lectureships	10
Retirements	12
New Faces	14
In Memory of Paul Boyer	15
Department News	16
Community Outreach	18
CPMS Convocation	21
Generous Gifts	22
Generous Donors	24
Awards and Fellowships	25

It is a great privilege to be part of BYU and to work in the Department of Chemistry and Biochemistry where so many faculty, staff, students, and alumni work so diligently to learn and to generate new knowledge. So much goes on behind the scenes to make all of this happen and I'm grateful to all of you for making this department so special.

A recurring theme every time I sit down to write these messages is change. The past year has seen the retirements of Professor Paul Farnsworth (who joined the faculty just before my senior year; I was in the first class he taught at BYU!), Kelly Jensen (who has handled purchasing for the department for as long as I can remember), and Janet Fonoimoana (who has lovingly shepherded our graduate students for many years). We will miss each of them!

Change also means new people are joining us. We have hired two senior faculty from government labs (their loss is our gain!) who will join us this summer. Dr. Ryan Kelly, who holds a BYU PhD, comes from the Pacific Northwest National Laboratory and is an expert in the mass spectrometric analysis of very small biological samples (think single cells, and even single organelles). Dr. Walter Paxton, who was a postdoctoral fellow with Nobel Laureate Fraser Stoddart a few years ago, is joining us from the Center for Integrated Nanotechnologies jointly operated by Sandia National Laboratory and Los Alamos National Laboratory. His work involves placing biofunctional molecules such as ion transporters into synthetic membranes to yield lifelike function in synthetic materials. We are excited to welcome both of these new faculty members.

Our faculty continue to achieve both university, national, and international awards that I won't detail here, but we are proud of them. We are also delighted to note the promotion of Professor Jeff Macedone to full teaching professor and the advancement of Professor Jeremy Johnson to candidacy for continuing faculty status during the past year.

We are progressing in other ways. Nearly 100 graduate students and over 200 undergraduate students performed cutting-edge research in our laboratories last year, helped by BYU's emphasis on mentored learning and generous funding from the College of Physical and Mathematical Sciences. Our graduate students now operate with a new set of graduation requirements uniform across the department, which allows us to better serve their needs. We have expanded opportunities for undergraduate students from other schools to have a BYU research experience, extending our Talmage Research Fellows program to operate year-round and added a new Research Experience for Undergraduates (REU) program funded by the National Science Foundation, operating for the first time in summer 2018. Our new Biological Mass Spectrometry facility is up and running with a state-of-the-art, top-of-the-line new mass spectrometer. We continue to enjoy teaching nearly 12,000 undergraduate enrollments per year, and our students continue to score well above average on American Chemical Society standardized exams.

As you will see in the stories that follow, many exciting things are happening in the BYU Department of Chemistry and Biochemistry. We will continue to seek great students and great new faculty members in the coming year.

Finally, we love hearing from you, so please feel free to get in touch!



David V. Dearden

### FULFILLING THE MISSION OF BYU

#### DEPARTMENT GOALS/ INITIATIVES

- \*Identify, recruit, and retain the best faculty who will fulfill the mission of the university and achieve the high standards of discipline.
- \*Prepare our students by providing engaging, rigorous classroom instruction.
- \*Provide our students with opportunities to participate in meaningful research projects.
- \*Create a sustainable structure for maintaining and replacing research and teaching instrumentation.

#### EFFECTIVE TEACHING

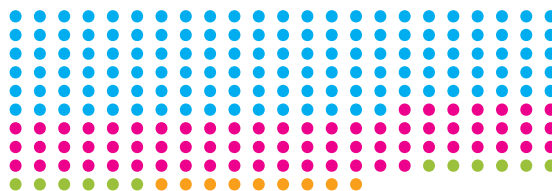
Students	Student Destinations	Course Ratings
11,659 Students taught in 2017, 86% service teaching	36% Grad School	(Service) - 2016
396 Majors (39% female, 61% male)	21% Professional School	Chem 105 4.17/5.00
46 BA or BS graduates in 2017	19% Jobs as Chemist/ Biochemist	Chem 106 4.26/5.00
95 Graduate students	4% Teaching Chemistry	Chem 285 3.93/5.00
13 PhD Graduates	19% Other	Chem 351 4.36/5.00
6 MS Graduates		Chem 352 4.43/5.00

#### EXPERIENTIAL LEARNING

##### Mentored Research

222 total undergraduates

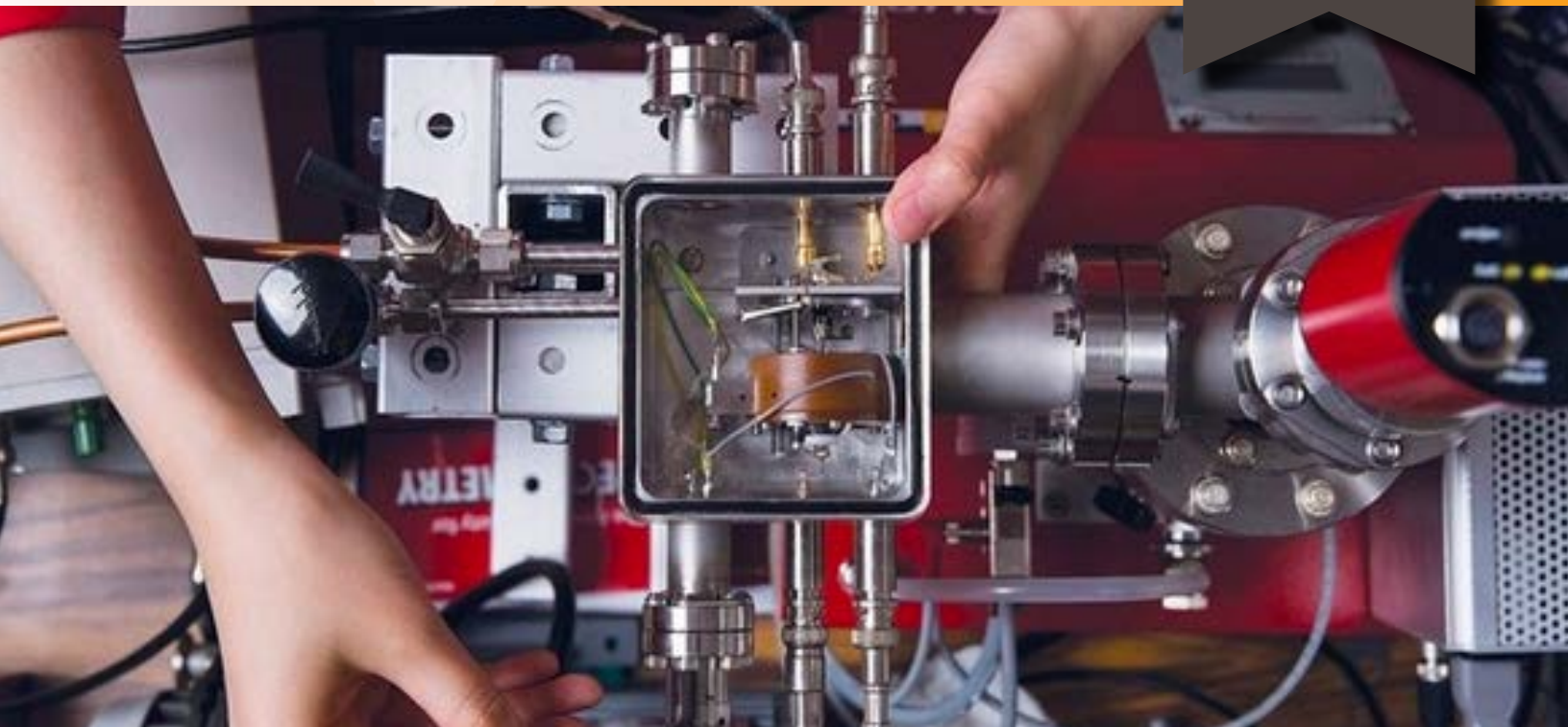
- 131 Majors
- 70 Non-majors
- 12 Talmage Fellows
- 9 HS students



#### PRODUCTIVE SCHOLARSHIP

##### Scholarship

155 peer reviewed publications  
 47 with student coauthors  
 \$2.62 million in external funding in 2017



## Dr. Daniel Austin's Research Featured on the Cover of C&EN

BYU professors were listed among the top ten scientists in the October 2017 issue of *The Analytical Scientist* magazine

*Chemical and Engineering News* (C&EN) is an award-winning news outlet that reaches around 156,000 scientists, members of the American Chemical Society, as well as the global chemistry community in industry and academia.

Dr. Daniel Austin's research was featured on the front cover of Volume 96, Issue 22, for his research on miniature mass spectrometers titled "Shrinking mass specs." A second feature article titled "Mini mass specs are still looking for an audience" was also published in the same issue.

