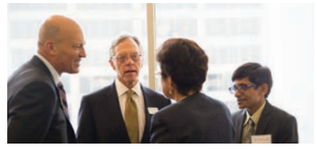
# RESEARCH**MATTERS**

## *2014–2015 ANNUAL REPORT*

**Arkansas**Research**Alliance**

Coming together to move Arkansas forward.

# *Research Matters*



Research continues to be essential for the improvement of mankind. In fact, with the rise of the innovation economy, **Research Matters** more than ever. When Arkansas Research Alliance (ARA) launched in 2008, we imagined a future for our state that was full of promise and teaming with opportunities for economic development, innovation and advancement. Today, that promise is alive and well, and job-creating research is recognized as a vital pathway to progress.

We continue our evolution from an aspirational organization to one that is delivering real impact for Arkansas. We have expanded our research partnerships with universities and other public and private partners to generate value for the people and businesses of our state. At a time when federal research dollars are shrinking, we are stepping up our efforts to connect science with the marketplace. Throughout this report, we are proud to highlight our progress, including:

- Inducting inaugural ARA Fellows from four university campuses
- Naming two new ARA Scholars
- Welcoming a new board chair and board members
- Expanding our partnership with the National Center for Toxicological Research (NCTR)

ARA began with the goal to bring new research talent to Arkansas, and that remains a key area of focus. In 2015, we welcomed two new ARA Scholars to the University of Arkansas: Jie Xiao, Ph.D., from the Pacific Northwest National Laboratory, in the area of energy materials and systems; and Morten Olgaard Jensen, Ph.D., from the Georgia Institute of Technology, in the area of biomedical engineering. Arkansas is now home to seven ARA Scholars, and each one is a change agent injecting new energy into our state's innovation economy.

Recruiting new talent starts with investing in the strong base of researchers already making a difference in our state. That is why we launched our ARA Fellows program to support distinguished researchers currently working at one of the five research universities in the state. The induction of our four new ARA Fellows serves to recognize and retain research leaders with an established history of impact.

Our ARA Scholars and ARA Fellows programs are steadily gaining traction. We have nearly doubled our researchers in the past year. ARA Scholars are coming to Arkansas to stimulate new innovation, while ARA Fellows are sustaining impact.



Another strategic function that ARA has taken on is the role of convener. By connecting NCTR with state research universities, we are helping ensure the proper tools, resources and people are dedicated to two primary projects: bioinformatics (precision medicine) and nanomaterials research, which both play a crucial role in promoting and protecting public health. Working collectively and in real time, universities are able to leverage NCTR's research capabilities, which provide additional scientific strength and expertise. The relationship has led to a $764,000 grant for bioinformatics research from the Food and Drug Administration (FDA) and $2.5 million in funding for graphene toxicity research from the FDA and the state of Arkansas.

We believe there is great strength in collaboration and through that we can collectively move Arkansas forward. Our accomplishments are a direct result of this approach. I am grateful to the ARA board of trustees for their guidance and commitment. I would like to welcome Rick Webb (Walmart), as the new board chair and our three new board members, Roger Jenkins (Murphy Oil Corp.), Andrew Clyde (Murphy USA, Inc.) and Dan Williams (Garver). Each member is a steadfast champion not only for quality research but also the quality of life in our state.

Our work would not be possible without a network of partnerships that include: Arkansas Economic Development Commission (AEDC), Accelerate Arkansas, State Science & Technology Institute (SSTI) and Georgia Research Alliance, as well as Governor Asa Hutchinson. In the months since entering office, Gov. Hutchinson already has provided valuable leadership and a shared vision of Arkansas competing and winning in the 21st century. We look forward to continuing our partnership in the years ahead.

We are confident that the strong foundation we have built over the past seven years will carry us successfully into the future. We are committed to moving forward with an even greater sense of urgency and partnership as we continue to be a convener and a catalyst for innovation. Thank you for joining with us in finding new ways to fulfill the promise of Arkansas for generations to come.

With gratitude,

Jerry B. Adams

Jerry B. Adams
President and CEO
Arkansas Research Alliance

# *ARA Leads Collaboration with NCTR*

Arkansas Research Alliance is proud to foster collaboration between industry, government and academia that forges alliances and partnerships to create innovation. We continue to collaborate on strategic research efforts with the team at the National Center for Toxicological Research (NCTR) in Jefferson County, Arkansas, and at five research universities: University of Arkansas (UA), University of Arkansas for Medical Sciences (UAMS), University of Arkansas at Little Rock (UALR), University of Arkansas at Pine Bluff (UAPB) and Arkansas State University (A-State).

