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Winter 2013

A scientist for the
21st century

Dr. Bin Wang
Marshall University

West Virginia Higher Education Policy Commission



WV EP SCOR



BIN WANG: Marshall University

Growing up, Bin Wang had no problem finding a role model to inspire her to pursue a career in science.

Her father was an organic chemist and her mother was a physician.

"I had two examples at home," she says.

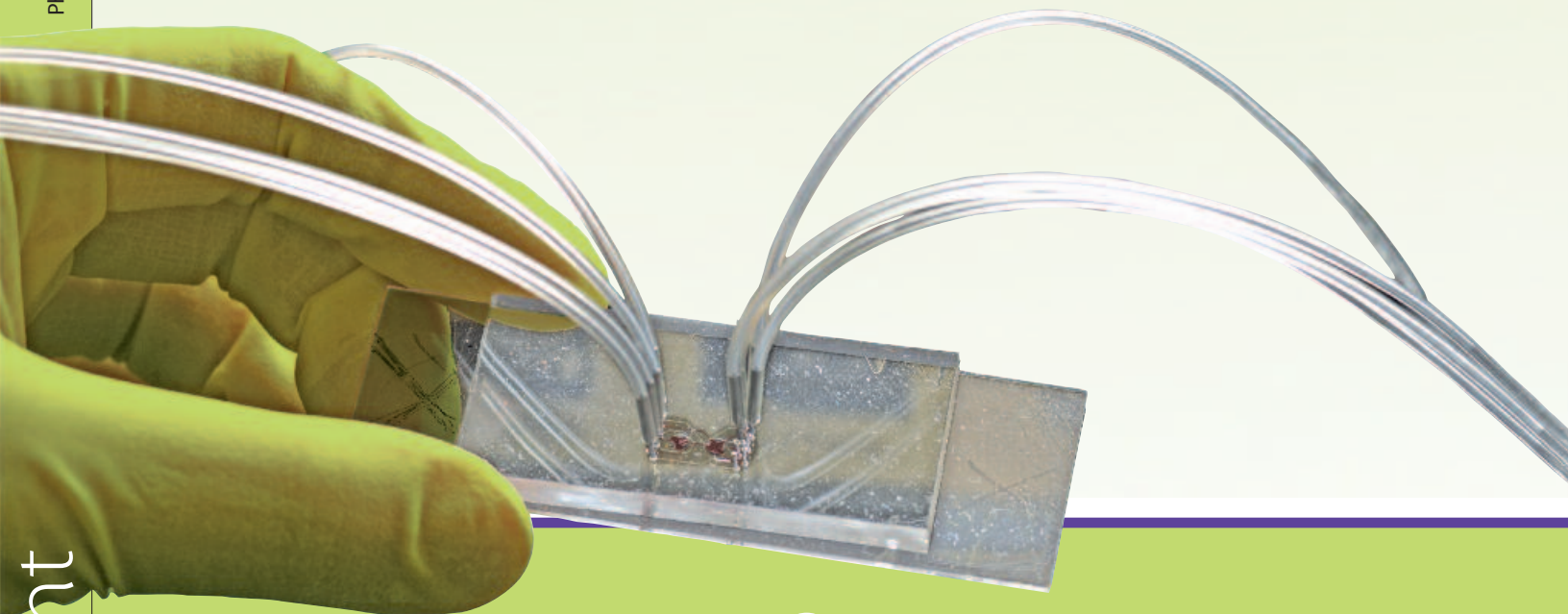
Those examples instilled a work ethic, curiosity and a desire for adventure that have led the Beijing, China, native to Marshall University. Today, she is an assistant professor, teaching and conducting research in the field of analytical chemistry, and a key member of Marshall's Interdisciplinary Research Team 3 working on a National Science Foundation grant awarded through the EPSCoR program (Experimental Program to Stimulate Competitive Research).

While the influence of both parents was important, the young Bin Wang was particularly inspired by the enthusiasm of her father, a renowned scientist. When he died early in her college career, she felt the need to follow in his footsteps. "I wanted to make him proud," she says.

The Chemistry Department labs where Dr. Wang mentors students offer a research-rich learning environment.

No doubt the elder Dr. Wang would be impressed with his daughter's young career (see box), which includes degrees from universities in China, Singapore and Canada and post-doctoral work at Queen's University in Ontario and University of North Carolina.

Photography by John Sibold



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A scientist for the 21st century

"Originally, I didn't plan to go this far," Bin Wang says, regarding ending up at Marshall some 6,000 miles from her childhood home. Yet she's traveled far both geographically and professionally.

It was her multidisciplinary background in biochemistry, with experience in polymers, microfluidics, electrophoresis and RNA, among other specialties, that made her a good fit when Marshall's Chemistry Department was gearing up for the NSF EPSCoR grant and brought her on in 2007.

Says Dr. Michael Norton, who chaired the selection committee: "Bin Wang is one of the rare scientists who has the combination of breadth of experience and depth of understanding. She has the inventiveness and entrepreneurial spirit we were looking for to lead a 21st-century analytical chemistry research group."

Dr. Wang's research falls into two categories: ribonucleic acid (RNA) nanotechnology and microfluidics, working with the Interdisciplinary Research Team to help develop hand-held devices – essentially laboratories on a chip – that can remotely identify potential environmental threats, pollutants and even diseases.

Those projects involve "the interface of molecular biology, chemistry, nanotechnology, physics, mathematics, engineering and computer science, which could have a significant impact on undergraduate research at Marshall University," she says.

