

2019 Fall Semester Research Newsletter

Major Events:

- The College of Sciences is celebrating its [50th anniversary](#). In 1958, UNLV's College of Science and Mathematics was formed. The following year, Robert Smith began serving as founding Dean, with nearly 500 undergraduate and 41 graduate students enrolled. Fifty years later, the college has approximately 2,500 undergraduate students and 250 graduate students in five core academic areas: **life sciences; chemistry and biochemistry; geoscience; mathematical sciences; and physics and astronomy**. After hosting five successful public lectures during the spring semester, the college hosted two more during the fall semester:



1. Sep. 12: Dr. **Brian Hedlund**, School of Life Sciences, ["Expanding the Tree of Life: Biodiversity Exploration in Geothermal Springs"](#);

2. Oct. 3: Dr. **Elisabeth Hausrath**, Department of GeoScience, ["Rock, Soil, and Water on Mars: Understanding Mars' Past and Planning for the Future"](#);



- The first ["Conference on Computational Mathematics and Applications"](#). "Conference on Computational Mathematics and Applications" was held at UNLV on October 25 – 27, 2019. The conference was co-chaired by Drs. **Jichun Li** and **Hongtao Yang** from Department of Mathematical Sciences and [Center for Applied Mathematics & Statistics](#), and was supported through an NSF conference grant led by Jichun Li. More than 90 participants mainly from the United States have attended the meeting.



- College of Sciences hosts the "Inquiry II: The Art of Scientific Discovery" exhibition from 8 a.m. to 5 p.m. Oct. 18 to Dec. 13, Monday through Friday, at the Jessie & Brian Metcalf Gallery on the second floor of the Richard Tam Alumni Center. This exhibition showcases the art in science research.



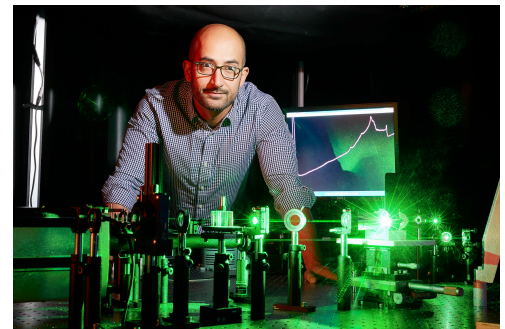
- Department of Physics and Astronomy sponsored the **Russell Frank Astronomy Lecture Series** on September 19, 2019, which featured Caltech professor Woody Fischer. The title of his talk was “The rise of oxygen — a planetary revolution.”

Newly Awarded Major Research Grants (>\$100,000):



1. **Ashkan Salamat** (Physics & Astronomy) 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 Defense** Office of Science. He will receive about **\$750,000** during the next five years. The award, titled “The synthesis of metal superhydrides through extreme temperature/pressure

conditions: towards room temperature superconductivity”, will allow him conduct research in identifying the precise makeup of metal superhydrides – extremely hydrogen-rich materials – and techniques to readily synthesize them.



2. **Shichun Huang, Matthew Lachniet, Ganqing Jiang** (all Geoscience) were awarded a **\$675,292** research grant from the **National Science Foundation** Major Research

Instrumentation (MRI) program. This program will acquire a Multicollector Inductively



Coupled Plasma Mass Spectrometer (MC-ICP-MS) which will provide high-precision isotope measurements of multiple elements that may be found in minute quantities and support on-going research in the broad field of Earth, environmental and planetary science at UNLV.

3. **Artem Gelis** (Chemistry and Biochemistry) received three new awards as PI: 1. An award of \$92,192 from **TerraPower, LLC**, titled “Separation Studies”; 2. A **Department of Defense** award (sub-award from Oregon State University) of \$424,278 titled “Speciation and Behavior of Neptunium and Zirconium in Advanced Separation Process”; and 3. An award of \$281,863 from **Savannah River Nuclear Solutions (SRNS) through Minority Serving Institutions Partnership Program (MSIPP)**, titled “Speciation of Transuranium Elements and Strontium in Solid and Solution Phases of Alternative Decontamination Process Using Mixed Iron Oxides”.



4. **Frederic Poineau** (Chemistry and Biochemistry) received two new awards as PI: 1. A **Department of Energy/NNSA** award (subaward from UC Berkeley) of \$400,000 titled “Nuclear Science and Engineering Nonproliferation Research Consortium” and an award of \$300,000 (sub-award) from **Minority Serving Institution Partnership Program (MSIPP)** titled “CONNECT – the CONSortium on Nuclear sEcurity Technologies”.