NCTR plays a crucial role in promoting and protecting public health. As the only FDA Center located outside of Washington, D.C., NCTR gives the state a distinct competitive research advantage. Its 500+ acre campus has extremely well-equipped facilities where 123 experimental laboratories span the available 1 million square feet of floor space. Combined resident staff and postdoctoral fellows account for 183 doctoral level researchers, along with approximately 400 other staff. With a vast array of specialized capabilities needed to support modern toxicological research, NCTR continues to make advancements towards innovation.

By creating a nationally and internationally recognized research capability, this collaborative partnership significantly elevates Arkansas' scientific reputation. At a time when the complexities and critical importance of regulatory science need to be better understood, our partnership with NCTR staff and leadership is a valuable asset. The innovative impact is significant in helping to assure the safety and effectiveness of products produced globally and distributed to U.S. consumers. Moreover, that impact helps industry by providing important scientific bases for the more rapid development of safe and effective products.

ARA's collaboration with NCTR began with the signing of the Memorandum of Understanding (MOU) in 2011 between the state of Arkansas and the FDA. Important progress from the first contract on the health and safety of graphene-based nanomaterials led to a second contract bringing the overall total to $2.5 million. This amount represents approximately half of the funding goal of $5 million. The new FDA contract also extends the life of the program by 18-24 months.

Roger Buchanan, Ph.D., is the ARA Program Director and oversees work completed on four campuses, as well as the work coordinated with the team at NCTR on the graphene project in which research is focused specifically on the safety and toxicity of graphene and its impact on public health. Graphene is a common carbon nanomaterial used in electronics and renewable energy devices, and is the subject of significant research into its uses in pharmaceuticals and medical devices.



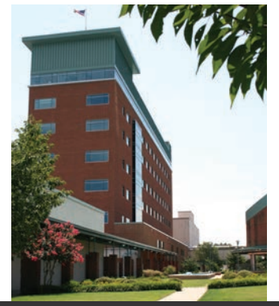
NCTR Director William Slikker, Ph.D., leads a team of more than 600 employees, including 180 Ph.D. level researchers.

*"NCTR develops and uses the latest scientific technology to find answers to persistent questions about the toxicity of foods, drugs, cosmetics, medical devices, veterinary products and tobacco that represent over 25% of all U.S. consumer spending. Our partnership with the ARA is critical to our work."*

A second area of ARA collaboration between NCTR and the universities involves precision medicine and bioinformatics—the application of computer technology to the management of biological information. Computers are used to gather, store, analyze and integrate biological and genetic information, which can then be applied to gene-based diagnosis and treatment as well as drug discovery and development. This specific application is focused on finding genetic markers in the blood from lung cancer in patients at UAMS. The combination of these two fields, precision medicine and bioinformatics, could have a dramatic effect on making early diagnosis of lung cancer possible and finding effective cures during early stages of the disease.

With the help of a five-year grant from the FDA, specifically in support of launching a new bioinformatics organization in Arkansas, ARA along with NCTR and our member institutions started the Arkansas Bioinformatics Consortium (AB-BIC) in March 2015. The grant provides for a convening of the Arkansas-centric bioinformatics community each year for five years. The group is aimed at developing, leveraging and enhancing statewide collaboration. AR-BIC forms a stable environment available to support the statewide research, education, training and entrepreneurial/industrial activities in life sciences-related computing. The first event drew nearly 100 attendees where speakers presented approximately 40 poster abstract reports.

The successful spinout of these technologies, and other collaborations with NCTR, will help protect public health and provide an opportunity for commercial development. By leveraging the intellectual and technical resources of NCTR, along with university resources, ARA will help bring forth commercially viable innovations so they may be translated to benefit patients and consumers.



# *Great Leaders Matter*

Operating as a public-private partnership, ARA is governed by a board of trustees comprised of chancellors from Arkansas research universities and business leaders from across the state. The board is committed to creating opportunities in the areas of research, commercialization and job creation. Each member is a champion for research in Arkansas and dedicated to the advancement of ARA. The board of trustees has been critical to the success of the organization and continues to provide unparalleled leadership as ARA launches new programs, forms new collaborations and gains momentum in the coming year.