While Queen's University and UNC-Chapel Hill are known for their research, Dr. Wang says Marshall compares well. "The things I saw at Queen's University and UNC are all here. Even though Marshall is a small school, we have almost all of the state-of-the-art instruments here. Other similar-sized schools can't compare."

While she has accomplished an impressive list of honors, awards, publications and presentations, Bin Wang still has much to do. She will continue to conduct and supervise research and teach. "I love to see young faces. They make me feel young."

Her first book, *RNA Nanotechnology*, which she edited from the contributions of "38 outstanding scientists" from four continents, is due out later this year.

Pointing out that her father authored three books on organic chemistry, she's confident the first book won't be her last.

"Something is in my genes. I will write a lot of books. I'm going to dedicate my books to my parents."

The Bin Wang file:

Beijing Medical University:
Bachelor of Science, Pharmaceutical Chemistry

National University of Singapore:
Master of Science, Pharmacy

Queen's University of Kingston, Ontario:
Ph.D., Analytical Chemistry

Post-doc:
Queen's University, Biochemistry

Post-doc:
University of North Carolina, Chapel Hill,
Biochemistry

"Even though Marshall is a small school, we have almost all of the state-of-the-art instruments here. Other similar-sized schools can't compare."

about the division of science and research

The West Virginia Higher Education Policy Commission's Division of Science and Research directs the National Science Foundation's Experimental Program to Stimulate Competitive Research (EPSCoR) in West Virginia. The division also coordinates scientific research grants to academic institutions and conducts outreach activities to broaden the public's understanding of science, technology, engineering and mathematics (STEM) disciplines. For more information, visit www.wvresearch.org.

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Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

SUCCESS:

Research Trust Fund

fully endowed with \$100 million

Senate Bill No. 287

4

"The West Virginia Research Trust Fund is arguably the State's most important initiative in recent memory. The program at Marshall University will enhance the economic vitality of our region and advance knowledge-industry career opportunities for citizens for generations to come."

Dr. Stephen J. Kopp, President, Marshall University

In January 2008, then West Virginia Governor Joe Manchin proposed that the state invest \$50 million of surplus funds into a *Bucks for Brains* trust for West Virginia's two primary research institutions, Marshall University and West Virginia University, provided that each could raise matching funds from the private sector. The Legislature agreed and the Research Trust Fund was born.

The \$50 million is fully matched. West Virginia University matched its \$35-million allotment in January 2012, creating new endowments worth \$70 million, while Marshall met its \$15-million matching goal in January 2013, resulting in \$30 million in new endowments for MU.

The schools reached their matching goals well before the July 2015 deadline provided in the statute.

At Marshall, 16 new endowments will support student research and research in specific departments and designated disciplines.

At WVU, 86 new endowments were created for chairs and professorships, scholarships, fellowships and broad-based research funds and library endowments.

In addition to the endowment funds to Marshall and WVU, interest earned on the initial \$50 million investment has generated more than \$700,000 for the state's primary undergraduate institutions.

Learn more about the Research Trust Fund at www.wvresearch.org.

"Our donors responded with extraordinary generosity and belief in the promise of university research . . . We have more donations ready to be matched in order to continue growing the investment in WVU's research infrastructure and brain power in our state."

Dr. James P. Clements, President, West Virginia University

Five years later: Research Challenge Grants awarded in 2007 produce big results

In 2007, the State of West Virginia, through the Division of Science and Research, invested \$7.7 million in five-year Research Challenge Grants to five research teams at Marshall and West Virginia universities.

As the original funding for the grants came to an end in mid-2012, those research teams had turned that investment into an additional \$44.6 million of research funded by external parties, supporting 193 research-related employment positions and resulting in the creation of seven patents, plus the development of six intellectual property licenses.

This extraordinary return on the state's investment was made possible by the West Virginia Legislature's establishment in 2002 of the Research Challenge Fund and its modification in 2004. Research Challenge Grants that support the creation of research centers and foster economic development and workforce advancement at Marshall and West Virginia universities are the largest awards. The fund also supports Instrumentation Grants, Innovation Grants, Summer Undergraduate Research Experience Grants, STEM Fellowship Grants and Mini Grants.