When determining which molecules are in a sample, scientists often turn to mass spectrometry. For years, researchers have been working on converting these powerful instruments into small, portable mass spectrometers that can be taken into the field, thereby allowing security officers faced with possibly dangerous substances to receive immediate answers instead of wasting time sending samples to a lab. "There are a lot of potential applications where it is best if you can make your analysis out in the field," Austin says. "It is especially useful when you need a fast answer; when you need to make a fast decision; when the sample is changing quickly; or when you need to make lots of samples quickly in a way that is cumbersome to send back to a lab." Security officers, for instance, will require the advantages of a miniature mass spectrometer that fits into their pockets when detecting toxic gases in transportation systems or making environmental measurements in the field. The feature article includes updates from several research groups and companies developing portable mass spectrometers.

# Chemical Companies Race to Develop New Catalysts

Chevron Phillips Chemical teams up with Dr. Ess and other BYU researchers to speed up catalyst development

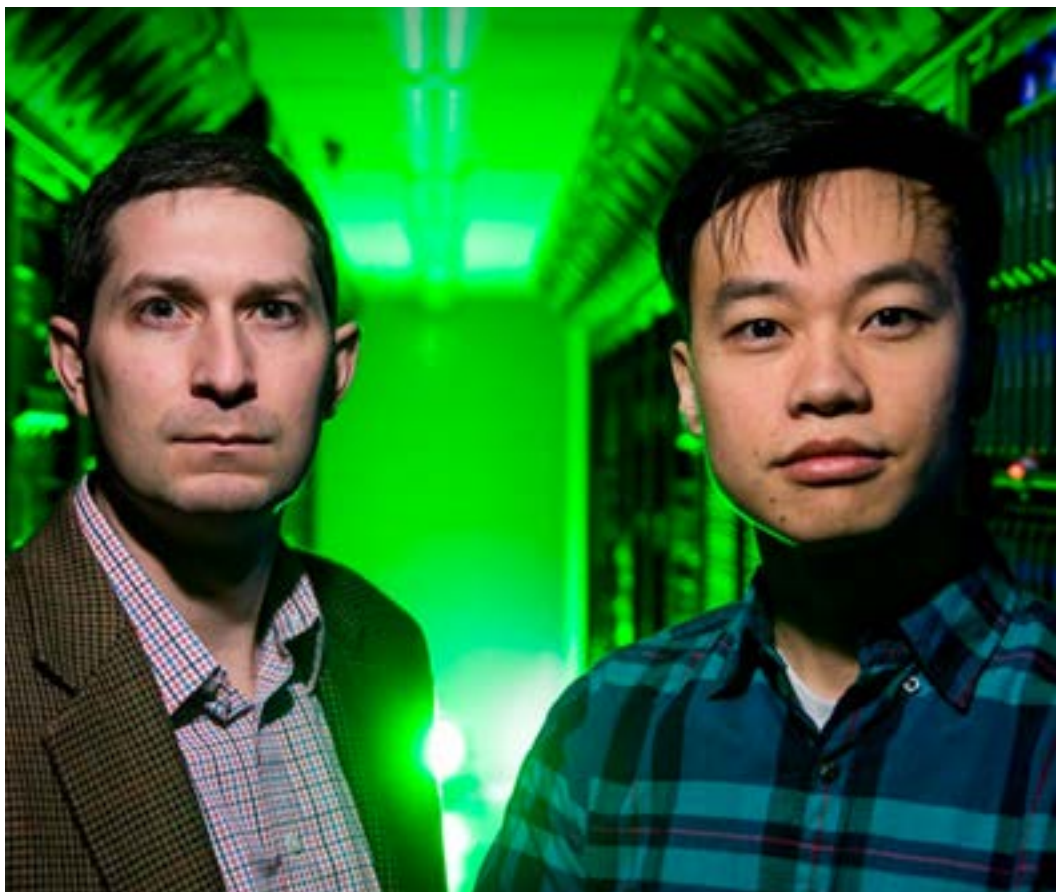
The soft plastic water bottle next to your monitor, the hard-plastic dash in your car, and the range of other plastics surrounding you are a combination of unique materials mixed to achieve properties such as strength, flexibility, opacity, and stability. However, chemical companies are looking for ways to improve process efficiency.

New research from a BYU chemistry team could help — and simultaneously open doors to tackle other “grand challenges in catalysis chemistry,” said chemistry professor Daniel Ess, whose findings were recently published in top-ranked journal *ACS Catalysis*. Chemical companies are currently racing to develop new catalysts that efficiently produce key commodity chemicals used in the manufacture of plastics. However, catalyst development can take several years.

“What may have taken several months to synthesize, test, and verify can now be examined in a matter of days to weeks,” said Steven Bischof, PhD, a research chemist with Chevron Phillips Chemical Company. “It really helps to focus the science on the critical path forward without being tangled up in the weeds.”

Because plastic is a growing market, Chevron Phillips Chemical collaborated with Ess and two of his graduate students to develop new catalysts to improve the production process of plastic precursors called alpha olefins. “Dan and his group have a unique set of skills and access to technological capabilities not available elsewhere,” Bischof said.

As part of their research, Ess and his graduate students developed a computer model to identify new catalysts. The approach was unique because using



computer simulations to design precise molecular catalysts is still novel in chemistry, Ess explained. And when Chevron Phillips Chemical chemists experimentally tested the new catalyst structures, the team found that they worked — with remarkable accuracy.

“In one of the first clearly demonstrated examples, computational chemistry has been able to improve catalyst refinement and prioritization in the laboratory space,” Bischof said.

BYU PhD student and study co-author Doo-Hyun Kwon said that the clear, practical purpose and outcome of this project, as opposed to purely theoretical work, made it particularly exciting to be a part of. “It was amazing that our

work specifically contributed to designing new catalysts for Chevron Phillips Chemical,” he said.

The next step for Chevron Phillips Chemical will be further designing the catalyst system to be commercially viable. But the bigger implications of the project, Ess said, lie in recognizing the value of computer simulations to design precise molecular catalysts.

“Our work, combined with several other groups in the field, is beginning to show that computer simulations hold significant promise for directing the design of new catalysts,” he said. “Very difficult chemical transformation problems could use simulations and computations to help.”

# Stopping a tiny — and deadly — fly in its tracks

Sixty million people in sub-Saharan Africa live at risk of African sleeping sickness, a disease caused by parasites transmitted through the tsetse fly. In the late stage of the disease, when the parasite crosses the blood-brain barrier, the results are oftentimes fatal.

BYU chemistry professor Ken Christensen, students, and collaborators at Clemson University have developed an innovative technique using biosensors to monitor the glucose level of *Trypanosoma brucei* parasites, which could in turn help develop treatments for the sleeping sickness.

“The unique thing about the *T. brucei* parasite is that it relies on host glucose for survival,” said Christensen, whose study was recently published in top-ranked journal *PLOS Neglected Tropical Diseases*. “We know that if you could deprive the parasites in the blood stream of glucose, the parasite will die.”

For the study, Christensen tested glucose levels to monitor the metabolism of the parasites using a genetically-encoded glucose biosensor. The biosensor combines three proteins: a cyan fluorescent protein, a glucose-binding protein, and a yellow fluorescent protein.

When the glucose-binding protein interacts with glucose in the parasite, the two fluorescent proteins move closer together. Christensen then uses the spectroscopic changes to monitor the fluorescence-intensity ratio between the yellow and cyan proteins. When the proteins are far apart, the blue light from the cyan fluorescent protein remains. But as the proteins move closer together, the blue light goes down and the yellow light from the yellow fluorescent protein increases.

This ratio is proportional to the glucose level in the parasite.

The results obtained from the biosensor provide new insights into the process through which parasites acquire and transport glucose for survival and provide a means to identify molecules that disrupt glucose levels in the parasite.

“In the long run, we hope that some of the glucose-disrupting molecules we are now identifying can be developed into therapeutics to treat African sleeping sickness,” Christensen said.

