

# CHEMISTRY

Missouri S&T | Spring 2020

A HEART AND SOUL  
FOR RESEARCH

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# INSPIRING CURIOSITY



## Advancing our understanding of the fundamentals of science starts with mentoring student scientists.

And for **Carey Bottom**, Chem'72, MS Chem'75, PhD Chem'79, helping chemistry students turn their natural curiosity into a passion for research is the perfect first step.

In spring 2018, Bottom established the Carey and Christine Bottom Endowed Scholarship in Undergraduate Chemistry Research, a summer research program designed to give undergraduate chemistry students the financial support they need to pursue their aspirations as scientists, scholars and leaders in their field.

In spring 2019, Bottom established another research funding program — this time open to graduate students, too.

The Carey Bottom Science Ethics Support Initiative supports graduate and advanced undergraduate students. The fund supplies seed money for applications for interdisciplinary research grant funding from agencies like the National Science Foundation.

Bottom's generosity has served as a catalyst for other alumni gifts that fund the Undergraduate Research

Scholarship Program, which provides 10 scholarships for students who spend the summer advancing chemistry research.

These scholarships are funded by generous S&T alumni and friends, and the College of Arts, Sciences, and Business dean's office. Will you help us make even more of an impact?

When an S&T student calls you during our department's annual phonathon, we hope you'll take time to talk with the student. It's a great way to learn what's happening in chemistry and across campus. And it's also a great time to give back. Every gift supports the undergraduate research opportunities that launch the scientists of tomorrow.

[give.mst.edu](https://give.mst.edu)



# DEAR ALUMNI AND FRIENDS,

2020 is a year to remember. This is the year the campus community will commemorate the 150th anniversary of Missouri S&T's Feb. 24, 1870, charter. Our department will honor the sesquicentennial with the presentation of the Fifth Annual Stoffer Lecture featuring 2019 Chemistry Nobel Laureate **M. Stanley Whittingham** on Oct. 16, 2020 — the Friday before Homecoming. If you have a chance to visit with us in 2020, that would be an excellent time.

Since our last newsletter, we've had some faculty changes.

After long and productive careers, **Philip Whitefield** and **Gary Long** retired in 2019 with emeritus status. Both colleagues remain active in research and teaching. **Nicolas Leventis** moved on, and **Garry Grubbs** was awarded tenure and promoted to associate professor. **Wenyan Liu** joined the faculty as an assistant research professor, and his analytical expertise will enhance our research efforts.

2019 brought major changes in our office staff. After many years of devoted service, **Shannon Roark** retired and **Tina Balch** left



to have more time with family. We welcome **Tammy Heidenbrand** and **Magdalena Zawodniok** who attend to departmental business, and both are off to a great start.

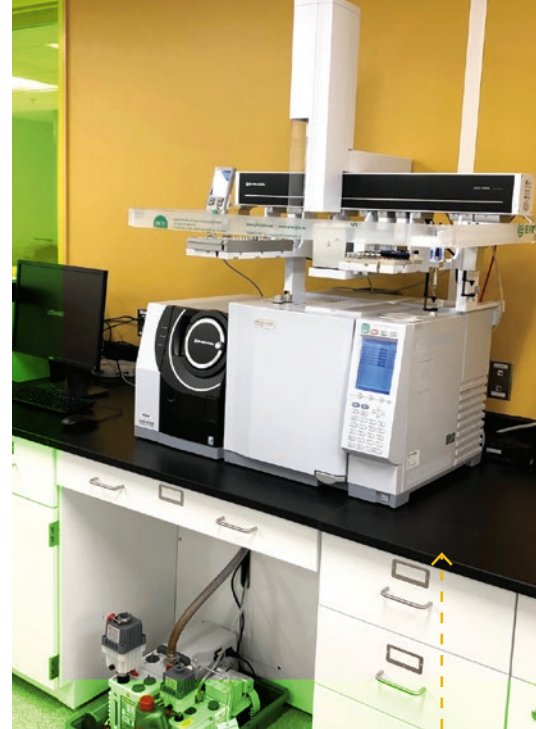
Clearly, the defining event of 2019 was the completion of the renovation of Schrenk Hall's west wing. Read on to learn some associated benefits, including new, state-of-the-art teaching labs, the vastly improved shared instrumentation lab, and three new advanced instruments to facilitate the Bio-CURE project. Major strides have also been made with long-overdue maintenance in Schrenk Hall's east wing.

The Undergraduate Summer Research Scholarship (UGSRS) program was a highlight of 2019. Raising scholarship funds for graduate students is our current challenge. **Carey Bottom**'s Science Ethics Support Initiative presents a pioneering milestone, and we hope that it will catalyze alumni initiatives to promote graduate student support.