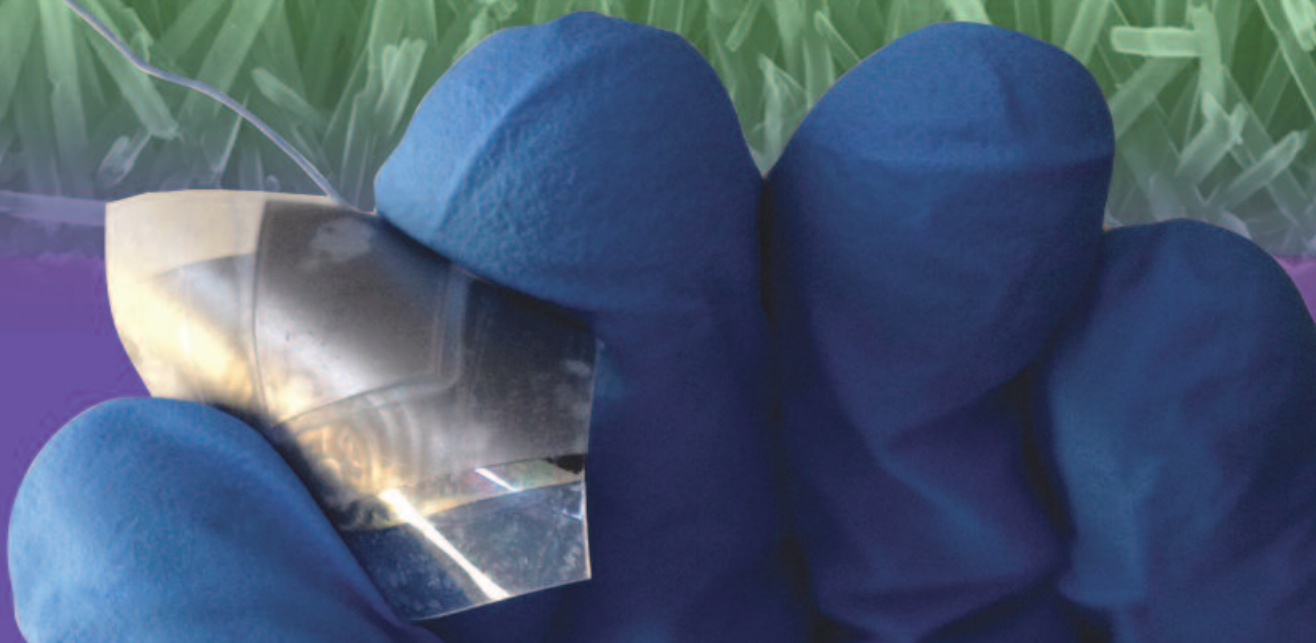
Funding comes from a dedicated revenue stream of one-half of one percent of the state's proceeds from racetrack video lottery terminal income.

The Division of Science and Research recently awarded three Research Challenge Grants for the third round of funding, as well as other grant programs supported by the fund. Read about them on page 8.

Learn more about the Research Challenge Fund at www.wvresearch.org.



Researchers like Dr. Philippe Georgel (above) of the Cell Differentiation and Development Center at Marshall University overall brought in six times more external funding from the \$7.7 million Research Challenge Grants of 2007. Dr. Ever Barbero's Energy Materials Science and Engineering Program at West Virginia University developed nanorods for a solar energy device and a flexible tactile sensor (below).



Fairmont State professor and students collaborate on honeybee research

"None of the work that I do is earthshaking. I'm not going to win a Nobel Prize or anything like that, but the students are getting an experience in taking a problem and trying to address it. It's a valuable process for them to go through."

Dr. Don Trisel, Professor of Biology
Fairmont State University



Fairmont State's Don Trisel says having the students addressing the honeybee problem is a valuable research experience.

Sharing his love of plants and honeybees comes naturally to Dr. Don Trisel, Professor of Biology at Fairmont State University. Over the past few years, more than a dozen students have had their first exposure to scientific research by studying the genetics and diseases of honeybees.

"None of the work that I do is earthshaking. I'm not going to win a Nobel Prize or anything like that, but the students are getting an experience in taking a problem and trying to address it. It's a valuable process for them to go through," he says.

Trisel's students have investigated a variety of topics of interest to the beekeeping community including Varroa mite control methods; the prevalence of Nosema disease and tracheal mites in West Virginia honeybee colonies; queen-rearing methods; and flower phenology.

Trisel and student Caitlyn Jones will present the results of their ongoing hive weight study at the Association of Southeastern Biologists meeting in Charleston in April. Student Jaime Ford has helped Trisel begin a honeybee-breeding program.

Over the past two years they have been refining their techniques in grafting queen cells and instrumentally inseminating the queens. Careful evaluation of the queens and the selection of valuable traits (disease resistance, hygienic behavior, gentleness, low swarming rate, good honey production) hopefully will lead to a locally-adapted bee that will reduce dependence on importing bees and their diseases from other areas of the country.

This work has been supported by several different grants through Fairmont State University, the College of Science and Technology at FSU, NASA, WV Queen Producer Zelma Boggess and the U.S. Department of Agriculture.

The state's beekeepers also benefit from the work of Don and his students, who have made many presentations about their projects and findings. Don and his wife Kim were named 2013 Beekeepers of the Year by the West Virginia Beekeepers Association.

Learn more at www.fairmontstate.edu.



WVSU students go green for environmental competition

EPA's Campus RainWorks Challenge promotes storm water management nationwide

West Virginia State University students are going green for the Environmental Protection Agency's "Campus RainWorks Challenge" by creating an environmentally friendly storm water management system on campus. The national competition demonstrates how green design elements benefit schools, communities and the environment.

"The Challenge provides a great opportunity to promote awareness about constraints and possibilities associated with storm water in urbanized landscapes," said Dr. Amir Hass, a WVSU research scientist and one of the group's faculty advisors. "Developing such green infrastructure will serve as a unique demonstration and education project to further promote awareness and innovative solutions for storm water management on WVSU's campus and beyond."

Two large terraces to be constructed on campus will feature a wetland area at the base, with a walking trail for visitors and students to enjoy. A variety of native plants will be planted around the area, such as holly, rhododendron, cattails and ferns. The water collected from the area will be captured to infiltrate back into the groundwater on campus.

"We're greatly reducing the amount of pollution runoff that's coming off two parking lots and going directly to a waterway leading straight to the river," said WVSU Biology major Lora Funfstuck, one of four students working on the project. "In essence, we're taking water that would otherwise be highly polluted and reutilizing it." The group is using existing green space between the Wilson University Union and the Drain-Jordan Library parking lots.