Written by Andrea Christensen/ Photo by BYU Photo



# Professors 3D-print First Truly Microfluidic “Lab on a Chip” Device

Researchers Greg Nordin and Adam Woolley are the first to 3D-print a viable microfluidic device small enough to be effective at a scale much less than 100 micrometers. Microfluidic devices are tiny chips that can sort out disease biomarkers, cells, and other small structures in samples like blood by using microscopic channels incorporated into the devices

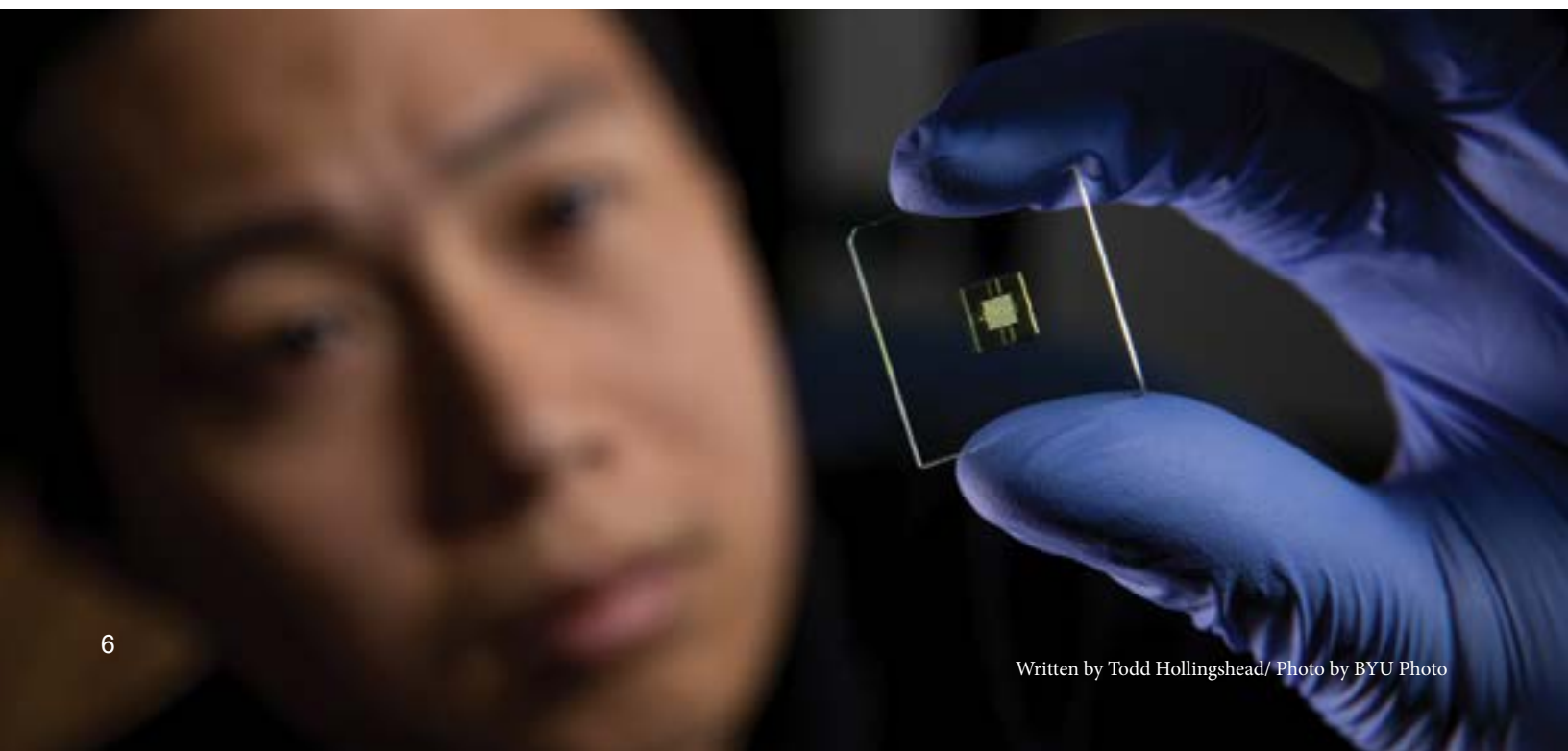
Bryce Bickham, a BYU undergraduate, played a key role in the research. Nordin said Bryce found the perfect material thanks to his weeks-long effort in the BYU library. The key to their innovation was two-fold: Building their own 3D printer to print at a much higher resolution; using a new, specifically-designed, low-cost, custom resin. “Others have 3D-printed fluidic channels, but they haven’t been able to make them small enough for microfluidics,” Nordin said. “So we decided to make our own 3D printer and research a resin that could do it.” Their work has produced labs on a chip with flow channel cross sections as small as 18 micrometers by 20 micrometers. Previous efforts to 3D-print microfluidic devices have failed to achieve success smaller than 100 micrometers. The researchers’ 3D printer uses a 385 nm LED, which dramatically increases the available selection of UV absorbers for resin formulation compared to 3D printers with 405 nm LEDs.

The advantages of 3D printing for microfluidic device fabrication are already well-known and that their method, digital light processing stereolithography (DLP-SLA), is an especially promising lower-cost approach. DLP-SLA uses a micromirror array chip, like those in most consumer projectors, to dynamically create the optical pattern for each

layer during layer-by-layer printing of a device. Researchers say they are laying the foundation for 3D printing to challenge the dominance of conventional methods — soft lithography and hot embossing — of microfluidic prototyping and development. “We’re deliberately trying to start a revolution in how microfluidic devices are fabricated,” Nordin said.

Woolley’s research interests in microfluidics focuses on using lab-on-a-chip devices to detect biomarkers related to preterm birth. To that end, he and Nordin just submitted a proposal to the National Institutes of Health to develop the approach in this paper for preterm birth prediction. Woolley said the paper represents an improvement of a factor of 100 on the size of features that are now possible in 3D printed microfluidics. It also cuts down on time and hassle: the BYU-authored approach can create a device in 30 minutes’ time and doesn’t require the use of clean rooms — a special lab environment free from dust and other contaminants.

“It’s not just a little step; it’s a huge leap from one size regime to a previously inaccessible size regime for 3D printing,” Woolley said. “It opens up a lot of doors for making microfluidics more easily and inexpensively.”





# Annual University Conference

Congratulations to the members of the Chemistry and Biochemistry Department who received awards

## Daniel E. Austin

[The Karl G. Maeser Research and Creative Arts Award](#)

This award honors faculty members for outstanding research and creative accomplishments and is made possible by the generosity of the Karl G. Maeser Scholarship Society. Daniel E. Austin develops miniaturized mass spectrometers for portable chemical analyzers and for space exploration, studying chemical and biological processes in extremely high-velocity impacts and in charge detection mass. Much of this NASA-funded work relates to the search for life on Mars and in the oceans of icy moons orbiting Jupiter and Saturn.



## Steven L. Castle

[Wesley P. Lloyd Award for Distinction in Graduate Education](#)

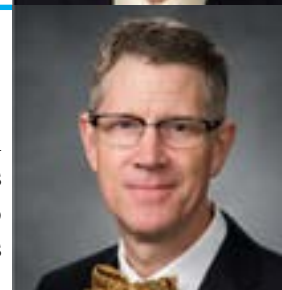
This award pays tribute to faculty members of exemplary performance in teaching, research/creative work, and citizenship in graduate education. Steven L. Castle teaches organic chemistry and is associate director of the Simmons Center for Cancer Research. Working with graduate students, he conducts research funded by the National Institutes of Health that targets new ways of synthesizing organic molecules. He applies these techniques to constructing bioactive natural products and to understanding chemical biology.



## Eric T. Sevy

[Religious Education Transfer Professor](#)

This award recognizes excellence in providing outstanding teaching in Religious Education outside of a faculty member's discipline. Dr. Sevy has taught as a transfer faculty member teaching Book of Mormon classes in Religious Education since 2012. Indicative of his passion for teaching and his love for students is the fact that he has achieved consistently high ratings on student assessments. Those in his college who nominated Eric noted he is an excellent teacher and citizen in Chemistry and strongly advocated for his nomination.



## Daniel H. Ess

[Richard Roskelly Teaching and Learning Faculty Fellowship](#)

This award recognizes a faculty member who has demonstrated outstanding achievement in mentoring and teaching/learning activities. Ess has made it his goal to prepare his students to be top-notch organic chemists by producing supplemental materials for his students. "I try and treat them like chemists," Ess said. "What that requires me to do is often give them more material than is in the book. I want to help my students be on the cutting-edge of organic chemistry and to understand organic molecules rather than understand a textbook."



## Jaron C. Hansen and Lee D. Hansen

[Technology Transfer Award](#)

This award recognized faculty members who have made significant research contributions that have led to the development of useful commercial products. Jaron C. Hansen and Lee D. Hansen started two companies, namely AD Technologies and Verde. AD Technologies functions to commercialize their invention for biogas conditioning. Additionally, Verde is a company that will essentially change the way waste conversion to fuel is treated as these professors have discovered a thermophilic bacteria that can pretreat bio waste and turn it into methane rapidly.



## Mentored Undergraduate Research



**Ashley Holdaway**  
Advisor - Daniel Ess

The objective of this proposal is to use density-functional theory (DFT) calculations to determine inherent reactivity for a variety of p-block metals, ligands, and solvents, which will guide catalyst prediction. Our central hypothesis is that main-group metals act similar to transition metal-ligand complexes and can induce C-H activation of methane followed by a metal-alkyl functionalization reaction step that results in carbon oxidation. Our group has previously used DFT calculations to predict C-H activation mechanisms for thallium(III) and iodine(III) p-block compounds. So far we have calculated ground states, transition states, and barrier heights for methane and ethane C-H activation. We have also calculated transition states and barrier heights for metal-alkyl functionalization. Accomplishing these aims will provide significant reactivity insights into main-group catalyzed C-H functionalization reactions. This will allow us to then make specific catalyst designs to test first computationally and then experimentally.