We welcome your input and are grateful for your generous support and advocacy, which helps us succeed. Please know you are welcome to visit with us any time.

Sincerely,

**Rainer Glaser**  
Professor and Chair,  
Chemistry



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# A HEART AND SOUL FOR RESEARCH

**Nuran Ercal** could easily be called the backbone of biochemistry at Missouri S&T. As the Richard K. Vitek/Foundation for Chemical Research Endowed Chair in Biochemistry, Ercal combines her academic expertise from analytical and environmental chemistry, biological sciences, and chemical and biological engineering to make significant scientific contributions.

## Conquering the fallout of oxidative stress

Ercal's been researching treatments for oxidative stress-related diseases since 1995, focusing on the role of glutathione (GSH), an especially powerful and versatile antioxidant that the body is normally able to generate on its own. Decreased GSH levels are associated with a wide variety of medical conditions, like lead toxicity, medicinal drug-induced toxicity (e.g., liver damage from Tylenol overdose), radiation exposure, alcohol abuse and neurodegenerative disorders. Her team's research has shown that antioxidant drugs with the ability to preserve or restore GSH levels may be effective in treating these conditions.



## NANOTECHNOLOGY RESEARCH FOR CANCER TREATMENTS RECOGNIZED BY UM SYSTEM

For the last 10 years, Ercal's primary research interest has been the non-invasive pharmaceutical treatment of cataracts and other degenerative eye disorders caused by oxidative stress.

### Merging medicine and materials

Ercal is one of the earliest S&T faculty members to receive research funding from the National Institutes of Health (NIH). Her NIH funding is ongoing, and subsequent awards total over \$1.5 million. In August, she received nearly \$400,000 from the National Eye Institutes (NEI) of the NIH to study nanodiamonds for antioxidant delivery.

Working with others from S&T — **Vadym Mochalin**, associate professor and a physical and materials chemist; post-doctoral fellow **Annalise Pfaff**; doctoral students **Justin Beltz** and **Ibrahim Abdullahi** — the team is combining their disciplines to test a nanodiamond delivery platform for slow-release antioxidant eyedrops to prevent cataracts.

"A major challenge in developing an effective eyedrop-based treatment is getting the drug to stay in the eye long enough to work," says Beltz. "With nanodiamonds as the delivery platform, we're breaking new ground toward a solution."

Ercal's long-term objective is to develop a topical antioxidant drug to halt or significantly delay the progression of cataracts. The study will run three years, starting with testing on human cell models and progressing to animal studies. Ercal is also collaborating on traumatic brain injury research projects funded by the U.S. Army Leonard Wood Institute.

During her nearly 30 years at S&T, Ercal has advised 20 Ph.D. and 11 master's students. She also teaches General Biochemistry and upper-level courses Biochemical Metabolism and Neurochemistry with Clinical Correlations. She says she's particularly enthused about her current research team's capabilities.

"I don't look when I'm running, I just run," she says. "I don't calculate. I'm doing what I love — research and teaching."



Chemistry assistant professor **Risheng Wang** represented Missouri S&T speaking to the University of Missouri Board of Curators, university leaders, and state and federal guests at the June launch of the UM System's NextGen Precision Health Initiative.

Held at the University of Missouri-Columbia, the launch also included the groundbreaking of its 265,000-square-foot research facility at MU.

"The goal of NextGen Precision Health Initiative is to achieve personalized treatments for society's toughest diseases," says Wang. "It contains three major UM System working groups — cancer, vascular, and neuro. I'm excited to be working in the cancer research group from S&T."

Wang's recent published research on cancer treatments includes the development of new DNA nanostructures — or "origami" — for delivery of the drug doxorubicin and the development of molecular microRNA biomarkers for early diagnosis and pathological understanding of cancers.

## NOBEL LAUREATE TO SPEAK AT S&T



The fifth annual Stoffer Lecture will feature one of three winners of the 2019 Nobel Prize in chemistry. The speech will be part of the university's 150th anniversary celebration events.

**M. Stanley Whittingham**, Distinguished Professor of Chemistry at Binghamton University with the State University of New York, will speak on Oct. 16, 2020.

"We are excited to welcome Dr. Whittingham for what promises to be a fascinating talk," says chemistry chair **Rainer Glaser**. "His development of the lithium-ion battery was foundational for powering most of the electronics that we use today."

The lithium-ion battery is a lightweight, rechargeable and powerful battery used in everything from mobile phones to

laptops and electric vehicles. It can also store significant amounts of energy from solar and wind power.

