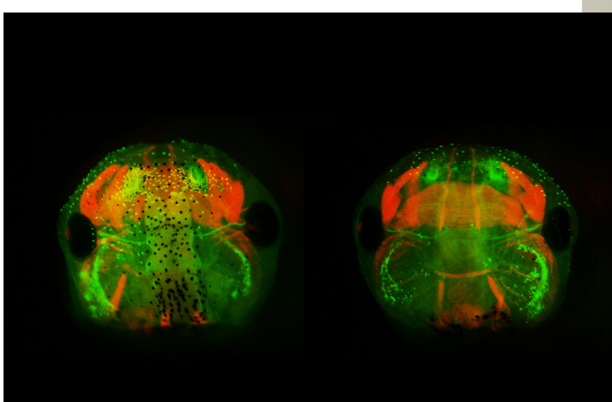
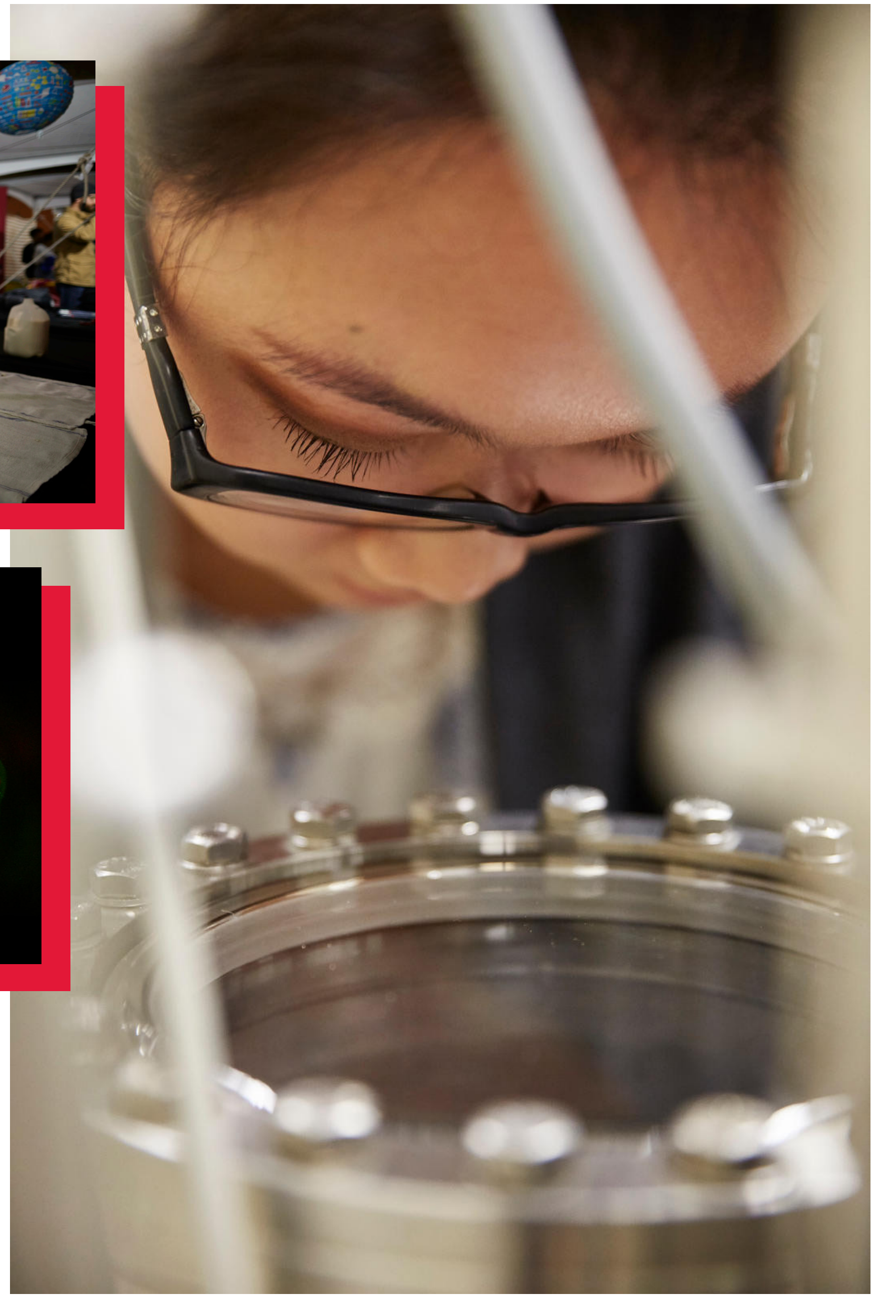
UNLV | COLLEGE OF SCIENCES





