

**Annual Report**  
2020-21

Department of

**Chemistry**



## CHEMISTRY AT ILLINOIS



Reflecting on the past year, I am rather amazed at all that's been accomplished in the Department of Chemistry through the innovation and dedication of our faculty, students, and staff. From creative, groundbreaking research that impacts the world to new initiatives that advance our core mission of educating the next generation of chemists with a spirit of inclusion, 2020-2021 was actually a pretty great year, in spite of COVID-19. We celebrated our newest alumni in May 2021, graduating 159 seniors and 56 graduate students. Reflecting on the recent past also reminds me of the generous support that we receive from our friends and alumni, a brilliant network of people across the globe. As we move forward, I am excited for continued progress on so many initiatives of the past year. The innovative COVID-19 test developed by members of our Department continues to play a key role in protecting people on campus and beyond. Architects are working on the design of a state-of-the-art addition to Roger Adams Laboratory. The most diverse class of chemistry graduate students, ever, is now on campus. Two new physical chemists, Mikael Backlund and Nick Jackson, joined our faculty in 2020-2021. And all our faculty, with their research groups, continue Illinois Chemistry's legacy of impactful, interdisciplinary scientific work, with more than \$23 million awarded last year by public and private sources for chemistry projects. I hope you enjoy this Illinois Chemistry year in review.

**Catherine J. Murphy**  
Head, Department of Chemistry  
Larry R. Faulkner Endowed Chair in Chemistry

## 2020-21 HIGHLIGHTS



### AUGUST 2020

Mikael Backlund joins the faculty

### OCTOBER 2020

Virtual Alumni Career Panel with Tripta Holtz (BS, '10), Yantao Hughes (PhD, '03, van der Donk), Mark Pytosh (BS, '86), and Olseni Sode (PhD, '12, Hirata)



### NOVEMBER 2020

Renovation/expansion of Roger Adams Laboratory approved by U of I Board of Trustees



### JANUARY 2021

Nick Jackson joins the faculty

### MARCH 2021

Women's History Month faculty panel features Catherine Murphy (UIUC), Lisa Olshansky (UIUC), Quinetta D. Shelby (PhD, '99, Girolami)



### APRIL 2021

Ralph Nuzzo and Wilfred van der Donk elected to National Academy of Sciences



### JUNE 2021

Asian American Pacific Islanders Celebration features Marinda Wu (PhD, '76, Drago)

### JULY 2020

Virtual event, Conversation with Leadership: Looking Back and Looking Ahead, features new department head Cathy Murphy and previous head Martin Gruebele

### AUGUST 2020

New NSF Artificial Intelligence Institute includes multiple faculty: Martin Burke, Scott Denmark, Charles Schroeder, M. Christina White, and Huimin Zhao



### OCTOBER 2020

Hye Kyung Timken (PhD, '87, Oldfield) receives LAS Alumni Achievement Award; presents Alumni Lecture



### NOVEMBER 2020

Markita Landry (PhD, '12, Chemla) receives UIAA Young Alumni Award

### MARCH 2021

Seven students selected NSF Graduate Student Fellows

### MARCH 2021

UI System's COVID-19 saliva test (creation included chemistry faculty) gains FDA emergency authorization for use beyond campus



### APRIL 2021

Nancy Makri and Kenneth Schweizer elected to American Academy of Arts and Sciences



### JUNE 2021

Royal Society of Chemistry awards Ken Suslick the Theophilus Redwood Award



Image to left: Heyu Chen

Unless otherwise indicated, all data in this report is for 2020-21.