The Stoffer Lecture, which is free and open to the public, is co-sponsored by Brewer Science, MO-SCI and the 150th Anniversary Advisory Committee, which awarded a \$3,000 mini-grant for the lecture.

Details about the lecture and all of the adjoining events will be announced on the S&T chemistry website at [chem.mst.edu](http://chem.mst.edu).

The lecture series was established by **James O. Stoffer**, Missouri S&T Curators' Distinguished Professor emeritus of chemistry and provides an opportunity for the campus and Rolla communities to learn from scholars and innovators in the field of polymer chemistry and related areas.

## ADVISORY BOARD SEEKS INSPIRING, IMAGINATIVE LEADERS

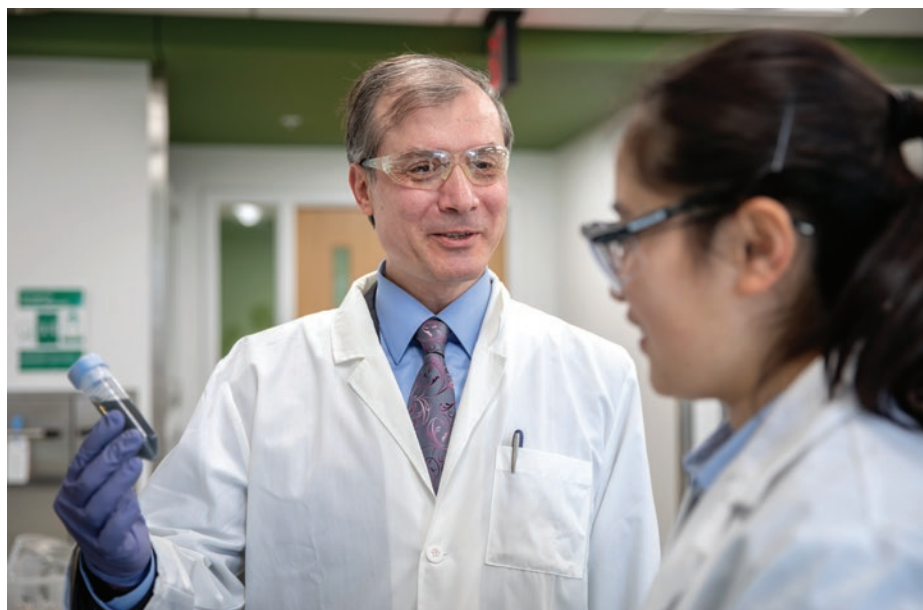
As S&T expands its scientific research capabilities and academic offerings, our academic leaders want to incorporate outside expertise to enhance our efforts in many ways.

Our new Chemistry, Biochemistry, and Biology Advisory Board (CBBAB) will be instrumental in advising department leaders on ways to expand on current partnerships between departments and colleges and build new ones.

They will help build partnerships with industry, government agencies and NGOs, and acquire needed infrastructure and instrumentation. They will also help advance our research missions through new undergraduate and graduate research fellowships, scholarships and internships.

We're looking for S&T alumni or graduates from recognized universities with degrees in chemistry, biochemistry, life sciences or biological sciences. Members should have successfully worked in their field for at least 10 years, and demonstrate leadership, achievement, and personal and professional integrity.

Our CBBAB members will become valuable ambassadors for Missouri S&T. If this challenging task sounds attractive to you, please let us know! We'd love to share more of our vision with you. To learn more, please contact chemistry chair **Rainer Glaser** at [chem.mst.edu](mailto:chem.mst.edu).



## MOCHALIN AND MXENES

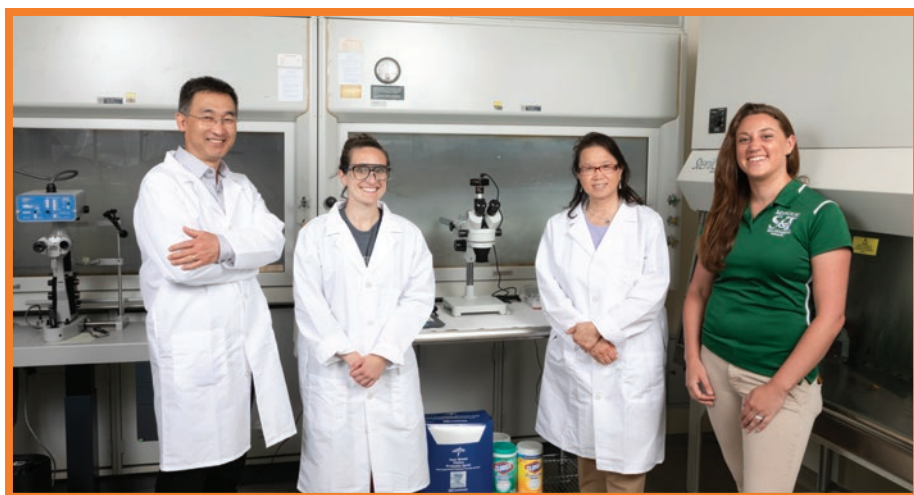
**Vadym Mochalin's** investigation into the ambiguous chemistry of 2-D nanomaterials called "MXenes" is earning recognition in the international scientific community.