50 YEARS
COLLEGE OF SCIENCES

FALL 2019

UNLV Geoscientist Tapped by NASA for Mars 2020 Science Team

LIBBY HAUSRATH IS ONE OF JUST 10 SCIENTISTS SELECTED FOR NASA'S RETURNED SAMPLE SCIENCE TEAM; WILL HELP DECIDE WHICH SAMPLES RETURN TO EARTH FROM MARS 2020 MISSION.

UNLV geoscience professor Elisabeth "Libby" Hausrath has been selected as one of just 10 returned sample science participating scientists for NASA's highly anticipated Mars 2020 mission.

As part of the Mars 2020 sample return program, Hausrath will help select and cache Martian rock, soils, and related samples for return to Earth.

"These samples, which will be the first samples from Mars ever to be returned to Earth, have the capacity to fundamentally transform our understanding of that planet," Hausrath said. "It has been such a privilege to be able to work with Mars data in my career, and I am so excited now to be able to help select samples for scientists to work with in the future."

In selecting the samples, the scientists will need to anticipate the current and future needs of researchers who will analyze the samples for a diverse range of studies in Earth-based laboratories.

These samples, which will the first samples from Mars ever returned to Earth, have the capacity to fundamentally transform our understanding of that planet.

Hausrath's research program at UNLV is focused on understanding chemical weathering and soil formation on Earth and on Mars. Her previous work related to Mars includes interpreting data from the NASA's Mars Exploration Program to investigate how soil and water might have once interacted on the surface of our solar system's most Earthlike neighbor. She also studies transitions in clay-mineral chemistry to better interpret the potential habitability and biosignature preservation of clay-mineral-containing Martian environments.

Prior to this appointment, Hausrath was one of 13 scientists NASA chose to serve on the Returned Sample Science Board to offer scientific input into the design and implementation of the upcoming Mars 2020 rover mission.

Additional work by the participating scientists will be to use the rover's instruments to characterize the geology of the landing site and its past habitability and potential for preservation of biosignatures. They also will prepare detailed "field notes" that document both the geologic context and the rationale used for sample selection for return of samples to Earth.

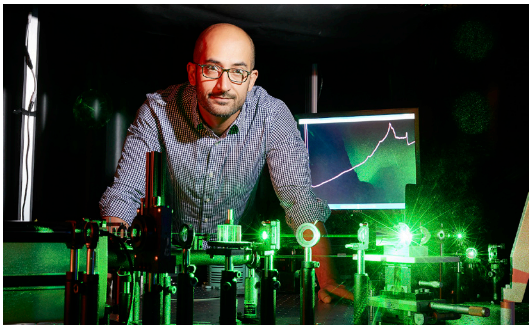
Mars 2020 is scheduled to launch in July or August of 2020, and land in February 2021.

Hausrath will participate in science team meetings and training events leading up to the Mars 2020 launch and after landing through the prime mission, which is anticipated to last until June 2023.

UNLV Professor Earns Early Career Award from U.S. Department of Energy

UNLV physicist Ashkan Salamat was one of just 46 university professors nationwide – and the first from UNLV – to earn an Early Career Award from the U.S. Department of Energy's (DOE) Office of Science.

Each year, the DOE selects rising researchers from the nation's national labs and universities for the competitive award. The program, now in its 10th year, comes with significant funding to bolster financial support for exceptional talent during crucial early career years, when many scientists do their most formative work.



Salamat's research focuses on identifying the precise makeup of metal superhydrides – extremely hydrogen-rich materials – and techniques to readily synthesize them. The discovery of metal superhydrides may provide an efficient means of storing and recovering energy on demand, as well as a method for transferring energy over long distances.