# Alumni

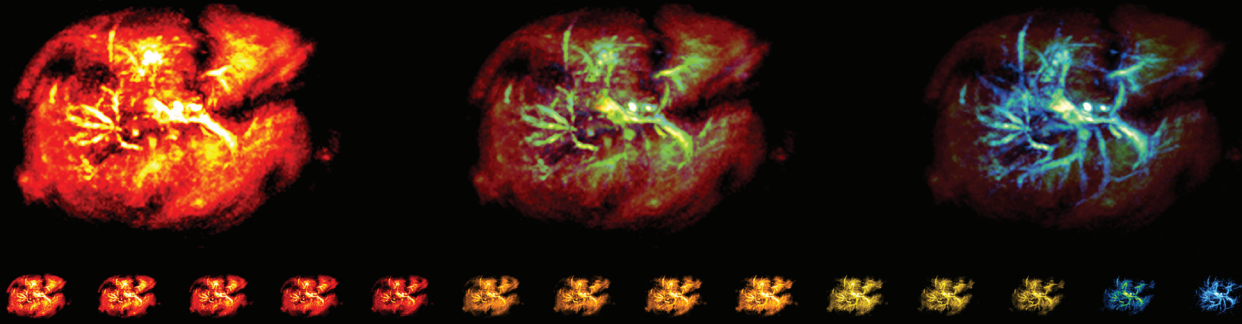


Image: Melissa Lucero



Photo by Andy Lopez

## Chemistry at Illinois graduates land first destinations

Before Philip Kocheril graduated as a UIUC Senior 100 Honorary Recipient in the Class of 2021, the chemistry major had already been offered a position at Los Alamos National Laboratory. The annual Illini Success survey again shows that most students graduating with a bachelor's degree from the Department of Chemistry landed their first destination after graduation despite workforce challenges created by the pandemic. A Barry Goldwater Scholar, Kocheril accepted the Los Alamos laboratory position, and in a few years, hopes to apply to PhD programs, he said. An accomplished musician and member of the

nationally-acclaimed UIUC Concert Jazz Band, Kocheril was also an undergraduate researcher for adjunct chemistry professor Benjamin McCall and chemistry professor Steve Zimmerman. Kocheril said being a chemistry major at UIUC changed his life in the best possible way.

"I'm so deeply grateful for the experiences I've had here, and although I'm sad to leave Champaign-Urbana, I can't wait to start the next chapter of my life," he said shortly after graduation in May 2021.

## GRADUATE SUCCESS

### CLASS OVERVIEW

Secured First Destination 93%

### PRIMARY STATUS

Employed 47%  
Continuing Education 46%  
Seeking 7%

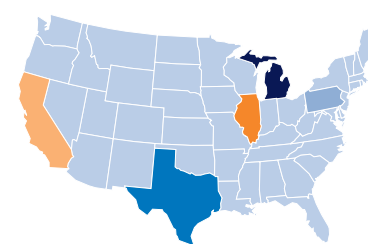
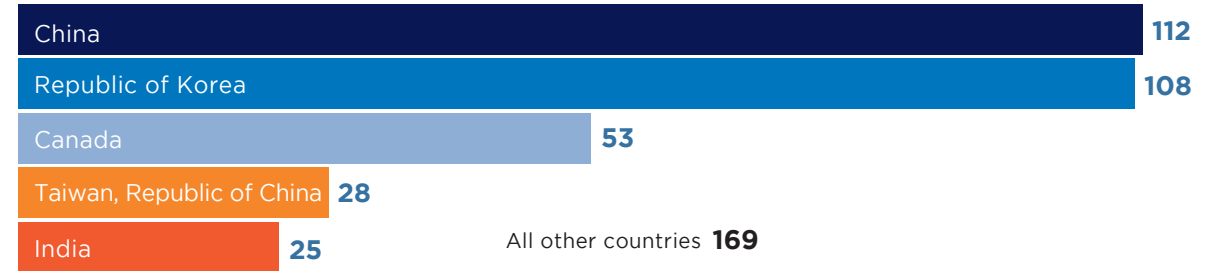
### FULL TIME EMPLOYED SALARY

Average Salary \$ 70,011.00  
25th Percentile \$ 65,000.00  
50th Percentile \$ 72,000.00  
75th Percentile \$ 75,500.00

Graduate success data is self-reported and represents a 56% response rate (180 of 323) from those who received an undergraduate degree in 2019-2020 from the School of Chemical Sciences (Department of Chemistry and Department of Chemical and Biomolecular Engineering). Visit [illinisuccess.illinois.edu](http://illinisuccess.illinois.edu) for more information.