5. **Jason Steffen** (Physics and Astronomy), **Shichun Huang** (Geoscience), and **Zhaohuan Zhu** (Physics and Astronomy) were awarded a **\$550,000** research grant from the **National Science Foundation** for “Modeling Dust Condensation in Protoplanetary Disks”. This program will combine UNLV's expertise in geochemistry and in planet formation to calculate the composition planet-forming material both in the solar system and in planetary systems that orbit distant stars.\



6. **Ashkan Salamat** (Physics and Astronomy), **Paul Forster**, **Frederic Poineau**, and **Keith Lawler** (all Chemistry and Biochemistry) were awarded a **\$449,901** research grant from the **National Science Foundation** for

“Expanding Known Binary Technetium Nitrides and Sulfides: A Computationally-Led Synthesis Program.” The proposal will fill in critical gaps in fundamental knowledge of the solid state chemistry of binary technetium compounds using a computationally-led synthesis program employing extreme conditions to access unique states.

7. **Qiang Zhu** (Physics and Astronomy) received three new grants: 1. He is the principal investigator of a two-year grant of **\$325,000** funded by the **National Science Foundation**. He will collaborate with researchers at other institutions, including Arizona State University, New York University, University of Arkansas, Cornell University, and University of Puerto Rico, to employ the advanced simulation techniques in both physical and data science to investigate the dynamical behavior of catalysts for both nano particles and enzymes. 2. He received **\$260,000** from **NASA**, which allows him and his collaborators in UNR and DRI to develop high energy density battery materials at Low Temperatures for future NASA Missions. 3. He is also the PI of an award of **\$100,000** from the **SONY** company to develop an efficient computational code to enable the automated prediction of organic semiconductors.



8. **Scott Abella** (Life Sciences) was awarded a three-year, **\$174,938** grant from the **U.S. Bureau of Land Management**'s national plant conservation and restoration management program. The title of the award is “Identifying perennial species for restoration to establish native plant communities.” He also received **\$100,000** from the **U.S. Bureau of Land Management** for two new research projects. One is titled “Stimulating Natural Regeneration of Native Desert Perennial Plants as a Minimum-Input Restoration Method”. The other is titled “Minimum-Input Restoration for Wildlife Habitat Enhancement”.



9. **Chao-Chin Yang, Zhaohuan Zhu and Stephen Lepp** (all Physics and Astronomy) were awarded a **\$456,315** research grant by **NASA** through the Emerging Worlds Program. They will investigate one of the most difficult stages in the course of planet formation by conducting state-of-the-art computer simulations and comparing the results with the properties of the Kuiper Belt objects observed in our own solar system.



10. **Chao-Chin Yang, Zhaohuan Zhu, Stephen Lepp, and Xiao Hu** (all Physics and Astronomy) were awarded a **\$474,315** research grant by **NASA** through the Astrophysics Theory Program. They will conduct state-of-the-art computer simulations to model a circumstellar disk around a young star and study the dust-gas dynamics in the disk.



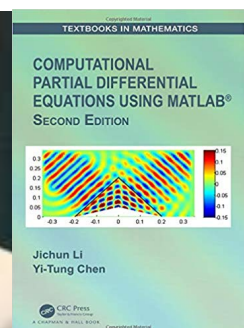
11. **David Hatchett** (Chemistry and Biochemistry) received an award of \$125,290 from **Mission Test Support Services (MSTS)**, titled “Oxidation of UF₆ from Ionic Liquid”.



12. **Eighteen PIs** from College of Sciences received awards from the UNLV Top Tier Doctoral Graduate Research Assistantship (**TTDGRA**) grant program. The awards support research and creative activity that involve the use of one state funded doctoral research assistant for one academic year, and renewable for up to two additional (3 years of total support: Fall 2020 through Spring 2023).

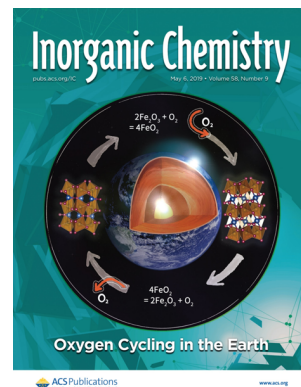
High-impact publications:

1. **Jichun Li** (Mathematical Sciences) published the second edition of his textbook “Computational Partial Differential Equations Using MATLAB”. He and collaborators also published two papers in the high-impact journals in mathematics: “Developing and analyzing fourth-order difference methods for the metamaterial



Maxwell's equations" published in *Advances in Computational Mathematics* and "Efficient stochastic Galerkin methods for Maxwell's equations with random inputs" published in *Journal of Scientific Computing*.

