

NEWS/RESEARCH



Medicines for All Institute targets COVID-19

Gilead Sciences' remdesivir, called Veklury, was the first fully approved COVID-19 drug treatment in the U.S. To improve the supply chain and prevent global shortages of the antiviral medication, researchers at VCU Engineering's Medicines for All Institute developed a more efficient way to synthesize a key component of remdesivir from readily available raw materials. They also demonstrated multiple novel, efficient synthetic routes that can be used for the large-scale manufacture of molnupiravir, an oral medication that is being evaluated to treat COVID-19.

GROWTH

NOW OPEN: the Engineering Research Building

VCU Engineering held a different kind of grand opening for its new Engineering Research Building. To comply with restrictions because of the COVID-19 pandemic, a large audience of well-wishers gathered by Zoom Feb. 3 to see university officials, architects, builders and civic leaders cut the ribbon on the 133,000-square-foot research and workforce development hub.

The building facilitates expanded public-private partnerships in VCU Engineering research. Construction of the \$93 million facility was funded by taxable bonds, which allows VCU Engineering to work closely with industry to conduct translational research. These collaborations support the college's mission to train students in real-world engineering, often alongside industry professionals. The Engineering Research Building also includes a 9,000-square-foot makerspace and a fully wired courtyard for working outdoors.



FROM THE CHAIR



B. Frank Gupton, Ph.D.

Floyd D. Gottwald, Jr. Chair in Pharmaceutical Engineering
Chair, Department of Chemical and Life Science Engineering
CEO, Medicines for All Institute

The Department of Chemical and Life Science Engineering at VCU Engineering is rapidly becoming a national leader in academic research. Research efforts of our faculty include:

- **James K. Ferri, Ph.D.**, improving the supply network for medicines
- **Stephen S. Fong, Ph.D.**, mapping urban heat islands and air pollution
- **Ram B. Gupta, Ph.D.**, developing next-generation rechargeable batteries
- **Nastassja A. Lewinski, Ph.D.**, developing coral lines to save coral reefs
- **Michael H. Peters, Ph.D.**, investigating the coronavirus spike protein
- **Christina Tang, Ph.D.**, inventing smart fabrics that change color at different temperatures
- **Vamsi Yadavalli, Ph.D.**, developing biomedical films derived from cuttlefish ink and silk.
- Medicines for All Institute (**B. Frank Gupton, Ph.D.**, **Mo Jiang, Ph.D.**, and **Thomas D. Roper, Ph.D.**) pivoting to COVID-19 treatments

All together, our annual research expenditures of more than \$1 million per faculty member this year helped to land us among the top echelons of academic institutions in the U.S.

\$12M+

IN RESEARCH EXPENDITURES

52

ISI INDEXED REFEREED PUBLICATIONS

AREAS OF RESEARCH

- Nanotechnology
- Pharmaceutical engineering
- Materials science
- Systems biology
- Energy technology