*"I'm proud to join the board of trustees to support ARA in their quest to pioneer groundbreaking research and economic development for Arkansas. This valuable organization delivers innovation, development and a competitive advantage to our state's business industry."*

Rick Webb, Board of Trustees Chairman; SVP, Global Business Processes, Walmart

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# Alexandru Biris, Ph.D.

### *2015 ARA Fellow*

*Director and Chief Scientist, Center for Integrative Nanotechnology Sciences; University of Arkansas at Little Rock (UALR)*

Alexandru Biris has been the Chief Scientist of the UALR Center for Integrative Nanotechnology Sciences (CINS) since it began in 2005, serving as Director since 2009. He leads the research at CINS, exploring the science of nanostructures that can be used to alter the properties of other substances at the atomic level. His vision for CINS is an aggressive outreach program to train and educate young people, as well as world-class scientists. These recruits will serve and attract business and industry to Arkansas from the region and the nation. Dr. Biris is also a professor in the Systems Engineering Department in the Donaghey College of Engineering and Information Technology, and serves as the Sturgis Endowed Chair for Excellence in NanoSciences.

*"In addition to being an honor, holding the position as an ARA Fellow allows me to leverage funding to accelerate research related to biomedical engineering applications. Our research team is passionate about having a human impact and is happy to have the support of ARA."*

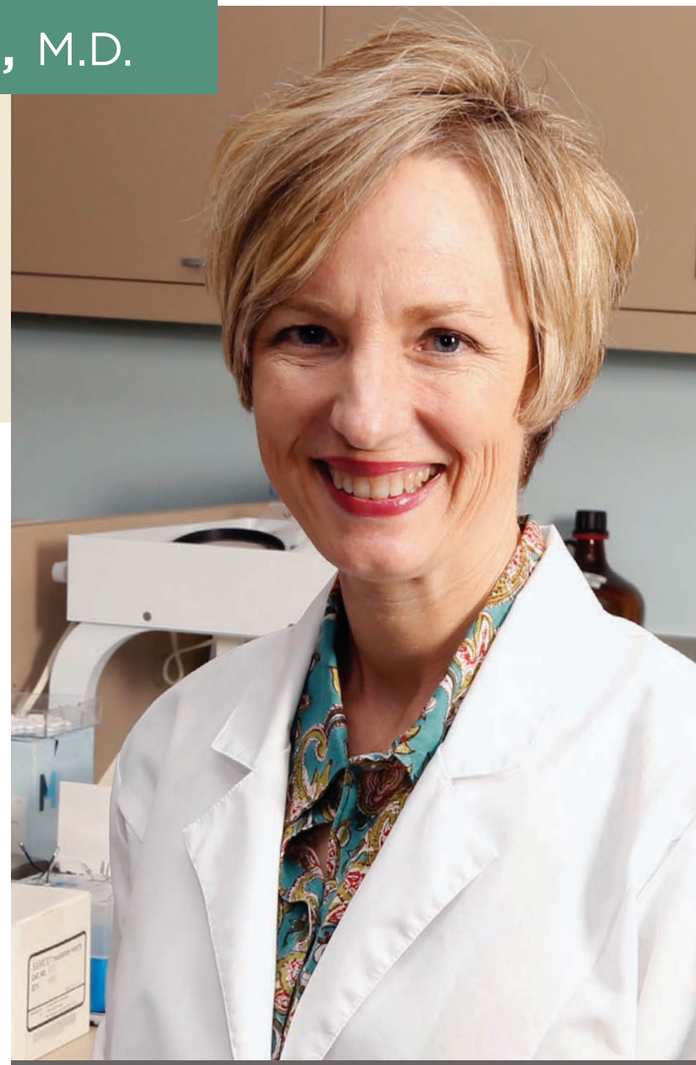


# Laura P. James, M.D.

### *2015 ARA Fellow*

*Director, Translational Research Institute; Professor, Department of Pediatrics; Section Chief, Clinical Pharmacology & Toxicology, Arkansas Children's Hospital; University of Arkansas for Medical Sciences (UAMS)*

Laura James has been a pediatrician and faculty member at UAMS since 1994. Her early research training and experience were in the conduct of pediatric pharmacology studies in children, supported by the National Institutes of Child Health and Human Development through the Pediatric Pharmacology Research Unit Network. These efforts focused on pharmacology studies in children in order to guide the dosing of a number of pediatric therapeutics. For 10 years, Dr. James has focused her research on acetaminophen toxicity and has worked with animal models and with clinical samples. This work led to federal funding through the National Institutes of Diabetes, Digestive and Kidney Diseases to develop a new laboratory test for the detection of a new marker of acetaminophen liver injury.