In October, he was one of four U.S.-invited speakers among 20 international experts, at the Beilstein Nanotechnology Symposium in Mainz, Germany, where MXenes were the focus. The Beilstein-Institute, founded by the Max Planck Society, disseminates high-quality, essential research information in chemistry. In January, he was invited to speak on MXenes at the Institute of Physics of the Czech Academy of Sciences in Prague.

MXenes are a family of 30-atoms-thick transition metal carbides that hold promise for energy storage applications in lithium-ion batteries and triboelectric nanogenerators thanks to their layered conductive properties. Mochalin's research team explores the properties of MXenes and new synthesis methods for use in industrial applications.

## ALUMNI NEWS

- » **Michael Haynes**, Chem'78, who retired from Dow Chemical in 2002, and his wife, Debbie, established a scholarship using Dow's matching gift program and the Miner Match program. Michael is a member of the CASB Dean's Leadership Council.
- » **Janet Kavandi**, MS Chem'82, received the Alumni Achievement Award from the Miner Alumni Association during Homecoming 2019. She also appeared on the NASA float in the Macy's Thanksgiving Day Parade. Kavandi was named to the Board of Trustees of Embry-Riddle Aeronautical University. A former NASA astronaut and Glenn Research Center director, Kavandi joined Sierra Nevada Corp. in 2019 as senior vice president for the company's Space Systems business area.
- » **Lynell Gilbert-Saunders**, PhD Chem'06, an associate professor of chemistry at Missouri Southern State University, received the 2018 Governor's Award for Excellence in Teaching.
- » **Alan Windhausen**, Chem'10, is now a quality trainer for the Brewers Association Basics of Beer Quality Workshop team.
- » **Robin Lasey**, Chem'94, associate professor of chemistry at Arkansas Tech University, received the 2019 Arkansas Tech Faculty Award of Excellence in the service category.
- » **Dwight Viehland**, Chem'84, CerE'84, MS CerE'87, professor of materials science and engineering at Virginia Tech, was reappointed as the Jack E. Cowling Professor of Engineering, a position he has held since 2014.



Paul Nam (left), Annalise Pfaff, Honglan Shi and Catherine Johnson study chemical consequences of detonations in rat models.

## IN SEARCH OF TBI THERAPIES

Complications from traumatic brain injury (TBI) can be life altering. They include post-traumatic seizures and hydrocephalus, as well as serious cognitive and psychological impairments, and the search for treatments to mitigate these neurodegenerative processes is on.

Chemistry associate professor **Paul Nam** leads a \$412,000 multidisciplinary project funded through the Leonard Wood Institute to investigate the use of antioxidants to treat TBIs.

Nam believes antioxidants could prevent or reduce the oxidative stress that occurs in the brain following exposure to a blast. And that oxidative stress is the culprit of the degenerative symptoms.

“Currently there are no FDA-approved drugs to treat TBI, but the research of antioxidants for brain health and recovery is an ongoing area of study,” says Nam. “We have a collaborative team of experts at S&T who can apply their knowledge to every stage of this study to test the antioxidants we’ve targeted and determine their efficacy.”

Co-principal investigators are **Nuran Ercal**, professor of chemistry and the Richard K. Vitek/Foundation for Chemical Research Endowed Chair in Biochemistry; **Honglan Shi**, PhD Chem’10, research professor of chemistry; and **Catherine Johnson**, assistant professor of mining and explosives engineering, who is also characterizing blast models in her work with the Acute Effects of Neurotrauma Consortium (AENC), Phelps Health and the U.S. Department of Veterans Affairs.



## DEFINING INTERSTELLAR SPACE

Chemistry professor **Richard Dawes** and post-doctoral fellow **Ernesto Quintas-Sánchez** conducted new computational modeling to define the reaction network of fluorine chemistry in the interstellar medium (ISM) — the vast near-empty spaces that lie between stellar systems in a galaxy.