"I am hoping these studies will provide the understanding on how to readily make these fascinating, new materials and to change the way energy is stored and transported," Salamat said. "This award will allow me to build a team and to focus on some of the most important questions in physics."

As part of the Early Career Award Program, Salamat will receive approximately $150,000 annually over the next five years to build his research program.

Salamat joined UNLV in 2015 and is currently an assistant professor in the university's department of physics and astronomy. He is also a part of UNLV's High Pressure Science and Engineering Center, a multidisciplinary group that explores fundamental experimental, computational, and engineering problems of materials under high pressure.

Exhibit Showcases the Art in Science Research

RESEARCHERS FROM THE COLLEGE OF SCIENCES SHOWCASE THE ARTISITIC SIDE OF SCIENCE BY FEATURING THEIR MOST CAPTIVATING IMAGES.

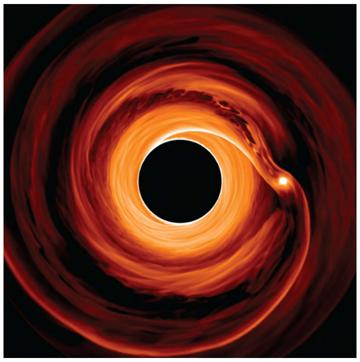
"Inquiry II: The Art of Scientific Discovery" brought the College of Sciences together with UNLV Galleries for an exhibit of images and objects related to UNLV research.

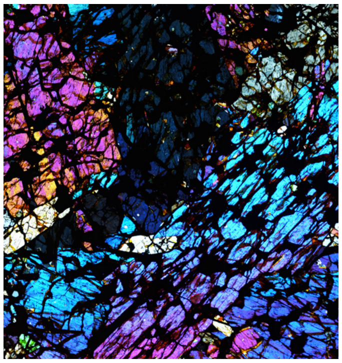
The exhibit ran from Oct. 18 to Dec. 13 at the Jessie & Brian Metcalf Gallery on the second floor of the Richard Tam Alumni Center.

About the Exhibit

There is tremendous beauty in the natural world, from witnessing the birth of the most distant galaxies, to seeing the smallest details of life on Earth, to examining the striking complexity generated by simple mathematical expressions. Often this beauty is overlooked because the technical nature of science requires that the communication of its results be done in the form of rigorous mathematical formulas, graphs that convey the results of complex data analysis, and language that has specific and narrow meaning. Yet, it is mankind's observations of the natural world that inspire artists in their work, poets in their words, architects and musicians in their crafts, and scientists in their efforts to understand humanity's place in the universe.

"Many science or math classes don't give the opportunity for students to see just how cool this stuff really is," said Jason Steffen, assistant professor in the department of physics and astronomy, who created the original exhibit in 2017 and reprised it this fall. "I wanted to have a forum where people could both learn how UNLV is expanding human knowledge through our research and see some of the amazing stuff that we scientists see as we work."





It's Easier Being Green

UNLV'S REINTRODUCTION EFFORT KEEPS LEOPARD FROG SPECIES OFF THE ENDANGERED LIST.

It was not what Jef Jaeger expected to find.

Four months prior, the associate professor-in-residence in the School of Life Sciences had released tiny relict leopard frog tadpoles in a pond at the Springs Preserve. When Jaeger returned in the fall for a population count, he discovered the frogs had not just survived but thrived far beyond his projections.

"They were humongous," he said. "We didn't realize that they could grow that fast in the wild."

Jaeger soon spotted the secret to the frog's success: Africanized bees shared the same watering hole. "These little frogs, which are basically the size of a bee, were grabbing up these bees and eating them," he said. "It was pretty cool to see."

The odds that the relict leopard frog could survive at all were once extremely long. The species was thought to be extinct along the Virginia and Colorado rivers. But scientists rediscovered it in Lake Mead in 1991, and in 2001 a multiagency conservation team coordinated by UNLV coalesced around the frog's cause. In the 18 years since, the team has spared the frogs from the federal endangered species list, bolstered its population, and kept management of the frogs in local hands.

