

Russ College Researchers Reap Revenue

The last year has brought new advances in high-tech research at the Russ College—and attention from leaders across Ohio.

The state of Ohio has awarded Ohio University, Russ College, and partners several major grants for research into bioinformatics and clean energy technology. Totalling almost \$16 million, the state funding will help continue to advance the Russ College to the forefront of state-of-the-art research and development—as well as create and strengthen influential connections with other institutions.

In March, an Ohio University-led proposal was among just seven to earn funding in the first round of the new Choose Ohio First Scholarship Program, giving the Ohio Consortium for Bioinformatics \$4.475 million for student scholarships.

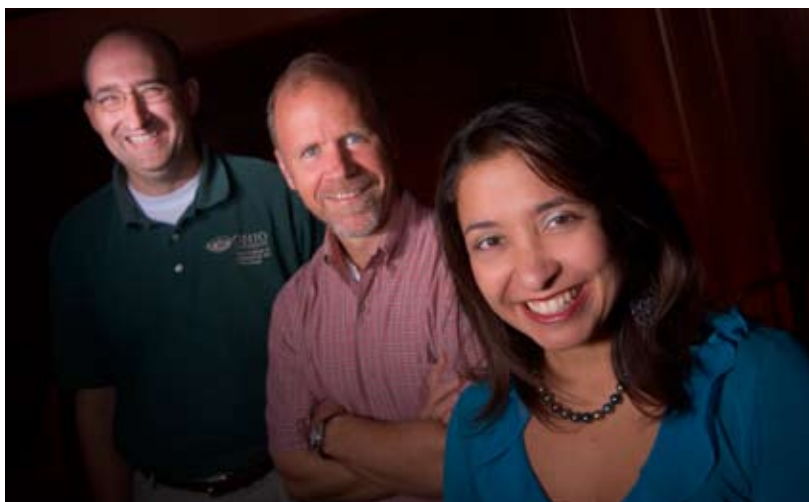
Ohio University and the Russ College are partnering with 11 other colleges and universities—and the Ohio Supercomputer Center, the Ralph Regula School of Computational Science, and industry leaders—to attract and graduate an estimated 345 students in science, technology, engineering, mathematics, and medical fields over five years. Partners in the consortium will contribute more than \$4.6 million to develop programs, expand offerings, and cover other related costs.

Bioinformatics is the field of science in which biology, computer science, and information technology merge to form a single discipline that relies on high-performance computing to analyze large amounts of data. It can assist in efforts as diverse as finding cures for diseases, making advances in agriculture, and enhancing industrial opportunities.

One of the fastest-growing areas in science, the need for bioinformatics has been driven by the vast amount of data that now can be generated by such technologies as DNA sequencing.

Lonnie Welch, Stuckey Professor of Electrical Engineering and Computer Science in the Russ College, has been working for several years to bring bioinformatics experts across the state together. He and Terry Lewis, M.F.A. '78, of the Ohio Supercomputer Center, organized the first Ohio Collaborative Bioinformatics Conference, held on the Athens campus in 2006.

With the funding, Welch envisions the state taking a leadership role in a field that has the potential to help society in endless ways and create thousands of jobs across Ohio.



(L to R): **Dave Bayless, Lonnie Welch, and Gerri Botte**

“I’ve seen the expertise we have around the state of Ohio in this field,” Welch said. “By pulling together that expertise, we can form a very strong entity that covers all the areas of bioinformatics. Each of us complements what the other is doing. That’s going to be unique in the nation.”

The Russ College also continues to spearhead research efforts into cleaner, more sustainable energy and environmental protection. Gerardine Botte, associate professor of chemical and biomolecular engineering, was awarded \$973,992 in April to establish the Center of Excellence on Advanced Electrochemical Technologies.

The money comes from Ohio’s Third Frontier program for research and economic development, and will go towards the purchase of new equipment and renovation of facilities in Stocker Center and the University’s research park in Athens, along with salaries of a research technician and two postdoctoral student fellows.

Botte, already internationally recognized for her research on and development of ammonia and hydrogen-based fuel cells, intends to expand her research on new technologies. Projects include electrochemical sensors for wastewater treatment; hydrogen production from electrolysis of unconventional fuels such as ammonia, ethanol, and wastewater; ammonia and solid-oxide fuel cells; and waste remediation technologies.