My research focused on the catalysis of an organic reaction that produces a crucial component of many plastics. The production of this component, ethylene, is widely done industrially. However, I looked at ways to make this production faster and more efficient. I synthesized powdered catalysts that were made up of metal oxides and extensively tested them. In the months of my most recent URA, I have been focusing specifically on aluminum and nickel oxides in the catalysts. Future plans for my project involve the incorporation of cerium and niobium oxides as well. What we have seen in our experiments is that the use of the nickel oxide on the aluminum oxide support has allowed us to make ethylene at temperatures much lower than those currently employed in industry. We believe that even further improvement to the efficiency of our catalyst is very possible. If we can successfully prepare a catalyst that works incredibly well for this reaction at low temperatures and with a high yield of ethylene, it would be industry changing. Ethylene based plastics could be made without such massive energy inputs in a simplified process.



**Kelsey Canizales**  
Advisor - Brian Woodfield



**Brian Peine**  
Advisor - Adam Woolley

My research has focused on adapting a bacterial infection protocol that I have helped to develop into use on a micro-fluidic chip (lab on a chip). In addition to trying to optimize different aspects of the reaction, I have helped to troubleshoot and test different variations of this protocol on the device. This work will aid in the development of a small portable cartridge capable of diagnosing bacterial identity and drug resistance by simply analyzing a patient's blood in a user-friendly manner. Compared to current procedures, this procedure requires a relatively small amount of blood. Likewise, it will help to bring the diagnostic wait time down from about 24 hours to under one hour. I have focused my part of research on adding different fluorescent molecules to the bacterial DNA we capture to "label" them for quantitative detection. I have worked with Oligreen, Sybr Green II, and sequence specific molecular probes. Off the device, I have been able to detect about 65% recovery from initial amounts of DNA in solution. On the device, we have yet to develop a way to quantitatively assess how much we recover, but data has shown that we were able to recover at least some quantity.

We are developing a new class of influenza A inhibitors. Influenza kills tens of thousands of people each year in the United States alone and has the problematic ability to mutate rapidly, developing resistance to therapies and evading long-lasting immunity. This is dangerous because currently there is only one type of inhibitor against influenza. We discovered compounds that inhibit influenza protein synthesis in cells by screening a large library of compounds in silicon using docking. We docked 22,000 compounds to a binding site on the polymerase subunit PB1. We then synthesized 32 derivatives of the top compound tested, resulting in a compound with a 200-fold increase in efficacy. This semester, I tested the compounds in zebrafish to determine the relative toxicity in an animal model. We are currently trying to determine the mechanism of these inhibitors. I also passaged A/CA/09 (the famous "swine flu") five times in the presence of the lead compound, resulting in a strain that was twice as resistant as the wild type strain. This is promising because it shows that the virus is unlikely to be able to escape these compounds easily. When we isolate a highly resistant strain (>10x resistance), I will be able to sequence resistant mutants to determine which mutations allowed the virus to escape the inhibitor. This will help us narrow down the mechanism, allowing more rational optimization from here on.



**Gregory Mohl**  
Advisor - David Michaelis



## Rossiter Lecture Series

Presented by Dr. Gary Patti - Washington University in St. Louis

### Public Lecture

[Untargeted Metabolomics: A Last Resort or the Next Frontier?](#)

It has become relatively routine to acquire mass spectrometry-based metabolomic data, either in one's own laboratory or using one of the many service facilities around the world. Despite this progress, however, interpreting metabolomic results continues to be a major challenge for many researchers that severely limits potential applications of the technology. Indeed, out of the thousands of metabolomic signals that are typically detected from a biological specimen, only a small fraction are commonly identified. Although the challenge of interpreting metabolomic data may seem to be purely informatic in nature, we will discuss how the problem fundamentally starts with poorly designed experiments that adversely affect data quality and unnecessarily complicate results. Opportunities to optimize metabolomic workflows with respect to extraction, chromatography, mass spectrometry, and informatics will be reviewed. We will present solutions to identify artifacts, contaminants, and signal redundancies (such as adducts, fragments, and isotopes) within the data. Using one dataset as a representative example, we will illustrate that there can be an order of magnitude more metabolomic signals than unique metabolites. The implications of these findings for various applications of untargeted metabolomics will be discussed and exciting biochemical problems that are best suited for the technology highlighted.

### Technical Lecture

[Location, Location, Location: Compartmentalized Metabolism Creates Therapeutic Vulnerabilities in Cancer.](#)

An increasing number of untargeted metabolomic studies have focused on characterizing “dark matter.” This effort aims to identify the chemical structures of naturally occurring metabolites that had not been previously described. To modernize our perspective of cellular metabolism, we argue that it is also important to complement this work with experiments that can discover new reaction arrows in metabolism maps. In this talk, we will describe an experimental platform using NMR and mass spectrometry-based metabolomic technologies to achieve the latter and, in some cases, to localize reaction arrows within cellular compartments. Significant attention will be dedicated to tracking the comprehensive fates of lactate and 2-hydroxyglutarate without bias. We will show that lactate, often recognized as an excreted waste product of fermentation, can be used as a metabolic precursor to synthesize lipids in cancer cells. Using stable isotopes, we will demonstrate that lactate is directly imported into the mitochondria where it is subsequently oxidized. A model will be presented in which fermentation and mitochondrial lactate transport constitute an electron shuttle that promotes lipogenesis. Surprisingly, in contrast to lactate, we find that 2-hydroxyglutarate (the so-called “oncometabolite”) is minimally metabolized in mammalian cells. Instead we will focus on its synthesis, which consumes NADPH. We will show that consuming NADPH for 2-hydroxyglutarate alters the redox balance of cancer cells, and we will illustrate how this can be therapeutically exploited in the clinic.

Abstracts courtesy of Dr. Gary Patti/ Photo by Cambridge Isotope Laboratories

## Tenth Annual Izatt-Christensen Lecture

Dr. Franklin (Lynn) Orr spoke at the 10th Annual Reed M. Izatt and James J. Christensen lecture on October 19, 2017. His topic was “The Global Energy Transformation: Where Do We Stand?” Dr. Orr served as the Under Secretary for Science and Energy from December 17, 2014 to January 20, 2017. As the under secretary, Dr. Orr was the principal advisor to the secretary and deputy secretary on clean energy technologies and science and energy research initiatives. Orr’s lecture focused on the need for energy in everything we do, which leads to a demand for economical, efficient, and environmentally friendly innovations in the future. “While we have accomplished much in past years, there is still a need and plenty



Written by Phyllis Rosen/ Photo by CPMS

of opportunity space for improvements to energy technologies and systems,” Orr said. Orr suggested we look at several areas for a clean energy transition: improve energy efficiency everywhere; generate electricity with low-carbon technologies (wind, solar, nuclear, geothermal, hydro, etc.); improve the grid to accommodate intermittency and bolster resilience; electrify energy services (transportation, heat pumps, etc.); replace coal with natural gas, and/or deploy carbon capture and storage for either; develop new technologies (R&D). Orr reminded the students that the world is relying on them to come up with those new innovations. He closed with four words of encouragement: “You can do it!”

## 2017 Izatt-Christensen Faculty Excellence in Research Award

Presented to William Pitt

Professor William G. Pitt joined the Chemical Engineering faculty at BYU in 1987 with a PhD from the University of Wisconsin. Since then he has supervised \$3.7 million in research funds, serving as advisor to 31 graduate students. Dr. Pitt is noted for research in the areas of polymeric biomedical materials and drug delivery, with recent emphasis on ultrasonic enhanced drug delivery, which may permit delivery of chemotherapeutic drugs to the sites of cancerous tumors without affecting the rest of the body. His creativity is evidenced by his 8 patents and 140 peer-reviewed journal articles, which have been cited over 2,825 times. He teaches courses on transport phenomena, polymer engineering, biomedical engineering, and creativity.



Written by BYU / Photo by BYU Photo



### **Paul Farnsworth**

Paul Farnsworth certainly is a pivotal figure who will be sorely missed by the department. Farnsworth graduated from Brigham Young University with a Bachelor of Science. He then went on to complete his PhD at the University of Wisconsin, and his post-doctoral research at Indiana University. After this, Farnsworth became a visiting scientist at a Joint Research Center (JRC) at Ispra in Italy; and then became a visiting professor at the University of Utah. He began his career at Brigham Young University in 1983 as an assistant professor for the Department of Chemistry, and then went on to become chair of the department from 2004 to 2010.

With almost 100 publications, Farnsworth's contributions to the fields of Atomic Spectroscopy, Spectroscopic Instrumentation, Laser Spectroscopy, and Elemental Mass Spectrometry have been pivotal to these fields of research.

His most notable awards include the Spectrochimica Acta Atomic Spectroscopy Award (1998, 2006, 2010, 2015); the Lester W. Strock Award, SAS (2006); Utah Award, American Chemical Society (2006); Distinguished Service Award, SAS (2009); Karl G. Maeser Research and Creative Works, BYU (2009); College Distinguished Faculty Citizenship, BYU (2010); Fellow, Society for Applied Spectroscopy (2012); and Alumni Professorship, BYU (2012).