"When we started, there were only about 1,100 adult frogs on the face of the earth," Jaeger said. "We now have somewhere around 3,000 adult frogs on the landscape."

The team has raised more than 20,000 tadpoles and juvenile frogs, which are released in batches about 20 times a year at 14 sites around southern Nevada and northern Arizona.

"It's hard to find good translocation sites for these frogs," Jaeger explains. "The sites where they existed historically are covered in lakes, modified substantially, or infested with crayfish, exotic fishes or the chytrid fungus, which is causing massive declines in amphibians worldwide. Where we do find new sites, they are generally small and isolated, which makes them susceptible to flash floods, temporary loss of water and trespassing cattle. These small populations are quite vulnerable."

They have powerful agencies pulling for them. Jaeger coordinates the efforts of the conservation team, which includes the National Park Service, U.S. Bureau of Land Management, Southern Nevada Water Authority, U.S. Fish and Wildlife Service, Nevada Department of Wildlife and the Arizona Game & Fish Department.

That teamwork resulted in the frog remaining off the endangered species list when the U.S. Fish and Wildlife Service re-evaluated its status in 2016.

"They recognized that there is already in place a successful strategy," Jaeger said. "The trajectory of the species has been positive over the past decade. By not being on the list, it has allowed us to maintain local control and avoid massive amounts of paperwork and red tape. We can be more flexible in our approach."

A steady stream of undergraduate biology students, in both volunteer and paid positions, aid the agencies in that approach.

Rebeca Rivera joined the project in her junior year, nine years ago. Since then she has been serving as Jaeger's research assistant. Together with graduate student Anthony Waddle, they've been working on new research on the devastating chytrid fungus. They've already published two papers with a third in the works.

"I'm learning all the time," Rivera said. "Just by going out to the translocation sites, you can see how much the habitat has changed over the years. It's amazing to watch them grow and transform from a little embryo to a tadpole and then gain their four limbs.To see them four months after we release them as these huge frogs, almost tripled in size, is a beautiful glimpse of life."

New High-Precision Machine to Bolster UNLV Research in Sciences

UNLV has won a nearly $700,000 National Science Foundation (NSF) award to bring a high-precision scientific instrument — the first of its kind in the state — to campus, in an effort to boost the university's research power.

The sophisticated scientific device, which boasts a lengthy name, the "multicollector inductively coupled plasma mass spectrometer," helps researchers measure concentrations of very rare, naturally occurring isotopes. It's as big as a Volkswagen Bus, but can collect and measure items that are so tiny, they can't be seen with the naked eye, or even with a traditional microscope.

"This is a significant milestone for the university, and will allow us to train our own students right here in Las Vegas, as they would be trained at other top research institutions around the country," said Shichun Huang, assistant professor of geoscience and lead writer for the grant. "The instrument brings UNLV to the next level in research capability."

The award will help the university to expand and support ongoing research in a variety of fields, including Earth, environmental and planetary science, geochemistry, geology, and archaeology, among others.

"It allows us to make such precise measurements that we can see variations we were never able to see before," said Matthew Lachniet, a professor of geology at UNLV, and a co-writer on the NSF grant. "It opens up an entirely new toolbox for understanding how the Earth works."

If the multicollector, Lachniet said, was a scale for weights, it would be able to weigh items plus or minus a millionth of a pound, as opposed to a traditional scale, which can only measure differences by one pound.

Lachniet is one of nearly a dozen researchers on campus who are currently working on projects that will benefit from the multicollector's analytical capability:

- Lachniet goes caving in the Great Basin, across the southwestern U.S., and in central America to gather stalagmite specimens — which can date back 500,000 years — in order to explore and chart past climate change patterns. He'll use the multicollector to analyze uranium isotopes that are naturally occurring in these cave deposits to understand past variations in climate, which provides key insights into the time scales and magnitudes of droughts.
- Huang studies the chemical and isotope compositions of oceanic islands like Hawaii in order to understand the dynamics within the solid Earth. He also studies chondrites, or stony meteorites, for insight into how the early solar system formed and evolved.
- Arya Udry, an assistant professor of planetary science, studies rocks from Mars. She'll use the multicollector to analyze the chemical variations in Martian meteorites to better understand the interior composition, magmatic processes, and general evolution of Mars.
- Simon Jowitt, an assistant professor of economic geology at UNLV, will potentially use the multicollector to further our understanding of the links between large magmatic events, mineralizing processes, as well as the sourcing of the metals that make their way into ore deposits. This includes research into the Carlin-type deposits of northern Nevada, the second largest gold district in the world.