Their study, “Collisional Excitation of  $CF^+$  by  $H_2$ : Potential Energy Surface and Rotational Cross Sections,” was published in the Nov. 14 edition of the *Journal of Physical Chemistry A*, along with their descriptive cover image.

Dawes says many scientific assumptions about equilibria don’t hold true in interstellar space because of its low density and cold temperatures. Their study simulates new collisional processes for the non-equilibrium states.

“With our newly created ‘AUTOSURF’ software, we’ve constructed an automatically generated potential energy surface that enables quantum scattering studies for colliding molecules in this environment,” says Dawes. “Using our code, these kinds of simulations will become routine, rather than taking months or even years to generate.”

In September, S&T received a \$1.96 million grant from the National Science Foundation for a new supercomputing system. The award resulted from an initiative Dawes led in S&T’s Center for High Performance Computing Research. More information is available at [hpc.mst.edu](http://hpc.mst.edu).

# GRADUATION DOESN'T MEAN GOODBYE

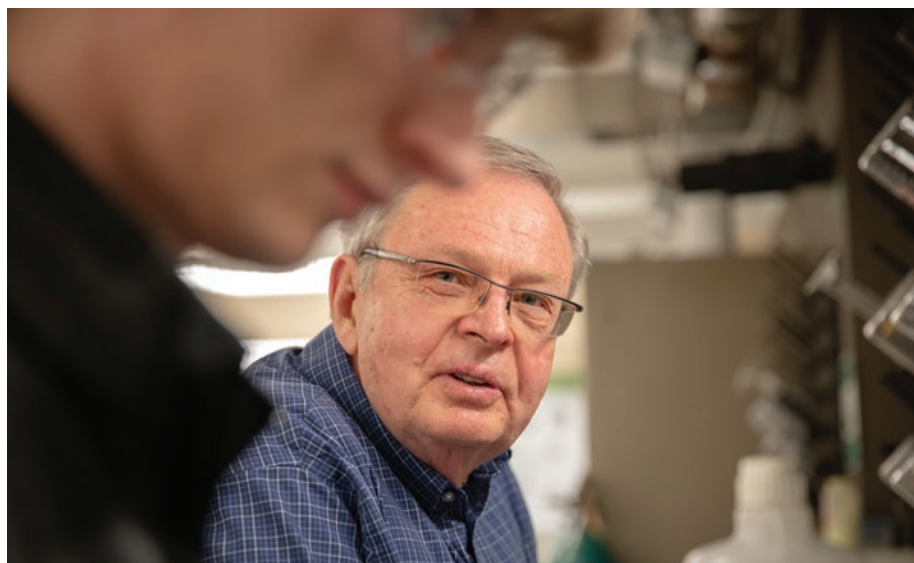
It’s easy to stay in touch with your alma mater. Just say hello when a student representative calls, visit campus next time you’re in Rolla or drop us a note at [chem@mst.edu](mailto:chem@mst.edu). Tell us what you’re doing with your chemistry degree, and what you’ve been up to since you left Rolla. We love to hear from our graduates, and share their accomplishments among our alumni achievement stories.



## FACULTY UPDATES

Our faculty are prolific researchers, and have been very active over the past year. Here are just a few updates.

- » “Confinement of atomically defined metal halide sheets in a metal-organic framework,” co-authored by **Gary Long** and **Fernande Grandjean**, was published in the November 2019 issue of *Nature*.
- » **Manashi Nath** was recognized as one of the top 5% of highly cited authors in the Royal Society of Chemistry journals in 2019 in the Energy and Sustainability portfolio. This recognition follows a highly cited research article published from Nath's group in *Energy & Environmental Science*.
- » **Rainer Glaser** received a certificate for excellence in peer reviewing from the Petroleum Research Fund of the American Chemical Society. He is one of 20 individuals to be recognized this year.
- » **Justin Beltz**, Ph.D. candidate, won Missouri S&T's 3-Minute Thesis Competition. Beltz wowed the judges with a fascinating research presentation titled “Eye drops for non-invasive prevention of cataracts.”



Jay Switzer works in the electrodeposition lab with chemistry graduate student John Tubbesing, Chem'19. Photo by Andrew Layton/Missouri S&T.

## SPIN DOCTORS AT WORK WITH EPITAXIAL FILMS

S&T researchers have found an inexpensive, liquid-phase deposition method for creating high-performance, molecularly ordered thin films, or “epitaxial” films. The films, which are used to manufacture semiconductors for flexible electronics, LEDs and solar cells, are normally made using costly vapor deposition techniques.

The research was published in the April 2019 issue of *Science*.