The EPA's "Campus RainWorks Challenge" is for undergraduate and graduate students nationwide. Students form teams with the ultimate goal of creating an innovative green infrastructure design on their campus. The winning team will receive a cash prize in addition to funding for their faculty advisor to use for green infrastructure research purposes.



WVU researcher awarded \$2.19 million for lung cancer studies

As the commercial market for nanoparticles grows, so does the research on potential toxicity of these man-made molecular materials that are used to make a wide variety of products including electronics, automobiles, cosmetics and drug delivery systems.

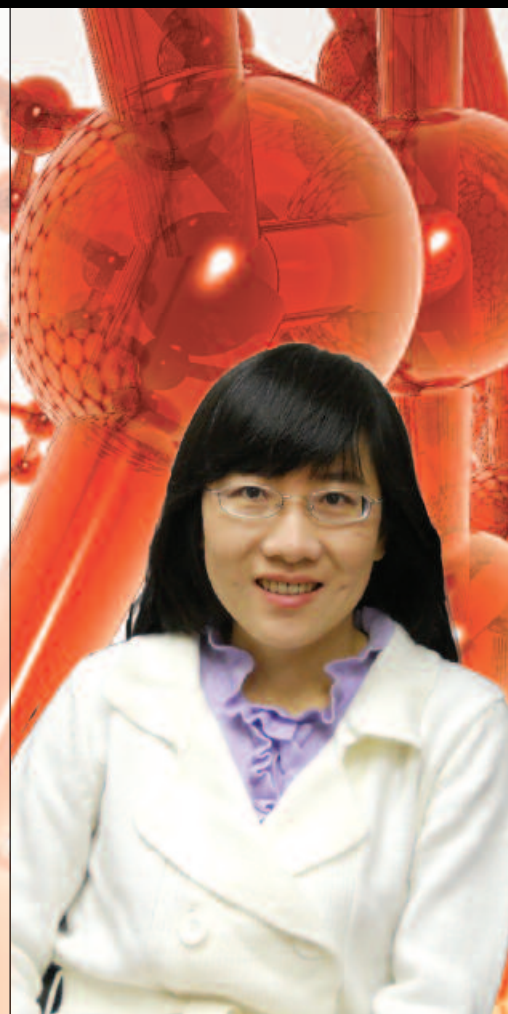
Lan Guo, Ph.D., is leading research at the West Virginia University Mary Babb Randolph Cancer Center that focuses on nanoparticles and lung cancer risk. Dr. Guo was awarded a five-year, \$1.67-million grant from the National Institute of Environmental Health to study the impact of multi-walled carbon nanotube exposure on pulmonary diseases, including fibrosis, a precursor to lung cancer.

"Nanoparticles have physical and chemical properties similar to asbestos, a known human carcinogen that can cause lung disease," says Guo, who is the biomedical informatics program director for the West Virginia Clinical and Translational Science Institute at WVU. "The issue is how safe are these materials when people are exposed to them."

Guo's team previously demonstrated that nanoparticles caused lung damage in animal models. Researchers also identified dramatic genetic changes known to be associated with human lung cancer risk and progression.

With the new funding, researchers will conduct experiments to compare their previous animal studies with studies on human lung fibrosis tissue and human lung cancer tissue. "We will examine the genomic profiles of the animal models and human cell lines and human tissue samples to identify biomarkers and see what genes were affected."

Guo also was awarded a two-year, \$520,000 grant from the National Library of Medicine of the NIH to support research aimed at predicting lung cancer recurrence in patients diagnosed with early stage lung cancer.



HEPC recognizes \$6.4 million in state-funded research

"These awards and the educational and economic development opportunities they provide are made possible by the forward-looking leadership of our Governor and Legislature," said Chancellor Paul Hill.

"It is critical that we provide our students with research opportunities as part of their undergraduate experience to fully prepare them for what is next in their educational, professional, and personal lives," Dr. Hill said. "Equally important is supporting an innovative climate at our institutions to increase research competitiveness and create new opportunities across our state."

THE RESEARCH AWARDS INCLUDED:

Three **Research Challenge Grants** of \$1.35 million each for five years to:

- **Center for Energy Efficient Electronics** at *Marshall* and *WVU* to investigate and develop devices that will lead to next-generation electronics. **Dr. David Lederman** is principal investigator
- **Center for Electrochemical Energy Storage** at *WVU* to conduct research leading to the development of devices for storing electricity. **Dr. Xingbo Liu** is principal investigator
- Further develop and expand the **West Virginia Cancer Genomics Network** to involve *Marshall*, *WVU* and *Charleston Area Medical Center*. **Dr. Richard Niles** is principal investigator

The **2013 STEM Fellowship Grants** were awarded to:

- **Dr. Richard Niles**, \$800,000 to expand STEM doctoral education at *Marshall University*
- **Dr. Katherine Karraker**, \$1.2 million to increase the number, quality and diversity of STEM doctoral students at *WVU*

The **2013 Innovation Grant** was awarded to:

- **Dr. Stephen Goodman** of *WVU Institute of Technology*, \$30,000 for his project to "Field test bed of connected vehicle applications in the mountainous terrain of West Virginia"

Research Trust Fund grants of \$100,000 each were awarded to:

- *West Virginia State University* for its Full Steam Ahead Program and
- *WVU Institute of Technology* for development of the W.Va. Center of Excellence for Cyber-Physical Systems

The **2013 Instrumentation Grants** of up to \$20,000 were awarded to fund scientific equipment for advanced undergraduate laboratories:

- **Dr. Jennifer Franko** of *Bethany College*
- **Dr. Stephen Kuehn** of *Concord University*
- **Dr. Mingyu Lu** of *WVU Institute of Technology*
- **Dr. Jordan Mader** of *Shepherd University*
- **Dr. Sara Sawyer** of *Glenville State College*
- **Dr. Ralph Wojtowicz** of *Shepherd University*

Mini Grants of \$5,000 each to aid faculty members in preparing external research proposals were awarded to:

- **Dr. Timothy Corrigan** of *Concord University*
- **Dr. Bonny Dickinson** of the *W.Va. School of Osteopathic Medicine*
- **Dr. Gary Schultz** of *Marshall*
- **Dr. Wendy Trzyna** of *Marshall*
- **Dr. Kaushlendra Singh** of *WVU*
- **Dr. Jennifer Weidhaas** of *WVU*

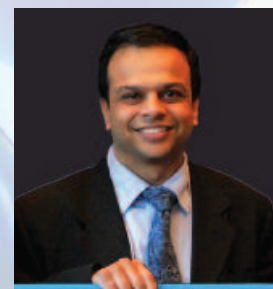
A \$100,000 **Research Incubator Grant** funded by the National Science Foundation was awarded to:

- **Dr. Gagan Kaushal** of the *University of Charleston*

One hundred undergraduate students presented their research at the 2013 Undergraduate Research Symposium. 20 research faculty at WVU were recognized with the 10th Undergraduate Research Award.



West Virginia



Dr. Gagan Kaushal
University of Charleston



Dr. Jordan Mader
Shepherd University

Read more about the awards on the Undergraduate Research page at www.wvu.edu

Research grants at Undergraduate Research Day

Undergraduate students present their research, and more than 100 West Virginia institutions present grant awards at the Undergraduate Research Day, February 28.



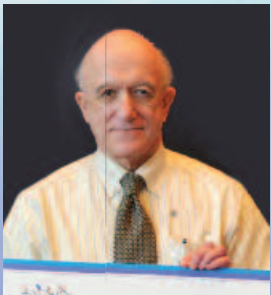
West Virginia State University



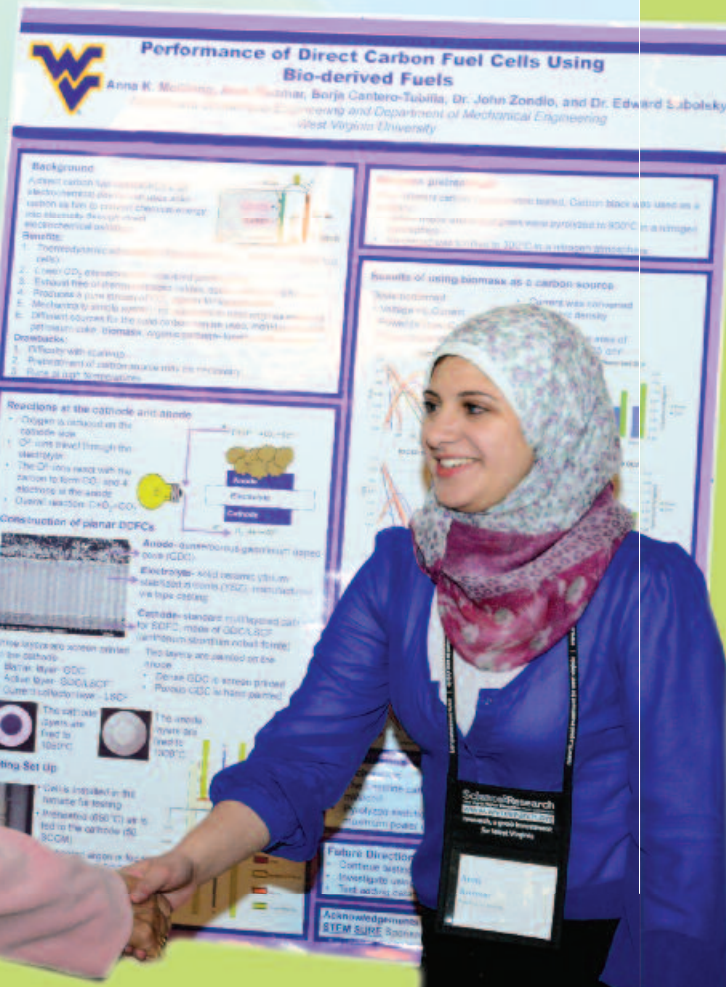
Concord University student Kimberly Cline discusses her research with Delegate John Shott of Mercer County (above), while WVU student Areej Kuzmar (below) greets Delegate Charlene Marshall of Monongalia County.



Jennifer Franko
Bethany College



Dr. Richard Niles
Marshall University



Research grants and awardees at the Undergraduate Research Day www.research.org.

WVU researchers work to track nutritional habits using **Big Data**

Big Data is a collection of data sets so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications. These data sets can uncover hidden patterns, unknown correlations and other useful information, and can provide competitive advantages over rival organizations and result in business benefits, such as more effective marketing and increased revenue.

With support from the U.S. Department of Agriculture's National Institute of Food and Agriculture, two researchers at West Virginia University are also applying Big Data methods to human nutrition.

Tim Menzies of the Lane Department of Computer Science and Electrical Engineering has partnered with Susan Partington of the Davis College of Agriculture, Natural Resources and Design to see if it's possible to design intelligent data collection strategies that significantly reduce the cost of understanding and monitoring a population.