UNLV researchers currently travel across the country to do this work. Bringing a multicollector to campus will help the university save money, attract graduate students, and also form collaborations with scientists from other institutions within the Nevada System of Higher Education and across the U.S.

Udry also received a second grant for nearly $200,000 from NASA that will bring a laser ablation system to campus and be attached to the new multicollector. The system zaps rocks with a laser beam, which then produces aerosols that can be analyzed in the multicollector.

The university expects the multicollector, and the laser ablation system, to be installed within the next year in the Science and Engineering Building on campus. The devices will be part of the Las Vegas Isotope Science Laboratory, which is co-managed by Lachniet, Udry, Huang, and geosciences professor Ganqing Jiang.

"Combined, we're pushing close to a $1 million in new instruments for our lab here on campus," Lachniet said. "This investment enables us to pursue externally funded research grants that we were never able to pursue before, and continue to be competitive with other Top Tier research universities."

X-rays Mark the Spot

PHYSICS PROFESSOR MICHAEL PRAVICA'S WORK ON USEFUL HARD X-RAY PHOTOCHEMISTRY COULD REVEAL NOVEL MATERIALS — AND POSSIBLY AN EXPLANATION FOR THE ORIGIN OF LIFE ON EARTH.

The same thing that makes X-rays helpful for diagnosing fractures and cavities is what makes them pesky in other areas. (Don't search for "X-ray burns" unless you have a strong stomach and a morbid curiosity.)

X-rays photons have plenty of energy, and the body — save all those stalwart calcium atoms in your bones — does a poor job absorbing it. When you get X-rayed by a doctor, what you seeing on the screen are the shadows of calcium-dense parts of your body as the X-rays pass clean through softer tissue. And that works out great when X-rays are used in short bursts, but in longer exposures, they can prove harmful.

Just like the X-rays hurt you if your dentist gets thoroughly distracted by YouTube videos during an exam, they can damage even inorganic matter. When X-ray photons collide with atoms and make them take on more energy, it can excite the electrons in those atoms to move to a high-energy orbit around the nucleus. It can cause an atom to ionize; those electrons could careen out of the atom; or they could relax to their natural state.

And in that space between excitation and relaxation is, perhaps, everything.

"For most physicists and other scientists that use X-rays, it's a nuisance. But what we realized is that we could actually use the X-rays as a means to harness novel chemistry," physics professor Micahel Pravica said. "Chemistry is usually done where we're adding [energy] in different ways. In our case we're using the X-rays.

"Hard [higher energy] X-rays are very penetrating and they are very highly ionizing. It's like taking a bull in a china shop just wreaking havoc. But when you heat something the whole sample gets heated up. X- rays, you can focus them to less than a millionth of a meter. So, even though it's a bull in a china shop it's a targeted bull. That can wreak havoc but over the course of that wreaking of the havoc you rebuild things. There's a healing process. What we're doing is we're using hard X-rays to drive the chemistry. We're finding that as a consequence of this you get new compounds that are synthesized that nobody's ever synthesized before."

Breaking Bonds

In 2011, Pravica and his team were studying X-rays and potassium perchlorate at the Department of Energy's Argonne National Laboratory outside of Chicago. While observing shadows from the X-rays, they noticed an occasional popcorn effect – the result of oxygen being formed which broke up crystals in the sample. So they started using the process on other chemicals. In the course of the experiments, Pravica had to leave Chicago and return to UNLV, so he left an assistant in charge of an experiment of trying to synthesize water, with strict instructions not to leave a cap on the container, or else gasses would build up and explode a $3,000 crystal detector.

Conintued on page 7

X-rays Mark the Spot Continued

He didn't; it did.