Botte currently manages the Electrochemical Engineering Research Laboratory, which employs both graduate and undergraduate researchers and will be incorporated into the center of excellence. Her research also receives funding from the U.S. Department of Energy.

“The Third Frontier program will really help us reach our goals,” Botte said. “Being recognized by both national and international programs will help attract more attention and investment.”

While Botte and her colleagues work on innovating new methods of energy production and storage, new state funding is also going to cutting-edge research on improving existing technologies.

The state of Ohio’s Research Scholars Program awarded Ohio University and lead partner The Ohio State University almost \$10.5 million this year to establish a collaborative cluster in advanced energy systems. The grant links Ohio University’s research on cleaner coal technologies with similar efforts at Ohio State.

Russ College researchers have received more than \$8 million since 2000 to determine more efficient ways to generate electricity and heat from coal—while creating less pollution. Led by Professor of Mechanical Engineering Dave Bayless, also director of the Ohio Coal Research Center, Russ College faculty, researchers, and students are studying fuel cells, converting coal to syngas (gasification) to make electricity and fuels, and using algae to reduce greenhouse gas emissions from coal.

As part of the grant, Ohio University and Ohio State each received one endowed research scholar position. Ohio University’s endowed chair in coal research was created with about \$2.5 million from the award, with matching funds from Russ College endowments.

Bayless said that the funding will expand Ohio University’s already extensive and well known research in converting coal to clean energy. “Hiring an expert faculty member will advance the critical area of turning coal to a variety of products, such as fuels and chemicals, in addition to electricity,” he said. “It’s clear that as a nation, we have to move towards less dependence on foreign oil and coal conversion must be part of that effort.”

Funds are also being used to support coal research staff and graduate students and to upgrade research space for the Russ College’s Institute for Sustainable Energy and the Environment. The institute, the umbrella organization for the Ohio Coal Research Center and the Center for Air Quality, also oversees laboratories that specialize in fuel cells and biofuels.

Ohio University clean coal research is part of a larger research initiative, the Consortium for Energy, Education and the Environment (CE3), launched in 2003. It unites engineers in fuel and air quality research with scientists and scholars in the College of Arts and Sciences and Voinovich School of Leadership and Public Affairs who study watershed reclamation and develop government policy solutions.

“This is an affirmation of the work we’ve been doing over the last five years, building relationships across the University and with other university partners,” said Scott Miller, CE3 director. “The new funding will build Ohio University’s ability to meet the advanced energy research needs for the state of Ohio.”

Mary Alice Casey; Spencer Elliot; Andrea Gibson, B.S.J. '04; and Katie Quaranta contributed to this story.

Air Force Partnership Shows Promise

Project aids development of better planes, spacecraft

Several Russ College projects have received major recognition from across the state in the last year—and one has gotten national attention. The Russ College is partnering with several leaders in the aerospace industry on a \$1.6 million federal project to research and develop the next generation of heat exchangers for military airplanes and spacecraft.

In a project launched last November, Ohio University’s Center for Advanced Materials Processing is working with GrafTech International, the Ohio Aerospace Institute, and Air Force Research Laboratories to develop the exchangers.

Khairul Alam, the University’s Moss Professor of Mechanical Engineering and researcher in charge of its part in the project, said the heat exchangers represent an exciting new technology because they have the potential to increase efficiency and decrease emissions in military planes.

U.S. Rep. Charlie Wilson, who worked to secure federal funding for the project alongside Sen. George Voinovich, was optimistic that the research will be at the forefront of modernizing military technology and spurring economic development in Ohio.

“We have research and technology for our military going on right here in Athens, Ohio, and that makes me proud,” Wilson said.

Heat exchangers serve a variety of purposes on military and commercial aircraft, such as oil coolers and fuel heaters. The heat exchangers under development are made from carbon foam, and will weigh up to 40 percent less than ones now in use, conserving energy, saving money, and increasing aircraft lifespans. According to Alam, they could be adapted for commercial uses in jetliners and even home heating systems and refrigerators.

“This is the next generation of heat exchangers that will allow people to make more energy-efficient products,” Alam said.

Alam is working with several Ohio University graduate students to develop models to test various configurations of the foam, allowing them to determine how to make it both conductive and cost-effective.

GrafTech, a leading carbon and graphite products manufacturer based in Parma, Ohio, ultimately will manufacture the heat exchangers.