“We’ve come up with a super-easy method that has never been done before to make these films from a solution using commercial spin coaters,” says **Jay Switzer**, the Donald L. Castleman/Foundation for Chemical Research Professor of Discovery in Chemistry, who directed the project. “This is an inexpensive and readily accessible route to single-crystal-like materials that should exhibit superior electronic and optical properties.”

Switzer’s work bridges the gap between chemistry and materials science, combining research efforts from both fields into his teams. Additional authors of this study are S&T’s **Meagan Kelso** and **Naveen Mahenderkar**, doctoral students in materials science and engineering; and **Qingzhi Chen** and **John Tubbesing**, doctoral students in chemistry.

## WHITEFIELD AND TEAM RECEIVE NASA GROUP ACHIEVEMENT MEDAL

In 2019 NASA honored five S&T researchers with the Group Achievement Medal for their participation in the NASA/DLR (German Aerospace Center) Multidisciplinary Airborne Experiment. The team was recognized for outstanding achievement conducting cruise-altitude and ground experiments to characterize fuel effects on aircraft engine exhaust composition and contrail microphysics. Contrails are the vapor trails aircraft produce at high altitudes.

**Philip Whitefield**, Chancellor’s Professor and professor emeritus of chemistry, directed the S&T portion of the project in a mission held in Germany. Team members included assistant research professor **Wenyan Liu**, senior electronics technician **David Satterfield**, Cloud and Aerosol Sciences Laboratory (CASL) senior research specialist **Max Trueblood**, and **Steven Achtenberg**, senior research specialist for CASL and the Center for Research in Energy and Environment.

The team’s data will be used to set parameters and improve microphysical and climate models to assess and predict the air quality and climate impacts of aviation. Their work addresses NASA’s strategic goal of advancing knowledge in aeronautics fundamentals and society’s need for greater production of clean-burning, renewable sources of energy.

Whitefield’s work in aviation emissions research during his nearly 30 years at S&T has brought in over \$25 million in research funding.





## IN MEMORIAM: RICHARD K. VITEK

**Richard K. "Dick" Vitek**, MS Chem'58, began his career as a research chemist for the Atomic Energy Commission producing uranium from ore. Then as a scientist with Allied Chemical Co., he developed solid oxidizers for rockets and missiles for the U.S. space program's Advanced Research Projects Agency. He worked for Aldrich Chemical Co. before founding three startups in the 1970s, including FOTODYNE, a pioneer in molecular imaging and the first company to manufacture lab instruments for DNA research. Working with the U.S. Coast Guard, Vitek developed UV imaging instruments that analyze oil spills to identify the tankers responsible. He then developed a method of testing arsenic levels in wine that led the Environmental Protection Agency to impose stricter limits on pesticide use in U.S. vineyards. Vitek's legacy includes an endowed chair in biochemistry and a graduate fellowship in analytical chemistry. He was also a past president of the Board of Trustees and trustee emeritus, and co-founder of the S&T Foundation for Chemical Research.

# ADVANCED INSTRUMENTATION SUPPORTS S&T'S BIOMEDICAL RESEARCH

The chemistry department acquired three high-priority instruments in 2019 to advance the University of Missouri System's collaborative research programs for bioanalytical drug discovery and dosage form design, including the NextGen Precision Health Initiative.

The instrument acquisition is an essential milestone toward building a centralized research facility at S&T — the Bioanalytical Drug Discovery and Pharmaceuticals Core User Research Lab, or "Bio CURE Lab," says chair and professor **Rainer Glaser**. The new instruments support Bio CURE labs for nanomaterials characterization, cell culture and radiation-approved bioanalytical chemistry research.

A total of \$570,000 for a new atomic force microscope, flow cytometer and Raman microscope was funded from combined contributions from S&T's vice chancellor of research and the provost. Additional support came from grants funding for associate professor **Risheng Wang**, **Anthony Convertine**, the Roberta and G. Robert Couch assistant professor of materials science and engineering, and associate professor **Vadym Mochalin**, as well as contributions from the Materials Research Center (MRC), the Center for Research in Energy, Environment (CREE), and the chemistry and materials science and engineering departments.

### BRUKER DIMENSION ICON ATOMIC FORCE MICROSCOPE (AFM)

This instrument offers the fullest advantage of high-resolution surface imaging on the order of fractions at the nanometer scale. Researchers and students use the AFM to study the topography, size, roughness and mechanical properties of nanomaterials, as well as biomolecules in liquid environments, says Wang, who maintains the microscope in Schrenk Hall.

### AMNIS CELLSTREAM FLOW CYTOMETER

The flow cytometer provides highly specific information about individual cells by measuring their size, count, cycle and more. Researchers and students use the instrument to develop cancer-targeting therapies. "These new chemotherapeutic agents are able to seek out and destroy cancer cells while ignoring healthy tissue," says Convertine, who manages the cytometer in McNutt Hall.