"I realized, my gosh, we have an interesting way to ignite things without heat. We called that X-ray induced combustion, which was driven by useful hard x-ray photochemistry. When I first saw this, I had this whole vision: what if we could make complex molecules?"

X-ray photochemistry wasn't, in itself, new. What was new was using hard X-rays and pressure to synthesize new materials that have never before been created, like new types of cesium superoxide, and stable doped (chemically altered) polymeric carbon monoxide.

It opens up entire avenues for materials science to explore and create in ways that previously hadn't been available to researchers. The former could theoretically be used to help create entire new structures of silicon that could revolutionize electronics; the latter could lead to new types of radiation-hardened sensors for extreme environments like deep space or in solar cells.

"We've actually for the first time been able to make a new structure just with X-rays that nobody could make with normal chemical methods," Pravica said. "That's what we're really excited about"

The applications go beyond materials, too. The work has already generated two patents, one for the synthesis of polymers using X-ray chemistry and one for bond destruction.

If the Post Office were trying to get rid of anthrax found in a letter, right now they'd use a neutron beam, which can irradiate materials. Using Pravica's method of bond destruction, an X-ray could be "tuned" to a particular bond, so it could be used to denature anthrax without any harmful side-effects.

If the chemical questions are robust, the epistemological ones are downright massive. The process could even be used to explain the most enduring of mysteries: how did life come to exist in the universe?

The Sweet Spot: X-rays

Human beings have been able to produce amino acids with just sparks, but we can't make complex polymers without complex means, and the primordial earth didn't have the complex means to form polymers. And with the early, harsh atmosphere, few complex organic molecules could be made. In the "civilized" conditions of space, though, it's another story.

Biological systems need molecular precursors like oxalate salts and oxalic acid. There have been longstanding questions about how these compounds could have been synthesized in space. Useful hard X-ray photochemistry may be the answer.

"There may have been some initial complex polymer that came onto the Earth and then for whatever reason on an asteroid or some interstellar medium you have billions of years of these X-rays. Over time they're interacting with other molecules and maybe through some of the same mechanisms that we're observing in our research they formed larger quantities of these materials and more complex molecules that may have led to the original of life on our planet. We found people talking about gamma rays, but nobody really was looking in the sweet spot of hard X-rays."

This kind of photochemistry could also could have had an effect on our celestial neighbor. The surface of Mars is believed to contain oxalate salts. Its atmosphere is thin enough to allow hard X-rays above a certain energy to penetrate, and though Mars' red hue is often attributed to iron oxide rust, it's also possible that it could be partially attributable to these types of chemical reaction products. Pravica's polymer carbon monoxide can turn that kind of red with the right dose of hard X-ray radiation. Mars could be a verifiable proof that these processes were happening, under the right conditions.

It's possible, at the beginning of understanding this catalyst, that hard X-rays could turn out to be the building block that explains processes deep into the past, and pave the way toward techniques and materials that serve us well into the future.

"I want to make something useful for humanity," Pravica said. "I want to make a whole tailored family of polymers using this extra X-ray-induced polymerization. And that I think would be the most exciting because it's a whole class of compounds we can make. We're showing X-rays can actually build complex molecules."

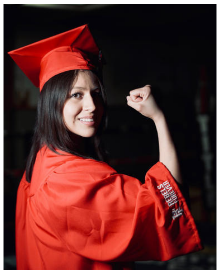
December 2019 Outstanding Graduate

More than 2,000 students joined the ranks of UNLV alumni Dec. 17, each with a unique path of perseverance that led them to receive their hard-earned degrees.

An enduring UNLV commencement tradition is for the president to honor a select group of outstanding graduates who exemplify the academic, research, and community impact of the graduating class.

One of this winter's honorees was from the College of Sciences.

DANIELA RODRIGUEZ
B.S. in Biological Sciences (Honors College)



When UNLV Boxing Club president Daniela Rodriguez wasn't taking on contenders in the ring, the pre-med student was busy knocking out: eight research fellowships, co-authoring several publications advancing the study of cystic fibrosis and hospital-acquired infections, winning tons of national awards, and volunteering in the community.