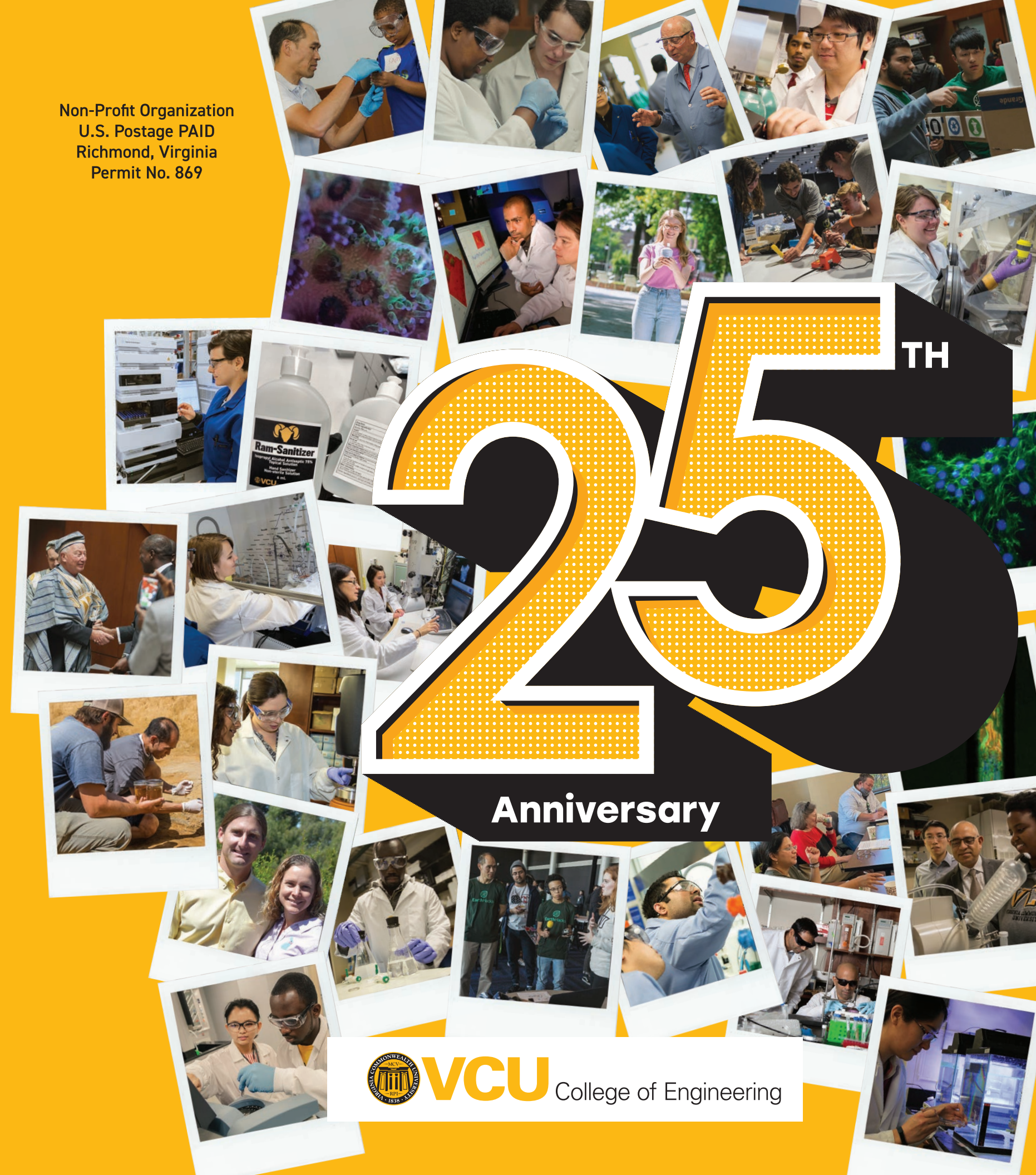
601 West Main St.
Box 843068
Richmond, VA 23284-3068

egr.vcu.edu/clse

- /VCUEngineering
- @VCUEngr
- @VCU_Eng
- egr.vcu.edu/linkedin
- VCUEngineering

21-0008

Non-Profit Organization
U.S. Postage PAID
Richmond, Virginia
Permit No. 869



2020 - 2021 Annual Review
VCU Engineering
 Engineers Make It Real.
Chemical & Life Science Engineering

Coral cell culture research

Nastassja Lewinski, Ph.D., is working to advance in vitro testing capabilities for studying the effects of environmental changes that can lead to bleaching, disease and toxicity in reef-building corals. In a recent study, her group established a framework for the development of immortal coral cell cultures. She is also part of a multi-institutional, multi-disciplinary research team that has proposed a digital image processing approach to detect and visualize subtle motion in coral.

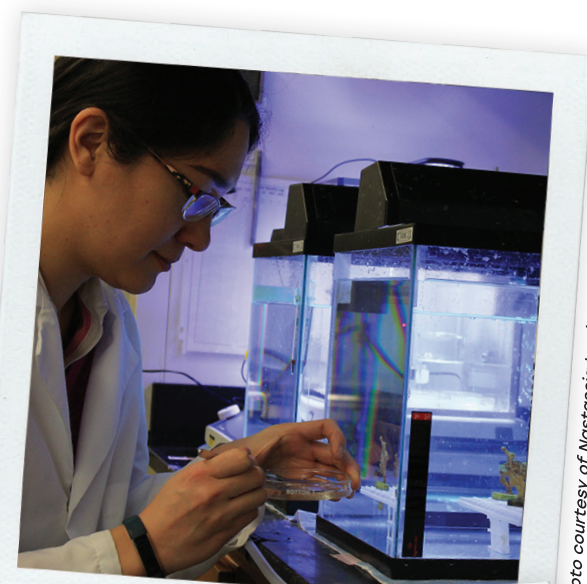


Photo courtesy of Nastassja Lewinski, Ph.D.

Digitizing the supply network for medicines

James K. Ferri, Ph.D., is working to make it easier for manufacturers in the U.S. to produce critically needed medicines here, instead of overseas. These include in-demand active pharmaceutical ingredients related to COVID-19 and several on the federal government's Strategic National Stockpile list.



Specialty catalysts for pharmaceutical applications

B. Frank Gupton, Ph.D., received grant funding from the Commonwealth Research Commercialization Fund for his work to develop specialty catalysts for pharmaceutical applications. His research, which focuses on novel approaches to producing active pharmaceutical ingredients, is improving global access to medications and helping boost drug manufacturing in the U.S.