Partington is researching the effects of food availability on obesity. "High obesity prevalence in the United States has become a national health priority with much of the focus on obesity prevention," said Partington. "Because environmental factors can be modified, they may be key in obesity prevention."

One way to do this, Partington said, is to give researchers access to a full inventory of foods sold in all retail outlets in a given area. That type of data, however, is not readily available and it would be a painstaking process to gather such information visiting site by site.

That's where Menzies comes in. "A repeated effect in most data sets is that a few variables and instances can serve as good exemplars for the rest," he said. "Once we have learned these key variables, it becomes practical to sample a wider area much faster."

Graduate student Vasil Papakroni has found that collecting data from 10 percent of the stores can approximate the results found in the rest of the population. These findings mean that the cost of monitoring patterns in a large population can be significantly decreased.

"The world is a big place," Menzies said, "and with Big Data methods, we can explore more of it in less time."

WVU researcher to study **blood vessel wall permeability**

Medical science has grown increasingly sophisticated and ambitious. But despite technological advances and global collaboration, researchers today are still seeking answers to cure common diseases and disorders.

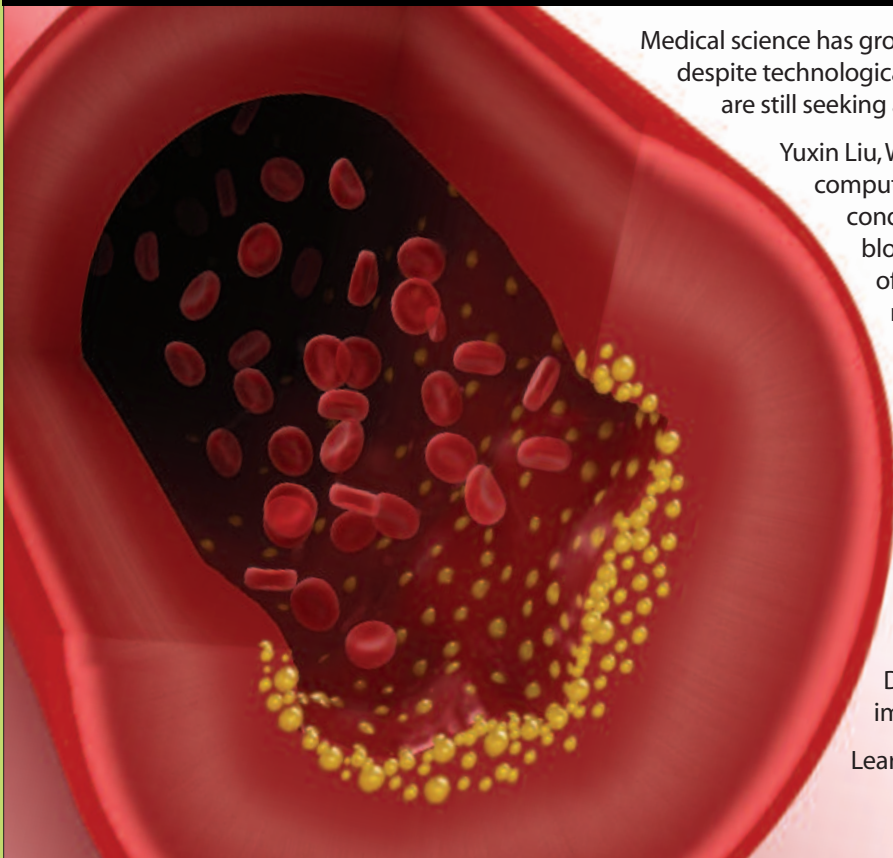
Yuxin Liu, West Virginia University assistant professor of computer science and electrical engineering, will be conducting research on controlling the permeability of blood vessel endothelial cells. Uncontrolled permeability of these cells is linked to tumor growth, diabetic retinopathy and chronic inflammation.

Blood vessel walls are lined by a single layer of endothelial cells. Endothelial permeability is characterized by a blood vessel wall's capacity to allow for the flow of small molecules like ions, water and nutrients in and out of the vessel.

Uncontrolled and lasting increases in permeability can result in extensive cell and tissue damage, explained Liu, who secured a \$174,982 grant from the National Science Foundation to conduct this research.

Dr. Liu came to West Virginia through an RII awarded to improve research and the state's research infrastructure.

Learn more at www.statler.wvu.edu.



Marshall engineering complex to have **state-of-the-art instructional, research facilities**

Construction is under way at Marshall University on the \$450-million, 145,000-square-foot, four-story Arthur Weisberg Family Applied Engineering Complex. The facility, to be located on Third Avenue between the Arthur Weisberg Family Engineering Laboratories and the Robert C. Byrd Biotechnology Science Center, will be one of the largest academic buildings on campus.

Weisberg was president of Arthur's Enterprises, which last year made a large gift pledge to the Marshall University Foundation to help pay for the complex. Weisberg's reason for supporting Marshall's engineering program, which now has about 600 students, is simple: "I love Huntington and I know this gift will make a lasting difference," he said.

Marshall President Stephen J. Kopp said education will be enhanced through the opportunities afforded with the addition of this building.

"This new applied engineering complex will move Marshall University and STEM majors to the forefront in terms of the quality and caliber of facilities available to support and advance STEM education – especially in new fields of engineering," he said.