The culmination of all that hard work? Daniela is graduating with a bachelor's in biology and is well on her way to a promising future as a physician-scientist.

The path to this stage wasn't an easy one for the Las Vegas native who, like many first-generation students, faced challenges in adjusting to college-level science courses. But Rodriguez persevered.

Rodriguez has won highly competitive grants and awards from the National Science Foundation and the American Society for Microbiology, to name just a few. This is on top of fulfilling her strong desire to serve her community.

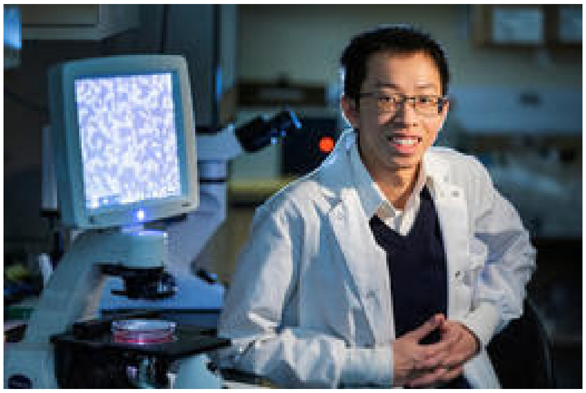
Nominators say Rodriguez, who will continue her lab work while applying for dual M.D./Ph.D. programs, epitomizes UNLV's motto: Rebels Make It Happen.

Original full story published at unlv.edu/news

Grad College Student Wants to Starve Out Tumors

A tumor is harmful, but it is the growth of that tumor that makes it dangerous.

Nam Hoang, a chemistry doctoral candidate, is researching that tumor growth. He recently presented his findings during the Graduate College's 2019 Rebel Grad Slam, a weeklong thesis competition that challenges graduate students to present their research using only three minutes and one PowerPoint slide.



"It's not the tumor that is going to kill you, it's when it spreads that it becomes dangerous. My work is trying to stop that process, trying to stop that progression of tumor growth," Hoang said.

Hoang's research focuses on the protein signal called hypoxia-induced factor 1 alpha and its function in cancer and tumor growth.

The protein signal is released by cells that the human body creates and destroys. However, if there is a tumor in the body, the tumor sends out a signal, to which factor 1 alpha responds. Instead of the body destroying factor 1 alpha, it provides the tumor with nutrients that allow it to grow.

"Technical science and biochemistry is very hard. Nothing turns out right the first time. Nine times out of 10, I am going to fail. But that 10 percent, when it works, is a fantastic feeling," Hoang said.

Hoang and associate professor of chemistry Hui Zhang were unable to find success for nearly a year with the factor 1 alpha experiment.

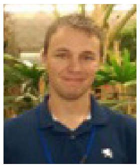
Continued on Page 10

Awards, Recognition, and Recent Grants

COLLEGE OF SCIENCES AWARDS

Alumnus of the Year
Travis Huxman, Life Sciences, Class of 2000

STUDENT AWARDS



Outstanding Dissertation Award
Joshua Sackett, Life Sciences

Outstanding Thesis Award
Rachel Rahib, Geoscience

Outstanding Graduate Student Teaching Award
Bhagya De Silva, Chemistry and Biochemistry

2019 Rebel Grad Slam Winner
Nam Hoang, Chemistry and Biochemistry

RECENT GRANTS

Chao-Chin Yang, Zhaohuan Zhu, Stephen Lepp, and **Xiao Hu, Physics and Astronomy**
Project: "Global Simulations of Dust-Gas Dynamics in Protoplanetary Disks with Dust Back Reaction"
Agency: NASA
Amount: $474,315

Chao-Chin Yang, Zhaohuan Zhu, and **Stephen Lepp, Physics and Astronomy**
Project: "Following the Gravitational Collapse of Forming Planetesimals"
Agency: NASA
Amount: $474,315

Scott Abella, Life Sciences
Project: "Identifying perennial species for restoration to establish native plant communities"
Agency: U.S. Bureau of Land Management
Amount: $174,938

Scott Abella, Life Sciences
Project: "Stimulating Natural Regeneration of Native Desert Perennial Plants as a Minimum-Input Restoration Method"
Agency: U.S. Bureau of Land Management
Amount: $49,999