Dr. Farnsworth has been a valuable, consistent contributor to the department and university as a teacher, scholar, and citizen throughout his long career at Brigham Young University. Farnsworth certainly has sustained and built upon the long tradition that the Department of Chemistry and Biochemistry has of collegiality and commitment to excellence in teaching and research. Many agree that one of Farnsworth's greatest contributions to his field, however, was the influence he left on students who worked with him as research assistants. "One of the highlights of my career has been seeing my students succeed both personally and professionally," said Farnsworth.

During his retirement, Farnsworth plans to spend more time with his wife, children, and grandchildren, and plans to indulge in some of the activities that he enjoys that have taken second place to work at BYU for the last several decades. Those activities include hiking, biking, woodworking, photography, and music. Farnsworth also intends to stay in touch with the sciences through consulting projects.

Written by Taelin Wilford/ Photo by BYU Photo

## Janet Fonoimoana

Janet's contribution to the department is evident in the impact she left on the people around her. To Janet, every student is an individual and has her respect, as she remains their advocate whether they are successful, struggling, or have been dismissed from the program. Over the thirteen years that Janet has been at BYU, and as Assistant Graduate Coordinator for over 400 or so students, Janet has filled the complex, challenging positions with innovation, professionalism, and good spirits. As a key member of our Graduate Recruiting Committee, Janet's ideas have led directly to improvements in both the quality and quantity of applicants to our program. As the very face of our program for incoming students, Janet is directly involved in helping them make the transition into graduate school, in setting up their course of study, and in tracking their progress

as they work toward either masters or doctoral degrees. She demonstrates legendary service and value in everything she does and has managed to increase numbers of domestic applicants despite decreasing chemistry majors worldwide. Janet could and willingly would stand in the 'circle of honor' with Karl G. Maeser.



Janet's late husband, Lucky Fonoimoana, passed away from brain cancer in 2014, and she has been very grateful for the support and understanding of the department community during that difficult time. She and her new husband, Dave Settle, retired from BYU on the same day (June 30). In late July they plan to serve a LDS church service mission in Laie, Hawaii, where they met 42 years ago. "Dave will do special projects for a vice-president of the Polynesian Cultural Center and I will assist Dave with those projects. I will also volunteer in the office of the Laie Hawaii Temple where I was secretary to the temple president for 18 years. I'm excited because the 100-year anniversary of the Hawaii Temple will be in 2019 and I'll be able to help plan for the centennial celebration!" said Janet. Janet and Dave are also planning to do a lot of traveling, including visiting Dave's homeland of England, and spending a lot of time with their 23 grandchildren.

Written by Taelin Wilford/ Photo by Yao Kuang Lee

## Kelly Jensen

After over 40 years of exceptional service, Kelly L. Jensen retired May 2018. Kelly began as manager of the Department Central Stockroom. Over time, he was promoted to Purchasing Agent to oversee all purchasing activity for the department. During his tenure he assisted with the implementation of an online purchasing system, enabling processing and documentation of over 4,000 orders annually. His capacity for high volume, quick turn around, and accuracy set a high standard for the University's purchasing team, who used Kelly's expertise when they upgraded the overall university purchasing system.

"He was an excellent example of paying attention to detail. Every task that he would do, was done with precise attention to detail and very meticulous notes; he rarely made mistakes. He also had a great memory; he placed dozens of orders every day and when someone would ask about their specific order he always knew what order they were talking about without even looking at his paperwork. As I got to know him on a more personal level, he was a very family oriented person. He cared deeply about all of his kids and his wife — they were his number one priority," said Todd Fluckiger, Chemistry Central Stockroom Receiving Manager.

During his retirement, Kelly plans on traveling around the country with his wife to support, cheer on, and celebrate any one of their six children's or grandchildren's new adventures and triumphs. Kelly also plans to continue working as an ordinance worker in the Mt. Timpanogos Temple. We wish Kelly all the best in his retirement and thank him for his years of dedication and service.



Written by Taelin Wilford/ Photo from BYU Chemistry

## New Faces

### Faculty



**Dr. Walter Paxton**

Dr. Walter Paxton will be joining the department faculty on August 1, 2018. Dr. Paxton earned his Bachelor of Science in Chemistry at Brigham Young University, and then went on to receive his PhD from Pennsylvania State. After his graduate studies, Dr. Paxton did a postdoc at the Pacific Northwest National Laboratory and a second postdoc at Northwestern University with Fraser Stoddart. He then spent the last seven years at the Center for Integrated Nanotechnologies (CINT) at Sandia National Laboratories and Los Alamos National Laboratory. When asked why he went into his chosen field, Paxton explained, "I had some great mentors throughout my career that inspired me to study new ways of making things (organic and inorganic chemistry) and measuring things (analytical chemistry). This led to some very interesting projects studying dynamic chemical systems that are far from equilibrium." Today, he is studying the self-assembly of polymers into structures that mimic cell membranes and how they respond to local chemical changes. These kinds of systems may be important for understanding fundamental life processes and designing new ways to control matter and energy in dynamic chemical systems.



**Dr. Ryan Kelly**

Dr. Ryan Kelly earned his Bachelor of Science from Brigham Young University in 2001. He then went on to receive his PhD in analytical chemistry from Brigham Young University in 2005. Afterwards, he pursued a postdoc at Pacific Northwest National Laboratory (PNNL) from 2005 to 2007 and was hired into the same group as a senior research scientist in 2007. In 2010, Dr. Kelly joined the Environmental Molecular Sciences Laboratory at PNNL where he continued as a senior research scientist and also worked in a number of other capacities, most recently as the chief technologist for EMSL and as the manager for one of EMSL's research groups. As a PhD student, he developed microfluidic platforms for miniaturized separation systems for biological analysis. When asked why he chose his field of research, Kelly explained that "I took an interest in analytical chemistry because of a great mentored undergraduate research experience with Dr. Adam Woolley and excellent course instruction in this area with Drs. Farnsworth and Goates." He goes on, "I also learned through my coursework and exposure to the field of analytical chemistry what a powerful technique mass spectrometry is. I decided to pursue postdoctoral studies at PNNL with one of the premier mass spectrometry groups and developed instrumentation and methods for ultrasensitive biological analyses. I have since drawn upon the typically disparate disciplines of mass spectrometry and microfluidics to isolate, prepare, and analyze ultra-small biological samples." Dr. Kelly's current research group is unique in its ability to identify and quantify hundreds to thousands of proteins within single or few human cells, which has implications for deciphering the molecular mechanisms behind disease, aging, etc. Dr. Kelly plans to continue this line of research at BYU.

Written by Taelin Wilford

### Staff



**Spencer Sarager**  
Central Stockroom  
Receiving Manager



**Todd Fluckiger**  
Department  
Purchasing Agent

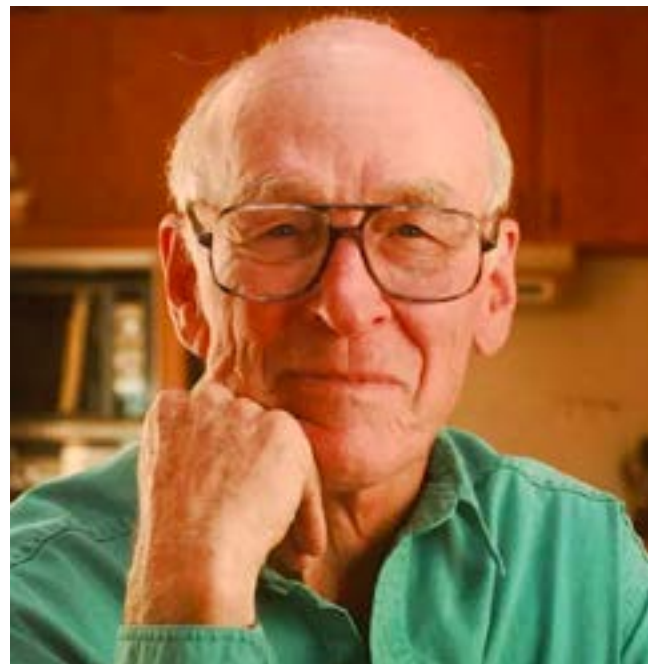


**Kari Van Sickle**  
Graduate  
Programs Manager



## In Memory of Paul D. Boyer PhD

BYU alumnus Paul Boyer, who won the 1997 Nobel Prize in chemistry for his pioneering research on how adenosine triphosphate, or ATP — the cellular energy that drives all biological reactions — is formed, passed away at age 99 on 2 June 2018. Dr. Boyer was an American biochemist, analytical chemist, and a professor of chemistry at University of California Los Angeles (UCLA). Boyer was born in Provo, Utah, and completed his BS in chemistry at Brigham Young University in 1939, and then went on to receive his Masters and PhD from the University of Wisconsin-Madison in 1943. During this time, Boyer began his research on ATP which led to him being awarded the Nobel Prize in 1997. “It’s an experience of a lifetime,” Boyer had said of winning the Nobel Prize. “The support of basic research by our society makes this kind of work possible. I feel like one of the most fortunate people to have the opportunity to satisfy my own interest in how things work. I just happen to be lucky.”