## 9796 ALUMNI FROM 54 COUNTRIES

### Top 5 countries outside U.S. for Alumni



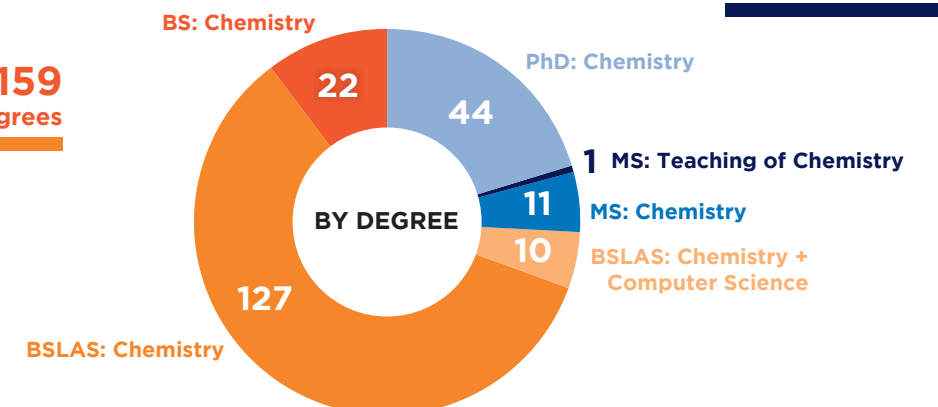
### Top 5 U.S. states for Alumni

	#	% of U.S. total
Illinois	3478	37%
California	821	9%
Pennsylvania	329	4%
Texas	317	3%
Michigan	255	3%
<b>Total of Top 5</b>	<b>5200</b>	<b>56%</b>