Scott Abella, Life Sciences
Project: "Minimum-Input Restoration for Wildlife Habitat Enhancement"
Agency: U.S. Bureau of Land Management
Amount: $49,996

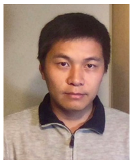
Alison Sloat, College of Sciences
Project: "Rebel Science Camp 2020"
Amount: $33,000 from Mission Support and Test Services and an additional $1,500 from Rotary of Southwest Las Vegas

Ashkan Salamat, Physics and Astronomy
Project: "The synthesis of metal superhydrides through extreme temperature/pressure conditions: towards room temperature superconductivity"
Agency: U.S. Department of Defense
Amount: $750,000

Ashkan Salamat (Physics and Astronomy), Paul Forster, Frederic Poineau, and **Keith Lawler (all Chemistry and Biochemistry)**
Project: "Expanding Known Binary Technetium Nitrides and Sulfides: A Computationally-Led Synthesis Program"
Agency: National Science Foundation
Amount: $449,901

Matthew Lachniet, Shichun Huang, and **Ganqing Jiang, Geoscience**
Project: "Multicollector Inductively Coupled Plasma Mass Spectrometer"
Agency: National Science Foundation
Amount: $675,292

Awards, Recognition, and Recent Grants Continued



Qiang Zhu, Physics and Astronomy
Project: "Collaborative Research: Atomic Level Structural Dynamics in Catalysts"
Agency: National Science Foundation
Amount: $325,000

Qiang Zhu, Physics and Astronomy
Project: "High Energy Density Battery Materials at Low Temperatures for Future NASA Missions"
Agency: NASA
Amount: $260,000

Qiang Zhu, Physics and Astronomy
Project: Zhu's group will develop an efficient computational code to enable the automated prediction of organic semiconductors
Agency: SONY
Amount: $100,000

Jason Steffen, Zhaohuan Zhu (Physics and Astronomy), and **Shichun Huang (Geoscience)**
Project: "Modeling Dust Condensation in Protoplanetary Disks"
Agency: National Science Foundation
Amount: $550,000

Balakrishnan Naduvalath, Chemistry and Biochemistry
Project: "Quantum State Control of Molecular Collision Dynamics"
Agency: Part of a team that received the coveted Multidisciplinary University Research Initiative (MURI) award from the Department of Defense, Army Research Office
Amount: $750,000

Artem Gelis, Chemistry and Biochemistry
Project: "Speciation and Behavior of Neptunium and Zirconium in Advanced Separation Process"
Agency: Department of Defense
Amount: $424,278

Artem Gelis, Chemistry and Biochemistry
Project: "Speciation of Transuranium Elements and Strontium in Solid and Solution Phases of Alternative Decontamination Process Using Mixed Iron Oxides"
Agency: Savannah River Nuclear Solutions
Amount: $281,863

Artem Gelis, Chemistry and Biochemistry
Project: "Separation Studies"
Agency: TerraPower, LLC
Amount: $92,192

Frederic Poineau, Chemistry and Biochemistry
Project: "Nuclear Science and Engineering Nonproliferation Research Consortium"
Agency: Department of Energy/NNSA
Amount: $400,000

Frederic Poineau, Chemistry and Biochemistry
Project: "CONNECT – the CONsortium on Nuclear sEcurity Technologies"
Agency: Minority Serving Institution Partnership Program
Amount: $300,000

Grad College Student Wants to Starve Out Tumors Continued

"It wasn't until we went back to the textbooks that we found that we had the wrong experimental conditions. We were able to move forward quickly once we figured out [the problem]," he said.

Hoang's interest in cancer research stems from his desire to help people and improve their lives. Hoang hopes to develop a novel therapy that can target factor 1 alpha and slow tumor growth. This kind of FDA-approved drug or therapy has yet to be achieved.

"Growing up, I've always wanted to help people," Hoang said. "I'm interested in how cancer works and how we can stop it. We can make people's lives better, reduce their pain."

This story was written by Dayonara Gaoteote, graduate assistant to the Graduate College