Boyer received the Nobel Prize along with John E. Walker and Jens Christian Skou. During this time, Albert Carnesale, who was then UCLA’s chancellor, said, “Professor Boyer is a humble, gracious, and dedicated researcher and faculty member who has spent decades working on giving the world a

greater understanding of energy storage in cells. Everyone at UCLA is extremely proud of Professor Boyer and this honor he so richly deserves.” At Wisconsin he first learned about the key substance in bioenergetics, ATP. After receiving his PhD in 1943 he worked at Stanford University with a research project on blood proteins for treatment of war-wounded. In 1947 he joined the biochemistry faculty at the University of Minnesota, and initiated studies on how ATP was made using the isotope  $^{18}\text{O}$ .

In 1955, Boyer received the American Chemical Society (ACS) Award in Enzyme Chemistry, and received a Guggenheim Fellowship to Sweden where he worked with Hugo Theorell, who received the Nobel Prize in 1955, at the Wren-Gren Institute at the Nobel Medical Institute. Then in 1970, during the time when Boyer was a professor and director of the new Molecular Biology Institute at the University of California in Los Angeles (UCLA), his team recognized the first of three main postulates of what was to become the binding change mechanism for ATP synthesis, namely that energy input was not used primarily to form the ATP molecule, but to promote the release of an already formed and tightly bound ATP. Boyer went on to serve as biochemistry chairman of the American Chemical Society (1959-1960), and as president of the American Society of Biological Sciences (1969-1970). Boyer then retired in 1990. When reflecting on his career, Boyer concluded that, “The experience reminds me of a favorite saying: Most of the yield from research efforts comes from the coal that is mined while looking for diamonds.”

A. Stephen Dahms, PhD, former postdoc of Dr. Boyer at UCLA, and founding director of the Molecular Biology Institute at San Diego State University, said that Boyer was, “an extraordinary scientist with profound insights into the magic of Mother Nature. [He had] an immense intellect with an exceptional ability to communicate science and stimulate others. [He was] one of, if not the most, ethical persons I have ever known and a leader with unique abilities in recruiting the best and then extracting from them the best. In basic terms, he was beyond a good scout: [He was] trustworthy, loyal, helpful, friendly, courteous, kind . . . and I know he would laugh at several of the remaining characteristics of one who follows the Scout Law of being obedient, cheerful, thrifty, brave, clean, and reverent [sic]. He will be missed and never forgotten.”

The Department would like to recognize Emeritus Professor Milton Lee, and Professor Adam Woolley for being listed among the top ten scientists in the October 2017 issue of *The Analytical Scientist* magazine.

## Congratulations to



### Dr. Milton Lee

Ranked at number 9 for the “Separation Scientists” category, Milton Lee has been contributing for more than 40 years to the fields of capillary gas chromatography (GC), Liquid chromatography (LC), and super critical fluid chromatography (SFC), and has earned a strong reputation among separation scientists. The advice that he gave to his younger self would be: “Put more effort into developing collaborations. I have done a pretty good job of this during my career; however, I could have started earlier and been more effective. Involving others in research increases creativity and productivity because of the different skills and insights that are brought together.”



### Dr. Adam Woolley

Adam T. Woolley is ranked at number 8 for the “Giants in Nano” category. When asked to describe his luckiest break Woolley commented on his very first US government grant from the Department of Defense: “The program officer initially told me he wouldn’t be able to fund it, and suggested I withdraw the proposal. About a week later he called and told me he had received my withdrawal letter, but that he had a new plan to try to get it funded: he asked me to submit a revised budget (about 10 percent higher!) and got it funded.”

The Department of Biochemistry and Chemistry would like to congratulate these professors for the scientific contributions they have made.

# Emeritus Faculty Milton Lee wins “Best of State Inventor” Award

This year we are pleased to honor outstanding separation scientist Milton Lee, Axcend Co-Founder and Chief Science Officer, who won the 2018 Inventor Best of State award in the Science & Technology category.

The Best of State Awards were created to recognize outstanding individuals, organizations, and businesses in Utah. The Best of State program recognizes excellence in the community and shares examples of success and triumph with the hope that all will be inspired to “reach a little higher, to try a little harder, and to work a little smarter for our dreams and goals.”

As a co-inventor on 20 issued patents, Dr. Lee has taken an active role in commercializing his inventions. Specifically, prior to co-founding Axcend in January 2018, he co-founded three analytical instrument companies for: Supercritical fluid chromatography; time-of-flight mass spectrometry; and hand-portable gas chromatography-mass spectrometry. Each raised outside capital and were later acquired by large global companies.

Dr. Lee has been a member of the faculty of Brigham Young University since 1976, and he is best known for his research in capillary separation techniques and mass spectrometry detection. He has authored/co-authored over 590 scientific publications and has delivered more than 500 technical presentations during his career, including the opening lecture at the renowned 42nd annual International Symposium on Capillary Chromatography held in Riva del Garda, Italy. During his career of over 40 years, Dr. Lee has received numerous industry awards, including being named three times as one of the 100 most influential people in the analytical sciences by *The Analytical Scientist* magazine in 2013, 2015, and 2017. In addition, he has mentored over 100 graduate students and post-doctoral researchers during his time in academia.

“It was a pleasant surprise to be notified that I would be given the 2018 Inventor Best of State Award,” Dr. Lee said. “I am humbled to receive this recognition for my efforts during my career. Thank you, Best of State.” The Best of State Awards Gala was held the evening of Thursday, May 17, 2018 in the Grand Ballroom of the Salt Palace Convention Center in Salt Lake City, Utah.

Source: Cision PR Newswire/ Edited by Taelin Wilford/ Photograph courtesy of Dr. Milton Lee



# Shiladitya Chatterjee Wins IM Flash Competition

Congratulations to Shiladitya Chatterjee, PhD in Analytical Chemistry, who won the 2018 TechTalks IM Flash competition between Brigham Young University and the University of Utah, marking the very first time that the BYU Department of Chemistry has won this annual event. His areas of expertise include microfabrication, surface characterization, and chemometrics (mathematical analysis of chemical data). Out of the copious number of students who submit abstracts to this competition each year, only five people were chosen to present recent advancements in their areas of research, two being from Brigham Young University. Chatterjee’s research submission was entitled “Breaking through memory barriers with applications of 3D XPoint/Optane—Fabrication and Analysis of Phase Change Memory for 3D XPoint Memory using Low Energy Ion Scattering (LEIS).”

Written by Taelin Wilford/ Photo by Kuang Lee





## **New This Summer: Biochem Camp**

[Helping young chemists see themselves—and their cells—in the lab](#)

The 13- and 14-year-olds at Biochem Camp, a new camp for young scientists sponsored by the Chemistry Department, got to see something new during their three days of experiments: the chemicals in their own bodies.

Along with testing various everyday foods to discover what chemicals were inside, students extracted the DNA from the cells lining their cheeks. These experiments—and many more—put the test tubes in the campers' ready hands. Seeing the chemistry at work in these familiar substances helped the students understand the complex science behind everyday processes.

## **ACS High School Awards Dinner and Program**

The 2018 American Chemical Society High School Awards Dinner and program took place on 8 May 2018. The program started at 5:00 pm in W140 Benson Building, and began with the lab tours where the students got the opportunity to discuss their career aspirations and witness chemistry demonstrations. Dinner was served at 6:30 pm in W170. Awards were given out to 62 high school students representing 23 high schools from the central and southern regions of Utah. The students were the top first-year and second-year chemistry students from their high schools. Five local ACS officers and six Y-Chem members helped. The aims of this program are twofold: the first aim is to inform high school students and their parents about the opportunities of fulfillment within the chemistry field, secondly, to recognize and award students for their achievements in chemistry.

“All kids seem to gravitate more easily to biological things, because they have heard the term DNA [and] they have heard the term protein,” said Dr. Daniel Ess, one of the faculty directing Biochem Camp. “I think these kids . . . eat it up.”



## BYU Open Lab Day

The 2018 Open Lab Day was held Saturday, May 12th. This annual event is held each May for high school, junior high, and elementary students in the Utah valley area. The students who attend Open Lab Day are able to do several hands on experiments with the help of YChem club members. YChem is the BYU student chapter of the American Chemical Society (ACS). YChem is involved in several events throughout the year. Their goal is to help members, fellow students, and the community grow in their understanding of chemistry and learn to love the science of the world around them. They also aim to help enable our students in their studies by helping them with finding research, providing ways to give service to the community, involving them in several fun and inspiring club activities, and giving them ways to do what they love in a non-classroom setting.

Edited by Taelin Wilford / Photo by BYU

## Golden Hashtags Award

[BYU's best of the best in social media recognized at the 6th Annual BYU Golden Hashtags](#)

The 6th Annual BYU Golden Hashtags event is where the best 2017-18 social media content posted from throughout the BYU campus is recognized and best practices are promoted. Think Golden Globes, but for BYU social media.