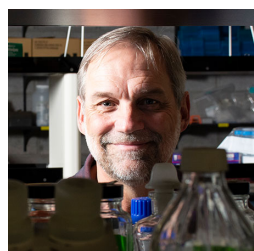
2. **Brian Hedlund** (School of Life Sciences) published three high-impact papers. The first one is "Function-driven single-cell genomics uncovers cellulose-degrading bacteria from the rare biosphere" published in *The International Society for Microbial Ecology (ISME) Journal* (2018 Impact factor = 9.493). The other is "Insights into ecological role of a new deltaproteobacterial order Candidatus Acidulodesulfobacterales by metagenomics and metatranscriptomics" also published in the *ISME Journal*. The third one is "Insights into the ecological roles and evolution of methyl-coenzyme M reductase-containing hot spring Archaea" published in *Nature Communications* (2018 Impact factor = 11.878).
3. **Qiang Zhu** (Physics and Astronomy) and his group published one paper "Computational Discovery of Inorganic Electrides from an Automated Screening" in the first volume of the high-impact journal *Matter* newly-established by the Cell press (Impact factor not announced) reporting a discovery from computation. This paper was accompanied by a preview to report the significance of the discovery. Another paper from his group "Structure-Controlled Oxygen Concentration in Fe₂O₃ and FeO₂" was featured on the Cover page in the journal *Inorganic Chemistry*.
4. **Scott Abella** (School of Life Sciences) led a paper "Persistence and turnover in desert plant communities during a 37-yr period of land use and climate change" published in *Ecological Monographs* (2018/2019 Impact factor = 7.698).



5. **Donald Price** (School of Life Sciences) published two high-impact papers. One is "Horizontal transfer of prokaryotic cytolethal distending toxin B genes to eukaryotes" published in *Molecular Biology and Evolution* (2018 Impact factor = 14.797). The other is "Reproductive Capacity Evolves in Response to Ecology through Common Changes in Cell Number in Hawaiian Drosophila" published in *Current Biology*

(2018 Impact factor = 9.193).

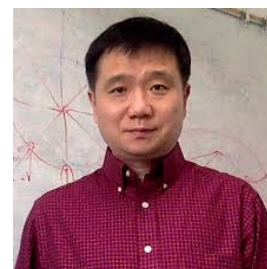
6. **Elizabeth Stacy** (School of Life Sciences) published two high-impact papers. One is “Divergent selection and primary gene flow shape incipient speciation of a riparian tree on Hawaii Island” published in *Molecular Biology and Evolution* (2018 Impact factor = 14.797).



7. **Jef Jaeger** (Life Sciences) was among an international team that published a paper “Cryptic diversity of a widespread global pathogen reveals expanded threats to amphibian conservation” in *Proceedings of the National Academy of Sciences* (2018 Impact factor = 9.58).



8. **Bing Zhang** (Physics and Astronomy) published an invited “news and Views” paper titled in “Extreme emission seen from γ-ray bursts” in *Nature* (2019 impact factor: 43.070) reporting the discoveries of high-energy photons from gamma-ray bursts.



9. **MaryKay Orgill** and **Sarah York** (both Chemistry and BioChemistry) wrote a research article that was published in the *Journal of Chemical Education* and also was featured in **American Chemical Society (ACS) Editors' Choice**.

10. **Artem Gelis** (Chemistry and BioChemistry) and team published two high-impact papers: “An Americium-Containing Metal–Organic Framework: A Platform for Studying Transplutonium Elements” published in *Angewandte Chemie International Edition* (2018 Impact factor = 12.257) and “Closing the Nuclear Fuel Cycle with a Simplified Minor Actinide Lanthanide Separation Process (ALSEP) and Additive Manufacturing” published in *Scientific Reports* (2018 Impact factor = 4.122).

11. **Ashkan Salamat** (Physics and Astronomy) and lab published a paper “Anomalous conductivity in the rutile structure driven by local disorder” published in *Molecular Biology and Evolution* (2018 Impact factor = 14.797).



12. **Hokwon Cho** (Mathematical Sciences) published two papers in top journals in his field: “[On Fixed-Width Confidence Limits for the Risk Ratio with Sequential Sampling](#)” published in [***American Journal of Mathematical and Management Sciences***](#) and “[Two-Stage Procedure of Fixed-Width Confidence Intervals for the Risk Ratio](#)” published in [***Methodology and Computing in Applied Probability***](#).