## GET TO KNOW OUR NEWEST ALUMNI

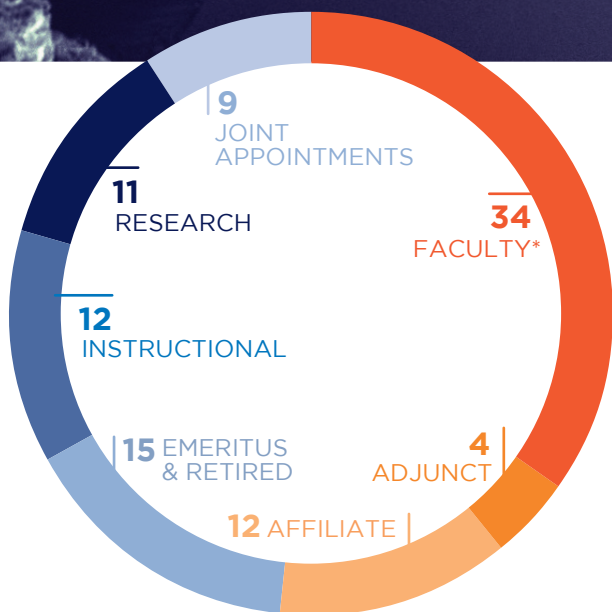
215 graduated 2020-21

159 Undergraduate Degrees



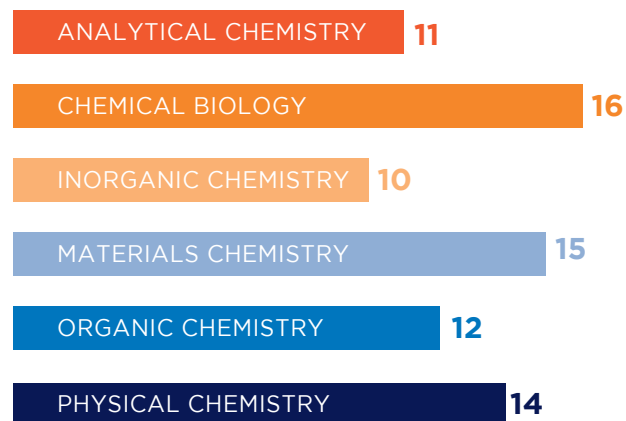
# Faculty & Research

97  
FACULTY



\*Includes full- and part-time

## TENURE-TRACK FACULTY BY RESEARCH AREA\*



\*Several faculty conduct research in multiple areas

Image: Aastha Sharma

## Remembering Chemistry at Illinois Professor Peter Beak



The Department lost an inspirational figure when Peter Beak

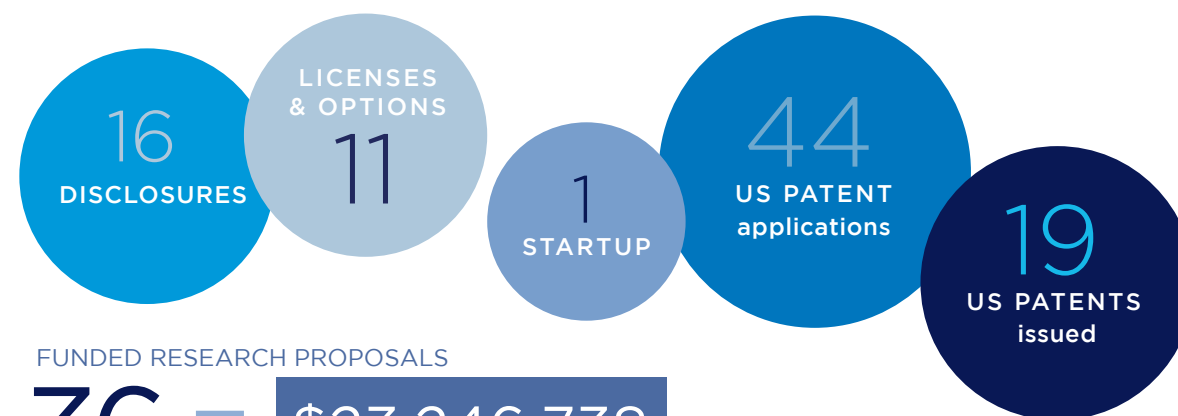
passed away on Feb. 21, 2021, at the age of 85. An internationally acclaimed organic chemist and UIUC professor for nearly 60 years, Beak was a role model for generations of faculty and students. With a BA degree from Harvard University and a PhD from Iowa State, Beak joined Illinois chemistry in 1961 as an instructor and was promoted to Professor of Chemistry in 1970. Over the next several decades, he made fundamental contributions to organic chemistry and served as research advisor for more than 100 graduate and postdoctoral students who have made significant independent contributions in their own fields.



## Startup, cystetic Medicines, to develop treatment for cystic fibrosis

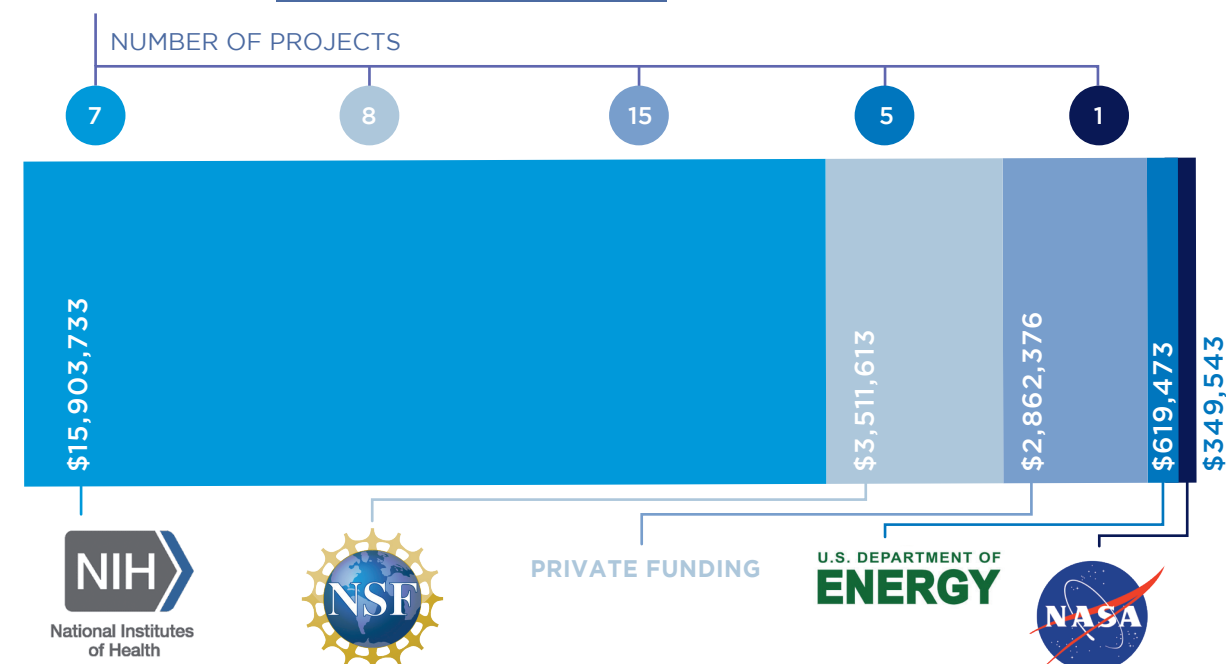
A research team led by Martin Burke, May and Ving Lee Professor for Chemical Innovation and Professor of Chemistry, developed a new treatment that could help all people with cystic fibrosis, a disease that causes persistent lung infections that limit the ability to breathe. Those with CF have a missing or defective ion channel protein in their lungs that is necessary to fight infection. Burke's team discovered that the ion channel-forming drug amphotericin (used to treat fungal infections) restored the infection-fighting abilities in cells of people with CF, acting like a prosthesis on the molecular level. The research led to the founding in 2020-21 of the startup company, cystetic Medicines, which is developing the treatment into a transformative new therapy for people with CF.