Said Dr. Wael Zatar, dean of Marshall's College of Information Technology and Engineering: "Professional societies such as the American Society of Civil Engineers and the Society of American Military Engineers are excited to see the resurgence of the engineering program at Marshall University because it will assist in leading our nation into the future. The complex will be the home for all our undergraduate and graduate programs and will essentially give us the opportunity to grow and expand into some areas that are important to the region."

"The engineering program will now have a state-of-the-art physical space in which to grow and thrive," said Dr. John M. Maher, Marshall's vice president for research. "In addition, research at Marshall will be immensely enhanced by the proximity of high-tech facilities and faculty along the Third Avenue corridor. Researchers in engineering will now be closer to colleagues in medicine, pharmacy, chemistry, biology and physics, and the offices of the research corporation will be more convenient to the campus community."





WVU robotics team picked again for robo-ops competition

For the second straight year, the Mountaineer Robotics team from West Virginia University has been selected to participate in the 2013 Robo-Ops competition to be held at NASA's Johnson Space Center's Rock Yard in June. This year's team will partner with students from Bluefield State College.

"We are very excited and honored to be selected for this competition once again, and we will do our best to showcase WVU as one of the top robotics programs in the country," said Powsiri Klinkhachorn, professor in the Lane Department of Computer Science and Electrical Engineering and advisor for the team. "Last year, we finished fourth overall. With one year under our belts, we feel we have a better understanding of the competition and have developed some new techniques that will hopefully allow us to perform better this year."

The competing teams each receive a \$10,000 stipend to offset the development costs of a Mars rover, materials, testing equipment, hardware and software. Rovers will compete on a planetary analog environment under the supervision of NASA judges. Up to three members of the team will travel to the space center for the on-site testing. The remaining team members will stay at their home university to conduct mission control tasks.

The prototype rovers will be tele-operated by the university team from the home university campus via a commercial broadband wireless uplink. The only information available to the rover controller to perform the required tasks will be information transmitted through on-board rover video cameras or other on-board sensors. The prototype must negotiate a series of obstacles while accomplishing a variety of tasks, like negotiating slopes, traversing sand and gravel pits, picking up rock samples and driving over rocks of a specified diameter.

The competition is sponsored by Revolutionary Aerospace Systems Concepts. The WVU team is sponsored by the Statler College of Engineering and Mineral Resources, NASA West Virginia Space Grant Consortium and the Lane Department of Computer Science and Electrical Engineering, in addition to in-kind support from the Department of Mechanical and Aerospace Engineering.





MU chemistry faculty member to involve **students** in **petroleum research**

“Because of research opportunities like this, the quality of our students is just getting better and better. We are better as a whole because of undergraduate research.”

Dr. Laura McCunn, Marshall University, Assistant Chemistry Professor

A Marshall University professor has secured a three-year \$65,000 grant to do petroleum research with the assistance of undergraduate students.

Assistant Chemistry Professor Dr. Laura McCunn and seven undergraduate students will study how several specific molecules decompose when heated in the absence of oxygen. McCunn says the results of their research will help shed light on biofuels and the mechanisms for combustion of conventional fossil fuels like petroleum. She and the students are particularly interested in exploring the decomposition of aldehydes, which occur as byproducts in biofuels and can be emitted from biodiesel engines.

“It’s significant in the petroleum field because this model could help predict the pollutants or soot that could be generated from particular fuel mixtures,” she said.

To conduct the experiments, McCunn and the students will use an instrument they constructed - the hyperthermal nozzle - to cause thermal breakdown of sample molecules in an oxygen-free environment. The products of the process will be condensed and trapped for analysis using a special spectrometer.

The grant program funding the project through the American Chemical Society Petroleum Research Fund is aimed specifically at involving undergraduates in advanced research activities in preparation for graduate school or employment.

McCunn said, “Research is a really important part of the students’ education. They will learn things in my lab that can’t be taught in a traditional classroom. The hands-on laboratory work teaches them problem-solving skills, perseverance and how to work independently.”

Another important skill the students will learn is to explain their research to various audiences.

“I’ll be taking them to scientific meetings where they’ll have the chance to present their work,” she said. “It’s important to be able to explain your research and your findings, because that’s a big part of being a scientist.”

“Because of research opportunities like this, the quality of our students is just getting better and better. We are better as a whole because of undergraduate research,” she said.



WVU's Yang hopes to slow and eventually stop Alzheimer's disease

Alzheimer's disease is the sixth leading cause of death in the United States and one of the few diseases that cannot be prevented, cured or even slowed. The 5.4 million Americans living with Alzheimer's suffer from memory loss and experience mood swings and dementia. Scientists have been unable to pinpoint one specific cause for the disease, but West Virginia University's Yong Yang has received a \$175,000 grant to research a hypothesis he believes may finally slow down, and eventually stop its progression.

In a healthy brain, proteins would be broken down and degraded. But in an affected brain, a distinguishing feature of the disease is the accumulation of amyloid plaques, which form hard, insoluble protein masses. Yang's overall goal is to define the molecular mechanism by which these amyloid plaques form and discover pharmaceutical targets against the disease.

Yang is assistant professor of chemical engineering in the Benjamin M. Statler College of Engineering and Mineral Resources.

Allison Bruce and Xiaoyan Yu, chemical engineering graduate students, are assisting in the research.

For more information, www.statler.wvu.edu.

Visiting Wesleyan professor studying effects of alcohol on nerve stem cells

Dr. Charles (Bruce) Anthony has joined West Virginia Wesleyan College as a visiting professor of Biochemistry.