### RENISHAW INVIA RAMAN MICROSCOPE

The Raman microscope measures the vibrational modes of molecules, revealing their structure for identification. With this model, optimum focus is maintained in real time during data collection and white light video viewing. Vadym Mochalin manages the new Raman microscope, which is located in Schrenk Hall.

# CHEMISTRY STUDENTS ARE ACTIVE RESEARCHERS

Through a variety of undergraduate and graduate programs at Missouri S&T — many of which are supported by alumni donations — our students gain hands-on research experience. These are just a few of our students' projects.

## FIRST YEAR RESEARCH EXPERIENCE

The First Year Research Experience (FYRE) offered through the College of Arts, Sciences, and Business gives new students a chance to work one-on-one with a faculty mentor on a specific research project.

FYRE students pose questions, check data and create knowledge. The program is designed to improve critical thinking, communication, and presentation and leadership skills.

Chemistry student projects include:

- **Kayla Cashion** works with **Manashi Nath** on "Developing efficient nanobiosensors for continuous blood glucose monitoring and neurodegenerative diseases"
- **Henry Politte** works with **Rainer Glaser** on "Kinetics and mechanism of oscillating chemical reactions"
- **Christian Swanson** works with **Smitty Grubbs** on "Quadrature detection schemes in chirped pulse Fourier transform microwave spectroscopy"
- **Adam Willett** works with **Thomas Schuman** on "Synthesis of modified cement particles and characterization"
- **Isabella Feltenstein** works with **Paul Nam** on "Soy-based polyurethane foam for structural insulated panels."

## OPPORTUNITIES FOR UNDERGRADUATE RESEARCH EXPERIENCE (OURE), OURE FELLOWS

The Opportunities for Undergraduate Research Experience (OURE) program and its corresponding fellows program give students an idea of what graduate research is like while they're still undergraduates.

Chemistry students involved in the program are:

- **Lucas Albrecht** optimizes cyclic photo-CIDNP reaction for NMR pH measurements with **Klaus Woelk**
- **Isamar Alhakeem** works with **Dave Westenberg** on a synthetic biology approach to anaerobically digest glycerol to make ethanol
- **Kelsey Brakensiek** studies nuclear-spin relaxation in strongly coupled two- and three-spin systems with **Klaus Woelk**
- **Christopher Dempsey** works with **Rainer Glaser** on Rubisco-inspired biomimetic CO<sub>2</sub> sequestration from air using modified amino acids
- **Zachary Foulks** investigates pteridines and biomarkers of progressive breast cancer with **Honglan Shi**
- **Daniel Greenan** synthesizes monolithic porous carbon aerogels without use of supercritical fluid drying from polymer-crosslinked aerogels powders. He works with **Chariklia Sotiriou-Leventis**
- **Gabriel Hulliung** studies the way Ti-based Mxenes interact in organic solvents with **Vadym Mochalin**

- **Dania Isidro** and **Kaysi Lee** are studying the effect of nanodiamonds on transepithelial permeability of tiopronin with **Nural Ercal**
- **Lauren Kehoe** is using NMR spectroscopy to assess polymer chain hydration and mechanical rheology with **Klaus Woelk**
- **Kari Knobbe** is working on computational studies of rubisco with **Rainer Glaser**
- **Gladwin Labrague** is working on control of alkali-silica reaction interface development in cement composites with **Thomas Schuman**
- **Maycie Lubbers** is working on self-assembly of 2-D DNA arrays with **Risheng Wang**
- **Julia Marshall** is working with **Paul Nam** on an optical oxygen sensor to monitor packaged food quality
- **Sara McCauley** is studying the reaction kinetics of Belousov-Zhabotinsky oscillating reactions with **Rainer Glaser**
- **Zihao Meng** is studying spin coating semiconductors for photovoltaics with **Jay Switzer**
- **Stephen Murphy** is working on polar order in crystalline organic molecular materials with **Rainer Glaser**
- **Hannah Vinyard** is studying the beneficial effects of antioxidants on oxidatively challenged A549 cells with **Nuran Ercal**
- **Sean Welter** is studying subcutaneous glucose sensing with a hypodermic optical micro-needle with **Paul Nam**
- **Alyssa Weyl** is studying the design of targeted drug delivery for cancer therapy using DNA nanostructures with **Risheng Wang**
- **Nicole Wheeler** is working with **Honglan Shi** on method development for Nanova Portable GC
- **Emma Wideman** is evaluating nuclear-spin relaxation in strongly coupled two- and three-spin systems with **Klaus Woelk**
- **Sklor Wilson** is working to synthesize potential cathode materials in the vanadium phosphite family for lithium-ion batteries with **Amitava Choudhury**.