Featured research:

1. **Elisabeth (Libby) Hausrath** (GeoScience) was selected as one of ten Returned Sample Participating Scientist on the NASA’s Mars2020 mission. The Mars2020 mission will be a historic mission to Mars to find evidence of life on the red planet. It will be the first time a sample of rocks and soil from Mars will be brought back to earth. The mission will be launched in July 2020 and land on Mars in February 2021. Dr. Hausrath’s contribution to the mission has been widely reported. See: [*Fox5*](#), [*Fox5 KVVU-TV*](#), [*UNLV News Center*](#), [*Reno Gazette Journal*](#), [*El Tiempo*](#), and [*Las Vegas Review Journal*](#) ([*video*](#)).
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2. **Jason Steffen** (Physics and Astronomy) is the only UNLV scientist who is listed as one of the **2019 Highly Cited Researchers** by [***Web of Science***](#). This honor recognizes the world’s most influential researchers of the past decade (2008-2018), demonstrated by the production of multiple highly-cited papers that rank in the top 1% by citations for field and year. He recently made a YouTube movie showing exoplanets resonances using music. See [*Las Vegas Review Journal*](#) and [*Fox5 KVVU-TV*](#).
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3. **Jun Yong Kang** (Chemistry and Biochemistry) has been awarded a [*patent*](#) for the invention “Functionalized phosphonates via Michael addition.” This synthetic method enables the efficient synthesis of functionalized phosphonates under toxic metal-free conditions.

4. **Artem Gelis** (Chemistry and Biochemistry) was featured in an **Argonne National Laboratory** [press release](#) (see also [EurekAlert](#), [SciTechDaily](#) and [Bulletin of the Atomic Scientists](#)) on 3D printing to ease nuclear separation, which paves the way to recycle more nuclear material.



5. **Brenda Buck** and **Rodney Metcalf** were featured in [EOS -- Earth & Space Science News](#) regarding their discovery of asbestos-like minerals near Las Vegas back in 2001 as well as the health implications and impacts on development.



6. **Kelly Ai-Sun Tseng** (Life Sciences) has her work featured in the newest (12th) edition of Gilbert's Developmental Biology, the discipline's foundational textbook.



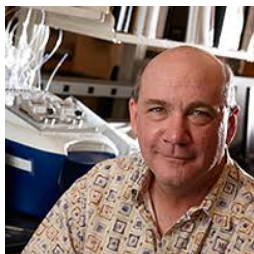
7. Three Nature papers published in November reported the detections of TeV emission from Gamma-Ray Bursts (GRBs) for the first time. **Bing Zhang** (Physics and Astronomy) theorized this emission near two decades ago and commented on the significance of these discoveries, see [MIT Technology Review](#) and [Smithsonian Magazine](#). He also commented in [New Scientists](#) about a theoretical model on another type of cosmic bursts known as Fast Radio Bursts (FRBs).



8. **Stan Smith** (Life Sciences, emeritus) was featured in [Las Vegas Sun](#) discussing origin of California wildfires.



9. **Matthew Lachniet** (GeoScience) was featured in [Nevada Public Radio](#) discussing climate change.



10. **Allen Gibbs** (Life Sciences) was featured in [News3LasVegas](#) discussing outbreak of West Nile in Southern Nevada.



11. **Daniel Thompson** (Life Sciences) was featured in [Las Vegas Sun](#) discussing butterfly species in Mount Charleston.



12. **Michael Pravica** (Physics and Astronomy) wrote in the Opinion column of *[Tampa Bay Times](#)* discussing on how to fight climate change.



13. **Dale Devitt** (Life Sciences) was featured in *[Las Vegas Sun](#)* discussing climate change.

Awards and Recognition:

Faculty Awards and Recognition:

1. **Ashkan Salamat** (Physics & Astronomy) was the first UNLV scientist to earn an Early Career Award from the U.S. **Department of Defense** Office of Science. He was also selected as the UNLV **nominee** for the Nevada System of Higher Education **Regents' Rising Researcher Award**.



2. **Dennis Bazylinski** (Life Sciences) was selected as the UNLV **nominee** for the Nevada System of Higher Education **Regents' Distinguished Researcher Award**.

3. **Elisabeth (Libby) Hausrath** (GeoScience) was selected as the UNLV **nominee** for the Nevada System of Higher Education **Regents' Mid Career Award**.



Student Awards and Honors:

1. **Robin Kee** (senior Life Sciences major) was selected as scholar in the National Institutes of Health (NIH) **Undergraduate Scholarship Program (UGSP)**. The UGSP is a highly competitive program with approximately 300 nationwide applications received and 10 students chosen as UGSP Scholars for the 2019-20 academic year.

2. Graduate student **Nam Hoang** (Chemistry and Biochemistry, advisor: **Hui Zhang**) was the **2019 Winner** of the **Rebel Grad Slam 3-Minute Thesis Competition**. The Rebel Grad Slam challenges students to a 3-minute/1-slide presentation to showcase their research to the audience and judges in a condensed and compelling way.