Chemistry Camp was one of the recipients of this award, and in what could be the biggest win in BYU social media history, the Simmons Center successfully rallied a worldwide audience to vote over and over and over again for Coach Rose in the Infiniti Coaches Charity Challenge to win \$100,000 for cancer research at BYU. They pulled it off, despite competing against bigger schools with bigger fan bases. It was a huge strategic success in how this campaign was run.

Written by Jon McBride



## Announcing National Chemistry Week, October 21-27, 2018

[National Chemistry Week 2018 theme is "Chemistry is Out of This World", focusing on chemistry of and in outer space.](#)

# Rex Lee Run For Cancer Research

The namesake of the race, Rex Lee, was the 10th president of BYU and, when the race was founded in 1990, was battling cancer. The race was placed on a brief hiatus, but was brought back in 1996 after Lee lost his life to cancer. The race has taken place every year since and is now sponsored by the Simmons Center for Cancer Research at BYU. Thanks to the race, more than \$100,000 has been given to cancer research, like the research conducted by David Kastner, who is part of the fellowship program with the Simmons Center for Cancer Research.

The race is also an opportunity to promote Dave Rose's own efforts to raise funding and awareness for cancer research. Rose, head coach of the men's BYU basketball team, was a finalist in the 2018 Infiniti Coaches Charity Challenge, sponsored by ESPN. Rose went on to win the entire competition, and \$100,000 which will be donated to the Simmons Center for Cancer Research. Along with Coach Rose, many racers, volunteers and other participants in the race were personally affected by cancer. That shared experience is what brought so many together to join in donating and racing for as great a cause.



Written by Kurt Hanson, Daily Herald / Photo by Isaac Hale Hale, Daily Herald

# Coach Rose Wins Infiniti Challenge



BYU men's head basketball coach Dave Rose competed in the Infiniti bracket-style contest to raise money for each coach's charity of choice.

A survivor of pancreatic cancer himself, Rose's charity of choice was the Simmons Center for Cancer Research. The Infiniti Challenge is a partnership between the American Cancer Society and the National Association of Basketball Coaches and aims to increase cancer awareness among basketball coaches, teams and communities. Coach Rose won the entire competition, and 100,000 for cancer research.

Written by Taelin Wilford / Photo by Gabriel Mayberry

## Words from Chemists

Associate Dean Dr. Jennifer B. Nielson and graduating chemistry student Edward Bay Pimentel speak at the 2018 CPMS convocation

Congratulations to all graduating PhD, masters, and undergraduate students within the College of Physical and Mathematical Sciences.

Associate Dean Dr. Jennifer B. Nielson gave the opening remarks. She posited that “we as scientists, like measuring, but beyond this arises the importance of ‘Life’s Measurements’:

- 1) Measure your feedback in life: Use criticism as the starting block for self-development
- 2) Love your critics: Those who measure you can be facilitators of your future success
- 3) Measure yourself: Be lifelong learners
- 4) You can’t measure the most important things: People are greater than data, and the most important things in life are both priceless and have no measurement”

The first speaker from the Department of Chemistry was Edward Bay Pimentel. Pimentel began by thanking all those who had made not only his but all of the members of the college's graduations possible: donors, scholarship funders, and personal supporters who include mentors, family, and loved ones. He thanked the donors for their continued generosity that allows the students in the college to be supported in their research and personal education through funding. He then encouraged his fellow graduates to continue to be lifelong learners, learners who use their education to become leaders in the community, who use their education to stretch humanity, and who engage in a life of service. “May we see this graduation as a beginning rather than an end, as we follow the Brigham Young University motto to: Enter to Learn, and Go Forth to Serve.”

Members of the 2018 graduating class will be heading off to various post-university work, including pharmacy school, medical school, PhD programs, government, and biotechnology companies. We wish them success in these future endeavors.





FRITZ B. BURNS  
CANCER RESEARCH LABORATORY



---

## **The Fritz B. Burns Cancer Research Laboratory**

---

The construction of the Fritz B. Burns Cancer Research Laboratory is almost complete and research students have begun their work within the new facilities. Last year, the Fritz B. Burns Foundation awarded \$6.5 million to Brigham Young University for the establishment of the cancer research laboratory. Dr. Joshua L. Anderson, Chemistry and Biochemistry principal investigator and director of the lab, has overseen the entire renovation project. “We are humbled and grateful to be partners with the Fritz B. Burns Foundation in our cancer research. Their support has enabled us to acquire state-of-the-art instrumentation and pursue innovative experiments to uncover the mechanisms that drive cancer growth, metastasis and resistance to therapy--mechanisms, and cancer vulnerabilities that we can ultimately target with personalized therapy. It has also created an environment where students can gain hands-on experience with cutting-edge cancer research technology, which puts them on a path to make life-long contributions in their cancer research careers even beyond BYU. The incredible impact of this support will be felt in so many ways for many years to come,” said Dr. Andersen.

The main lab is located on the second floor, east wing of the

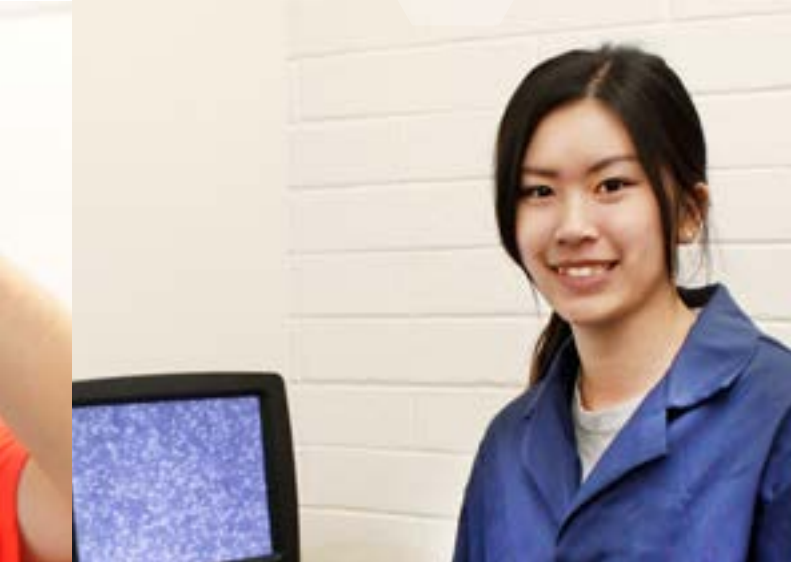
Benson Science Building (BNSN), with a fusion orbitrap mass spectrometer laboratory on the first floor.

Fritz B. Burns was born in Minneapolis, Minnesota in 1899. He began developing real estate in Los Angeles after World War I and built so many houses that he was known as Mr. Housing. He was the first president of the National Association of Home Builders, and also built, owned, and operated shopping centers and hotels in California and Hawaii. His foundation was established in 1955 to help fulfill his lifelong philanthropic purposes. The foundation has been a longtime supporter of education, medical care, and medical research, among many other charitable causes. Logan Larsen, Chan Tsz Yin and Ashari Kanannagara are among the exceptional student researchers in the Fritz B. Burns Laboratory.

### **Logan Larsen**

“The research I have been involved in concerns a protein called TNK1. TNK1 is a relatively poorly understood protein in the scientific community, and is thought to be oncogenic. When cancer cells in patients begin to develop a resistance to chemotherapy drugs, the ability to treat cancer patients significantly decreases. TNK1 could be a novel target to focus on to treat cancer patients. One experiment in particular that we have done showed that TNK1 contributes to the ability of cancer cells to migrate to other tissues, promoting a more aggressive cancer. Targeting TNK1 in the treatment of cancer patients could have significant effects on patient survival and quality of life. We are collaborating with Tolero, a pharmaceutical company, to develop an effective drug to inhibit the effects of TNK1.





The generous donation from the Fritz B. Burns Foundation has made available many opportunities for our project and our lab. A few major results from the donation were the purchases of a confocal microscope and a new mass spectrometer in the department. Those instruments have opened doors for experiments that were not available before. Our project has made a number of exciting discoveries as a result. Also, we have had more freedom to pursue higher-impact experiments and goals for our project. With that freedom, I have been able to develop my ability to think critically and creatively to develop experiments that will push the project forward. I have also been involved in and exposed to many different biochemistry and molecular biology techniques. I have undoubtedly become a more well-rounded scientist and researcher as a result of the generous donation from the Fritz B. Burns foundation.”

#### Chan Tsz Yin

“My research focus is on understanding and targeting the mechanism of chemoresistance in cancer. Receptor kinases are often elevated in cancer, which promote cancer aggressiveness. Although there are chemotherapies targeting receptor kinases directly, many tumors develop drug resistance by adapting ways to sustain pro-survival signaling independent of the receptors. Therefore, there is a need to understand the mechanism that promotes growth and survival in these cancers cells and hopefully identify a new therapeutic target to overcome chemoresistance. With our preliminary data, we identified a non-receptor tyrosine kinase promoting survival in different cancer cells, in which it mediates pro-survival signaling under receptor kinases. My goal is to uncover the first mechanism of its regulation,

which may provide novel ways to target pro-growth signaling in cancer.