Examining mutations of SARS-CoV2

Michael H. Peters, Ph.D., has been investigating the mutations of the spike protein in several variants of the coronavirus. Studying how the protein functions offers clues about what could make some variants more dangerous. Closely watching for mutations or deletions at the protein's key internal binding points of attachment, which he has mapped out, can help scientists anticipate future threats.



Seeking to improve air quality during pandemic

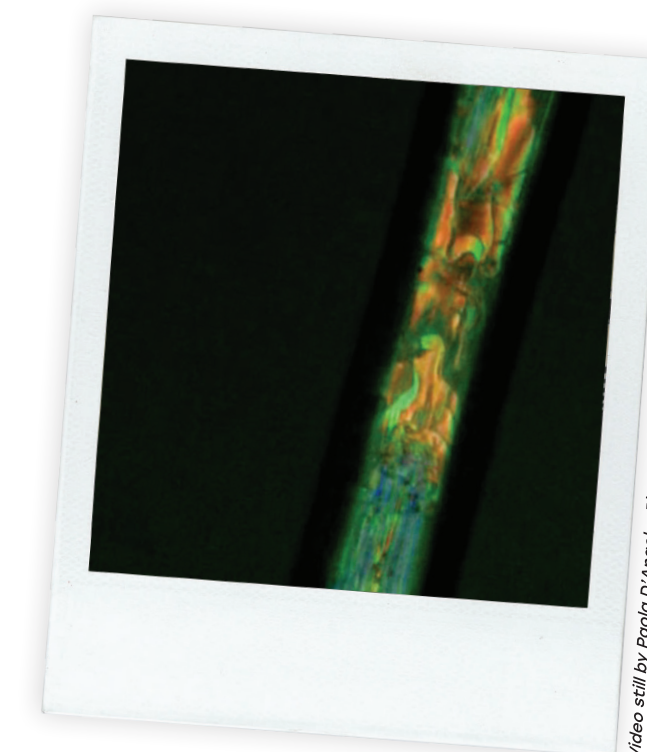
In collaboration with the Science Museum of Virginia, **Stephen Fong, Ph.D.**, is using real-time monitoring sensors in Richmond, Virginia, to study air pollution such as particulate matter, or tiny pieces of soot and other contamination. Next, the project will expand to include remote and airborne instrumentation. The coronavirus pandemic has raised the stakes, as a national study published in Science Advances in November 2020 has shown that areas with higher levels of particulate matter experience increased mortality rates from COVID-19.

Postdoc receives corals research award

Liza Roger, Ph.D., has received a 2021 Early Career Training Program Award from the Coral Bleaching Research Coordination Network, an interdisciplinary program funded by the National Science Foundation. Roger is a postdoctoral researcher in the lab of **Nastassja Lewinski, Ph.D.** Lewinski is leading coral cell culture research at VCU as part of a multi-university team researching ways to harness the data revolution in biology with machine learning to study coral biology and growth.



Photo courtesy of Liza Roger, Ph.D.



Video still by Paola D'Angelo, Ph.D., U.S. Army Combat Capabilities Development Command

Spotlight on students developing smart fabrics

Undergraduate students **Jimmy Nguyen** and **Ratib Stwodah**, from the lab of **Christina Tang, Ph.D.**, were featured in the International Fiber Journal, which covers fiber-related trends and material science developments. Nguyen and Stwodah have been working on a project to develop smart fabrics that change color at different temperatures.

Undergrad wins AIChE award

Emma Madrigal, who is majoring in chemical and life science engineering, received the American Institute of Chemical Engineers (AIChE) 2019-2020 Donald F. Othmer Sophomore Academic Excellence Award. Serving as president of the Society of Women Engineers at VCU, Madrigal hopes to work in process scale-up in the pharmaceutical industry.



Photo courtesy of Emma Madrigal

Wendy Jiang Scelia wins 10 Under 10 Award

Entrepreneur **Wendy Jiang Scelia (B.S.'11)**, won a VCU 10 under 10 Award. She is CEO and co-founder of hospitality software firm Tablee. In 2020, Scelia founded her second startup, Olivian, a manufacturer of domestically produced, high-quality medical-grade face masks.

By VCU Office of Development and Alumni Relations



Photo credit: -Jud Frolich, Development and Alumni Relations

Chemical engineering students compete to brew best coffee

First-year students applied fundamental chemical engineering concepts to brew the optimal cup of coffee. **Thomas D. Roper, Ph.D.**, revamped a traditional lecture class into a series of labs in which students tested filtration methods and coffee grind sizes to design a cup of coffee that would impress a panel of judges.