## MEET RACHEL MEYER



**Rachel Meyer**, Chem'18, a chemistry teacher at Washington (Mo.) High School, came to S&T with a passion for teaching and a fascination with science. Now she works to instill a healthy sense of curiosity in her students.

"Science teaches students valuable, everyday skills like problem solving and critical thinking, which allows them to develop a sense of curiosity and creativity," Meyer says. "Becoming aware of and understanding the chemistry taking place in the world around me was fascinating."

Now Meyer shares that fascination for science with her students.

"At first, my students were hesitant about chemistry and anticipated the course would be difficult," Meyer says. "Now, with a semester under their belts, they are striving to understand the how and why of chemistry."

Meyer's passion and enthusiasm about science keeps her students engaged.

"I am always trying new experiments and activities for students to gain hands-on experience and help them understand how the content applies to the world around them."

## ONLY GETTING BETTER

Schrenk Hall's west wing received more than a facelift in the last year. Aesthetic and functional improvements throughout the new open lab design, along with added instrumentation, were incorporated into first-floor teaching labs and the second- and third-floor research labs and offices.

On the first floor, hundreds of students in analytical, organic, inorganic and physical chemistry courses now work in attractive, well-lit lab spaces. Between two labs is a balance room equipped with scales sensitive to one milligram. There are snorkels at each workstation in the organic chemistry lab to eliminate solvent vapors during experiments. And the new fume hoods in the shared physical-inorganic chemistry lab include storage for flammable and corrosive chemicals.

The shared instrument lab, also on the first floor, serves students across all S&T departments. It includes a new infrared spectrometer with built-in attenuated total reflectance that allows samples to be examined in solid or liquid state without further preparation, making the instrument quite popular. Read more about new instrumentation on page 7.

On all floors, interaction between faculty and students is encouraged with the addition of open seating areas and small, glass-walled conference rooms.



Hoods and benches in the old organic chemistry laboratory in 304 Schrenk Hall have been replaced with the all-new, modern organic chemistry laboratory in 129 Schrenk Hall.

## CHEMISTRY STUDENTS PRESENT RESEARCH AT STATE CAPITOL

In April, two chemistry projects were among the 10 S&T student projects chosen to display for legislators during Undergraduate Research Day at the Capitol in Jefferson City, Mo. The annual event includes undergraduate researchers from all four UM System campuses.

**Zachary Foulks**, a junior in chemistry and biological sciences, presented "Identification of Brown Recluse Spider Pheromone Using SPME-GC-MS and Novel Bioassay Techniques," directed by **Honglan Shi**.

**Emily Johnson**, a senior in chemical engineering, presented "Discovering Mixed Transition Metal Based Selenides as Novel Oxygen Evolution Electrocatalysts," directed by **Manashi Nath**.

## TWO CHEMISTRY STUDENTS NAMED CHANCELLOR'S DISTINGUISHED FELLOWS

Chemistry graduate students **John Tubbesing**, Chem'19, and **Nicole Moon**, Chem'19, have been chosen as Chancellor's Distinguished Fellows. The fellowships, which provide \$10,000 in support for up to five years, are awarded to students to encourage them to begin and complete a Ph.D. at Missouri S&T.

Tubbesing works with **Jay Switzer** on economical ways to produce high-performance thin films for electronics. Tubbesing was also chosen as a student commencement speaker during December 2019 ceremonies.

Moon is a part of **Smitty Grubbs'** Microwave Spectroscopy Group. Her research has included interactions of oxygen with water and with hydrogen chloride.



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# 150 YEARS

## LET'S CELEBRATE MISSOURI S&T'S STORY

From our founding in 1870 as a pioneering technical school to our 21st century standing as a national university of science and technology, Missouri S&T's story spans a century and a half of remarkable change.

### GET SET TO CELEBRATE 150 YEARS OF MINER PRIDE!

A year of special events kicks off with MinerFest 150 in October 2020 and concludes with the Alumni of Influence celebration in November 2021. In between, mark your calendar in green for our biggest best ever festival — or “Bestival” — over St. Pat's Weekend in March 2021.

Watch for the publication launch in October 2020 of a commemorative book by Curators' Distinguished Teaching Professor emeritus Larry Gragg. His history of the university spans 150 years of Miner milestones, memories and mischief.

Visit [150.mst.edu](https://150.mst.edu) for more information.