Dr. Anthony is studying how the effects of alcohol on nerve stem cells can affect brain plasticity. He plans to expand his research to study the alterations in the brain's plasticity during recovery from alcohol or drugs.

"Understanding the dynamics of brain plasticity during early recovery from addictions is paramount for quality patient treatment and recovery," Dr. Anthony said.

He is shown here with Chemistry Major Ali Roberts.



Research yields statewide benefit

The Honorable Earl Ray Tomblin



Through investments in science and research, West Virginia's education, research, and entrepreneurial communities are uniquely positioned to create revolutionary ideas, innovative technologies, and cutting-edge jobs that will provide opportunities for current and future generations of West Virginians.

West Virginia remains committed to enhancing the educational and economic future of the state's citizens through continued support of science, technology, engineering, and mathematics (STEM) fields. Currently, West Virginia has the distinction of being ranked 18th in the nation in regards to state-sponsored research and development, an increase from 37th in 2006.

The state-sponsored Research Challenge Fund, established in 2002, provides a strong foundation to support science and technology research and education by allocating approximately \$3.5 million annually to researchers at West Virginia's public four-year institutions. From that foundation, the state's commitment to research has increased to include the Eminent Scholars initiative, a one-time appropriation to recruit top researchers to Marshall University and West Virginia University.

Perhaps the state's most critical investment in recent history, the Research Trust Fund – commonly known as Bucks for Brains – created endowments at West Virginia's major research institutions, Marshall University and West Virginia University, to be matched by private contributions. Marshall University has matched the \$15-million allocation with private donations, and West Virginia University has also matched the \$35-million initial allocation, resulting in more than \$100 million in public-private endowments for the institutions. The interest gained from the initial Fund has been utilized for awards to Concord University, Fairmont State University, Shepherd University, West Liberty University, and West Virginia State University to assist with their STEM program activities.

These research investments pay dividends and have resulted in world-class educators, researchers, and entrepreneurs choosing to live and work in our great state. From Dr. Tina Cartwright at Marshall University, who has been awarded research funds to help teachers inspire middle school students in STEM fields, to Dr. Brian Anderson at West Virginia University, whose research will potentially add geothermal energy to the state's energy resources, and Dr. Jeremy Dawson at West Virginia University, whose research in identification technology will improve public safety on a global scale, West Virginia residents are making discoveries every day that will improve not only our local communities and our state – but also our nation.

It is clear – West Virginians are making a huge difference right here at home. With the support provided to individual researchers, West Virginia has fostered a culture of collaboration resulting in the founding of two successful biotechnology firms, Protea Biosciences and Vandalia Research, which are currently operating and thriving in our state.

West Virginia has also made historic investments in research and innovation through the West Virginia Regional Technology Park, located in South Charleston. This facility, obtained by the state in 2010 and home to more than 600 high-tech, high-wage jobs, boasts a rich history of research and technology contributions to the Kanawha Valley and West Virginia as a whole.

We, as a state, must continue to focus on economic development opportunities that develop and maintain a culture of innovation leading to further creation of high-skill, high-wage jobs for today's students and tomorrow's workforce.



science and research council

Dr. Nader Abraham

Vice Dean for Research
Joan C. Edwards School of Medicine
Marshall University

Dr. Pamela Balch

President
West Virginia Wesleyan College

Keith Burdette

Cabinet Secretary
West Virginia Department of Commerce

Jack Carpenter

President, Kicking Stones, Inc.

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Chancellor, West Virginia Higher
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Dr. Fred King

Interim Vice President for Research
and Economic Development
West Virginia University

Dr. John Maher

Vice President for Research
Marshall University

Dr. Orlando McMeans

Dean & Director
Gus R. Douglass Institute
West Virginia State University

Dr. James B. Phares

Superintendent
West Virginia Department of Education

Earl E. Scime, Ph.D.

Chair, Department of Physics
West Virginia University

Dr. Charles Somerville

Dean of the College of Science
Marshall University

FROM THE DIRECTOR OF SCIENCE AND RESEARCH:

It was a busy winter



It was a busy winter for Science and Research in West Virginia, as you can read in this edition of *the Neuron*.

Perhaps the best news is that Marshall University met its \$15-million fundraising goal to match its West Virginia Research Trust Fund allocation. Marshall joins West Virginia University, which met its \$35-million Bucks for Brains goal last winter, finalizing \$100 million in new research endowment funding between the state's two primary research universities.

That means more endowed chairs, more research support, and most importantly, more educational opportunities for students for generations to come.

Also thanks to the state's initial \$50-million investment in the Research Trust Fund, we've been able to provide significant support for research at primarily undergraduate institutions, most recently to West Virginia State University and WVU Institute of Technology.

West Virginia's establishment of the Research Trust Fund in 2008 was a great investment, and we hope the Legislature will allocate funding for a similar program in the future.

Another state-funded program, the Research Challenge Fund, provided support to several programs this winter, including STEM Fellowship Grants, Innovation Grants, Instrumentation Grants and Mini Grants, all of which offer strong potential for greater educational opportunities for our students and economic development for our state.

Meanwhile, our researchers are deeply involved in the \$20-million Research Infrastructure Improvement grant we received through the National Science Foundation's EPSCoR program in 2010. We are in Year 3 of the 5-year grant, and making great progress in Bionanotechnology for Public Security and Environmental Safety.

Yes, it's been a busy winter. And that's just the way we like it.

Jan Taylor, Ph.D.

Director of Science and Research
West Virginia Higher Education Policy Commission