With the financial gift we received from the Fritz B Burns Foundation, we were able to purchase some significant equipments, which include a new mass spectrometer, high resolution confocal microscope, and an imaging flow cytometer. We are able to pursue high level experiments with these instruments which can expedite the project.”

#### Ashari Kanangara

“My project focuses on a cellular mechanism called autophagy that causes cancer cells to become resistant to chemotherapies. Chemoresistance is a major obstacle to effective cancer treatment. Therefore, identifying therapeutic targets to prevent chemo-resistance is needed. However, this has been a difficult task due to our limited understanding of the molecular mechanism of autophagy. My project aims to understand the molecular mechanisms that initiate autophagy in cancer. With this finding, our goal is to identify potential therapeutic targets and develop innovative therapeutic strategies

We are able to do cutting-edge experiments that wouldn't have been possible without the support of the Fritz B. Burns Foundation. We now have the ability to use imaging flow cytometry, quantitative mass spectrometry, and live-cell imaging, which gives us the ability to answer critical cancer research questions that we couldn't answer otherwise. These new capabilities are already producing exciting

Written by Taelin Wilford/ Photo by Yao Kuang Lee and CPMS

**Thank you Fritz B. Burns Foundation** 23

## **Bruno Szalkowski Donates Unique Glass Piece**



One of the most interesting sections of the Nicholes Building used to be the glassblowing laboratory that Bruno Szalkowski, who learned his skill in Germany, used to create all types of complicated glass equipment for chemistry, physics, and biology laboratory experiments.

“There is no item created in glassblowing that is really simple. It takes real coordination to keep the proper proportion,” explained Szalkowski at the opening of his glass shop on Main Street in Park City, Utah.

He explained that “glassblowing includes manipulation of molten glass; it is about the consistency of honey under high heat, as well as actual blowing.” After using a blowtorch that emits a flame of 1200 degrees centigrade, Szalkowski places his completed art work on a flat black block of pure carbon so that the glass will not stick to it and so remain free of impurities. Part of Szalkowski’s impressive showcase includes a Cinderella carriage, pictured on the department website.

Szalkowski was born on June 20, 1936 in Essen, Germany. Following the Second World War, Szalkowski’s family moved to the United States. Brigham Young University recruited Bruno in 1975 for his glassblowing skills in order to make custom apparatuses for not only BYU but other nearby universities as well.

Szalkowski is pleased to donate this one-of-a-kind piece to the Benson Building. The apparatus was used for fractional distillation where one liquid would be separated from another one and purified. The Fishbowl(W170) inside the Benson building will house not only Szalkowski’s donation but other pieces of his work for all to see.



Written by Taelin Wilford/ Photo by Yao Kuang Lee

---

**TAKE THE  
OPPORTUNITY  
TO GIVE**

**YOUR GIFT  
WILL MAKE A  
DIFFERENCE**

---

100% of your donation goes toward student support in our department. We welcome your contributions to aid students. Please consider setting up an endowment to fund scholarships, research, and any form of student aid. Please feel free to contact us with any questions regarding your philanthropic gift. Our commitment is to be wise stewards of your kindness and generosity.

Please contact the following:  
The Department of Chemistry and Biochemistry  
c/o Dr. David V. Dearden, Chair  
C-100 BNSN, Brigham Young University, Provo, UT 84602  
801-422-2355  
david\_dearden@byu.edu

OR

LDS Philanthropies, 1450 N. University Avenue, Provo, UT 84604  
801-356-5300  
ldsphilanthropies@ldschurch.org

**Thanks to generous contributions from you, our donors, we have been privileged to award this year:**

- \$53,000 in scholarships to twenty-two of our undergraduate majors
- \$225,000 in fellowships and awards to twenty-six of our graduate students
- \$40,000 in mentored research fellowships to six undergraduate students

*We recognize the foresight and trust represented by these gifts and endowments. Thank you for your donation.*

## Graduate Awards and Fellowships

### Charles E. & Margaret P. Maw Fellowship

Marjan Hashemi

### Bradshaw Organic Chemistry Award and Fellowship

Diana Saavedra

### Rex & Marcia A. Goates Fellowship

Kaylee Rellafor

### Garth L. Lee Award

Anna Nielsen

### Loren & Maurine F. Bryner Award

Hsien-Jung "Lavendar" Lin

Christine Sorenson

Andrew Arslanian

Chloe Ence

JD Singleton

Isaac Smith

### Roland K. Robins Fellowship

Steven Draper

Shiladitya Chatterjee

Gabriel Valdivia Berroeta

Michael Kinghorn

Tsz-Yin Chan

Richard Carson

Jeremy Tsang

Grant Ludlam

Basu Aryal

### Jennie R. Swensen Award and Fellowship

Abraham De La Cruz

Diana Saavedra

Jonathan Lynch

### Telford & Frank Woolley Memorial Research Award and Fellowship

Concordia Lo

Robert Hanson

## ACS Awards

### ACS Outstanding Analytical Student

### ACS Outstanding Organic Student

### ACS Outstanding Physical Chemistry Student

### ACS Outstanding Inorganic Student Award

Matthew Austin

Isabelle James

Megan Asplund

Edward Pimentel

## Undergrad Student Awards

*A special thank you to the Keith P. Andersen endowment.*

### Freshman Chemistry Award

Alex Daum

Alyssa Ferrell

### Organic Chemistry Award

Joel Howarth

Isabella James

### Chemistry Literature Award

Mackenzie Bayles

### Biochemistry Award

Garrett Parker

Mason Price

### Elliot Butler Service Award

Brigham Pope

Sarah Harper

### Hypercube Scholar Award

Wendy Williams

### Outstanding Graduating Senior

David Wilcox

### Ida Tanner Hamblin -- female in chemistry

Kylie Lytle

## Undergrad Scholarships and Fellowships

### James A. and Virginia S. Ott

### Undergraduate Research Fellows

Ashley Holdaway

Kelsey Canizales

### Kenneth W. Brighton Scholarship

William Beard

Jacob Davis

Ekpo Idongesit

Shawn Gubler

Misael Lazaro

Dalton Smith

### H. Tracy Hall Scholarship

Ekow Amakye

Mark Gold

Caroline Hansen

Haley Hunsaker

Camille Jackson

Garrison Nickel

Nathan Zuniga

### D. Clark and Pam Turner Mentored Scholars

Dallin Smith

Jacob Coby Davis

Larry Heki

Spencer Lee

### Byron J. Wilson Scholarship

Austin Ellis

Brigham Pope

### Boyd A. Waite Scholarship

Charles Bahr

Rachel Barlow

### Ida Tanner Hamblin Scholarship

Haley Hunsaker

Courtney Vavricka

### Hyrum and Permelia Dayton Scholarship for Biochemistry

Rebecca Clark

Ethan Damron

Carley Johnson

Alexandra Thornock



DEPARTMENT OF CHEMISTRY  
AND BIOCHEMISTRY  
BRIGHAM YOUNG UNIVERSITY  
C-100 BNSN  
PROVO, UT 84602-5700

# HOMECOMING EVENTS

# 2018

Photography by Nate Edwards/BYU

Please mark your calendar and plan to renew friendships in the department at the following homecoming activities

## DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY ACTIVITIES

### October 12th

6:00 pm RECEPTION  
6:30 pm COMPLIMENTARY DINNER  
7:30 pm AWARD PRESENTATION AND SPEAKER

## BRIGHAM YOUNG UNIVERSITY ACTIVITIES

### October 9th

12:30 pm FOUNDERS DAY LUNCHEON

### October 13th

9:45 am COUGAR RUN  
10:00 am PARADE

TBA FOOTBALL GAME

Below is a reservation form for the Department Homecoming activities.

Please RSVP through one of the following methods :

\* Send to the return address above \* Call (801) 422-2792 \* Email [coffice@chem.byu.edu](mailto:coffice@chem.byu.edu)

### I PLAN TO ATTEND:

Reception & Complimentary Dinner  YES  NO  
*Friday, October 12, 6:00 pm*  
*Reserved Seating*

Number Attending \_\_\_\_\_

Number who are BYU Chemistry & Biochemistry \_\_\_\_\_

Alumni (Please include yourself in both totals.) \_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

E-mail: \_\_\_\_\_

Contact telephone: \_\_\_\_\_

PLEASE RSVP NO LATER THAN SEPTEMBER 21

## CHEMIGRAM

Graphic Designer: Yao Kuang Lee / Lead Writer and Editor: Taelin Wilford

<http://www.chem.byu.edu/>  
Department Website

<https://www.facebook.com/BYUChemistry/>  
Undergraduate Facebook Page

<https://www.facebook.com/BYUChem/>  
Graduate Facebook Page