## 2020-21 RESEARCH ACHIEVEMENTS

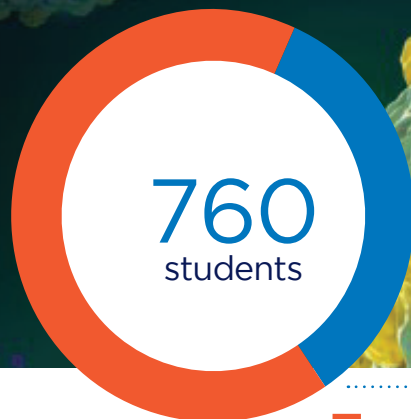


## FUNDED RESEARCH PROPOSALS

36 = \$23,246,738



# Students



**468**  
undergraduate

**105**  
(22%) participated in research

**43**  
(9%) received a departmental/  
donor-funded scholarship

**\$206,000**  
awarded in departmental/  
donor-funded scholarships

**292**  
graduate

**FUNDING**

**45**  
Full Fellowships

**147**  
Research  
Assistantships

**100**  
Teaching  
Assistantships

## FELLOWSHIPS (full & partial)

<b>11</b> Campus	<b>11</b> External: NSF
<b>191</b> Departmental/Donor- Funded	<b>12</b> External: Other

Image: Xing Wang Lab

## Illinois Chemistry admits most-diverse-ever graduate student class



In May 2021, the Department of Chemistry admitted its newest class of graduate students, a historic group that includes more women (32) than

men (30) for the first time in program history. The class is mostly PhD candidates (61) plus one Master of Science in Teaching Chemistry student and includes 12 (26 percent) who are students underrepresented in the chemical sciences, an increase of 3 percent over the previous year. Enleyona Weir, the Department's first St. Elmo Brady Scholar in the summer of 2019, is a member of this new graduate student class. The scholar program provides summer research opportunities at Illinois for undergraduates from Tougaloo College, Howard University, Fisk University, and Tuskegee University—four Historically Black Colleges and Universities (HBCUs) whose chemistry programs were founded by Illinois alum St. Elmo Brady, the first African American to receive a PhD in chemistry in the U.S. The program, Weir said, was the reason she applied to Illinois chemistry.

"I knew from that experience that if I continued to pursue chemistry at an advanced level, UIUC would be the institution," she said.

## GET TO KNOW OUR INCOMING UNDERGRADUATE STUDENTS

**98**  
INCOMING  
UNDERGRADUATE  
STUDENTS

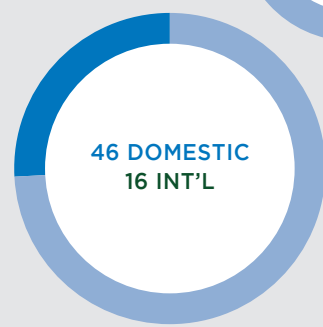
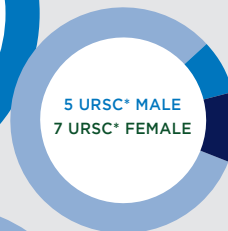
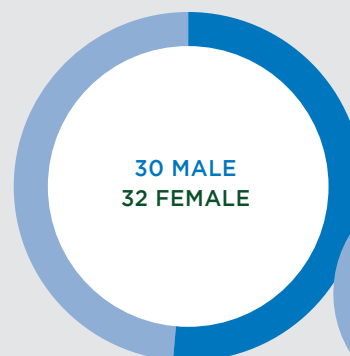


This data is for our newest class of students—  
incoming in 2021-2022.

\*Students Underrepresented in the Chemical  
Sciences (URSC)

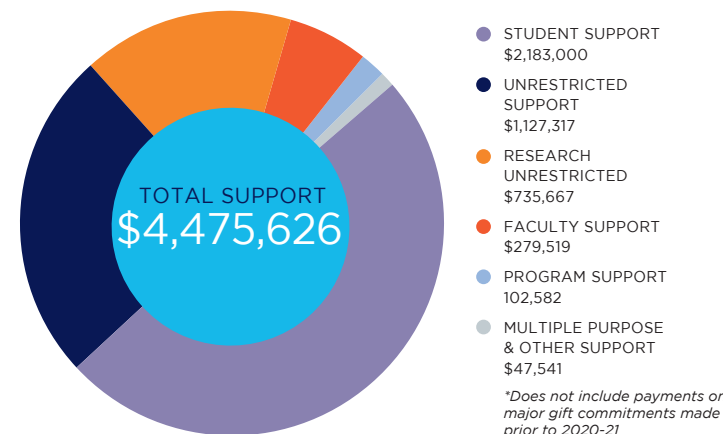
## INCOMING GRADUATE STUDENTS

517 → 203 → 62  
APPLICANTS OFFERS ACCEPTED



Thank You

Image: Hwei-Hwei Chang



394  
DONORS

545  
GIFTS

\$4.47 MILLION  
IN GIFTS & COMMITMENTS\*

The incredible generosity of our alumni and friends helps ensure our place as a world-class chemistry program – conducting groundbreaking research, recruiting the brightest faculty, and training the next generation of leaders in the chemical sciences.

Donor support serves as a source of inspiration, encouragement, and pride for our students and faculty, creating collective impact that goes far beyond the value of the individual gifts. Thank you for your generosity and partnership!

*For more information about supporting the Department of Chemistry, please visit [chemistry.illinois.edu/giving](http://chemistry.illinois.edu/giving).*

## NEW GIFT FUNDS

Dr. Ward W. Smith Chemistry Scholarship Fund  
Janet M. Buhrke and Victor E. Buhrke Chemistry Quasi Fund  
Professor Douglas E. Applequist Chemistry Fund  
Robert C. and Carolyn J. Springborn Endowment for Student Support Fund  
TM Balthazor Faculty Scholar Endowment Fund  
T.S. Piper Award in Chemistry Fund

\*Does not include funds created for direct support of individual faculty or other administrative purposes.



### Dr. Ward W. Smith Chemistry Scholarship

This new scholarship was established in 2020 by Dr. Cheryl Janson in memory of her late husband, **Dr. Ward W. Smith** (BS, '71), who passed away in July 2020.

The first recipient of the Dr. Ward W. Smith Chemistry Scholarship is **Lizbeth Garcia Lopez**, an undergraduate chemistry major in the Class of 2023 who plans to attend medical school and become a dermatologist.

As a first-generation American and first-generation college student, Lopez shared how much she appreciates this donor-funded scholarship.

“As an undocumented DACA recipient, I do not qualify for FAFSA and the scholarship opportunities I have are limited,” Lopez said. “Donor gifts like these have tremendously helped to alleviate the financial strains of pursuing a higher education.”

After graduating with a bachelor’s degree in chemistry from Illinois in 1971, Smith completed his PhD in 1977 at the University of Michigan and went on to postdoctoral work at the University of California, Los Angeles, where he met Janson, who was also a postdoctoral researcher in chemistry.



Most of Smith’s career was in private industry, starting at Monsanto as a structural biologist, then Agouron Pharmaceuticals in structure-based drug design, then the Department of Structural Biology at GlaxoSmithKline, where he developed expertise in synchrotron macromolecular crystallography.

In 2003, he joined the GM/CA-CAT beamlines at the Advanced Photon Source at Argonne to help build that facility, and later became program director in the Division of Cell Biology and Biophysics at the National Institute of General Medical Sciences (NIGMS). There, he managed the National Institutes of Health supported synchrotron and the Protein

Structure Initiative, receiving an NIH Director’s Award. He was also involved in oversight of the NIH-funded ABBIX project to build three beamlines at the National Synchrotron Light Source II, and in 2017, became program director for NIH-support of structural biology beamlines at NSLS-II and other Department of Energy synchrotrons.

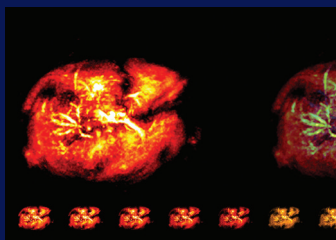
Smith once said that being able to work at something you enjoy is an invaluable gift: “I have always felt fortunate to have a career, rather than merely a job.”

The science images appearing in this report were created by students, faculty, and postdoctoral researchers in the department.



**Heyu (Betty) Chen** (Jeffrey Moore Group)

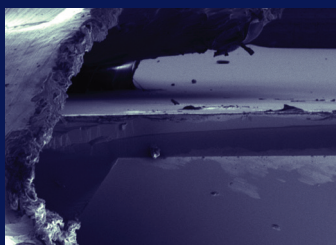
Color change is one of the important signs of reaction. During the workup of this Friedel-Crafts acylation, the rusty color solid spontaneously changed to yellow upon the addition of hydrochloric acid, indicating the formation of ketone.



**Melissa Lucero** (Jefferson Chan Group)

*Image title: A lot to liver*

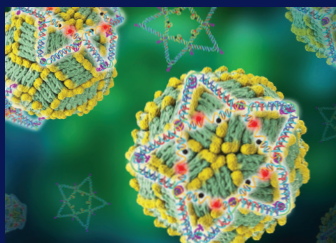
Photoacoustic imaging enables deep-tissue imaging by using light to generate ultrasound like in this image of the whole liver across the near-infrared spectrum (680-900 nm, colored red-blue). At the same imaging depth, endogenous chromophores absorb light more strongly at specific wavelengths (i.e. tissue absorbs less light at 900 nm).



**Aastha Sharma** (Josh Vura-Weis Group)

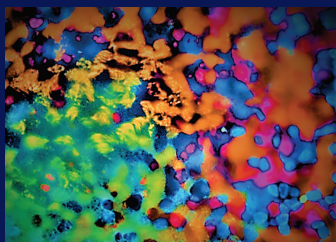
*Image title: Serene apocalypse*

Shown here is a color-corrected scanning electron micrograph of a multilayer semiconductor thin film with carbon tape used to minimize charging effects. Carbon tape with its rugged structure looks like a broken structure after an explosion. Layered film, looking like an ocean with sky's reflection, however, symbolizes serenity before destruction.



**Xing Wang Lab** (Department of Chemistry)

The image depicts an artistic representation of star-shaped DNA nanostructures binding to the surface of dengue virus particles in a polyvalent, pattern-matching fashion for rapid/sensitive diagnosis and potent inhibition of viral infections.



**Huei-Huei Chang** (Catherine Murphy Group)

*Image title: Resilience in the Darkness*

This processed, confocal fluorescence image shows human lung differentiation: epithelial cells recovered from aerosol exposure and differentiated into goblet (green), ciliated (orange) and club (red) cells. Nuclei are stained in blue. I hope this image encourages everyone during COVID-19 pandemic. Our cells bounce back. So do we!

On the Cover

**Tianle Chen** (Emad Tajkhorshid Group)

*Image title: Fatal Coronavirus Spike Forest*

SARS-CoV-2 enters human cells with its spike proteins binding to human receptor and mediating membrane fusion. Here is our simulation model of the coronavirus surface with its periodic replicas, containing envelope proteins (orange), membrane proteins (pink) and spike proteins. The rendering is performed using VMD. We acknowledge the assistance from Karan Kapoor, Barry Isralewitz and John Stone.



College of Liberal Arts & Sciences  
**Department of Chemistry**

600 South Mathews Avenue  
Urbana, Illinois 61801

(217) 333-5071

[chemistry@illinois.edu](mailto:chemistry@illinois.edu)

[www.chemistry.illinois.edu](http://www.chemistry.illinois.edu)