*"Being an ARA Fellow is an honor and provides valuable funding to further the continued development of a new laboratory test to help diagnose liver injury related to acetaminophen, the most common cause of drug-related liver injury in the U.S. Along with my team, I am passionate about using research discoveries to improve the management and treatment of patients and we are very fortunate to have the support of ARA."*

# Argelia Lorence, Ph.D.

### *2015 ARA Fellow*

*Professor of Metabolic Engineering; Co-Lead, Plant Imaging Consortium (PIC), Arkansas State University (A-State)*

Argelia Lorence directs the Plant High-Throughput Phenotyping (phenomics) Facility at A-State. She also co-directs PIC, a multi-state effort that uses phenomics and other imaging techniques to allow researchers to adapt food, fiber and fuel crops to meet the challenges of a changing climate and growing world population. The most significant contribution Dr. Lorence has made to plant sciences has been the discovery of a novel biosynthetic pathway for vitamin C that involves myo-inositol as a main precursor. Her lab uses Arabidopsis to better understand the role of various subcellular pools of vitamin C in plant physiology. Her ongoing research has potential applications for the development of crop plants with enhanced nutritional content, better growth and improved tolerance to multiple environmental stresses.

*"My team's research related to finding novel strategies to develop crops that are more resilient to harsh environmental conditions is greatly accelerated by the research funding that comes with being an ARA Fellow. We are passionate about plant biochemistry, plant health and improving nutrition. I am honored to be an ARA Fellow and have the support behind my team's research."*



# Alan Mantooth, Ph.D.

### *2015 ARA Fellow*

*Executive Director, National Center for Reliable Electric Power Transmission; Executive Director, NSF Center for Grid-Connected Advanced Power Electronic Systems; 21st Century Endowed Chair, Mixed-Signal IC Design and CAD; University of Arkansas*

Alan Mantooth has built an internationally recognized, award-winning electronics research program at UA. His team's electronic designs have flown on the International Space Station, surviving extreme temperatures and radiation. Their latest achievements can survive extremely high temperatures, such as those found in deep well drilling or vehicular engine compartments. His team was acknowledged for the second time in the last five years with an R&D 100 Award, which recognizes the world's top 100 innovations, for an electronic charger they designed for Toyota's plug-in electric vehicles. He has dedicated a part of his career to the transfer of research results into daily use by founding and nurturing three startup companies in Arkansas. The economic contributions of Dr. Mantooth have been estimated at more than $4 billion.

*"I am honored to be an ARA Fellow. It recognizes the impact of our research. I will utilize the associated research funding to accelerate research related to our electronics research program for transportation, the electric power grid and other extreme environment applications. I am happy to have the support of ARA."*

# Morten Olgaard Jensen, Ph.D. Dr.Med.

## *2015 ARA Scholar*

*Department of Biomedical Engineering, University of Arkansas*

Morten Jensen's research focuses on experimental cardiovascular surgery, seeking to create useful solutions with sophisticated technologies. He was appointed to the Danish Academy of Engineering and became the youngest person since 1965 to receive the prestigious "Elektroprisen." He serves on biomedical engineering committees and has initiated several projects that are currently in the commercialization process. Earlier this year, he was the third engineer in Denmark since 1479 to obtain the Doctor Medicinae degree for demonstrating significant clinical impact. Prior to joining UA, Jensen was Director of Research at the Scandinavian School of Cardiovascular Technology. His work has been published extensively in scientific journals, magazines and public media.

*"Being an ARA Scholar is a great honor. I will leverage the associated funding and network to drive translational cardiovascular projects. Our team is passionate about bridging the UA Biomedical Engineering research program with the clinical world."*



# Jie Xiao, Ph.D.

## *2015 ARA Scholar*

*Associate Professor of Chemistry and Biochemistry, University of Arkansas*

Jie Xiao's research spans from materials synthesis and electrochemical catalysis/kinetics to advanced characterization with particular interest in the identification of new materials and novel technologies for energy storage and conversion. In addition to being widely published, Xiao has received many accolades, including the Ronald L. Brodzinski Early Career Exceptional Achievement Award, R&D 100 award and Zapperd Award from the American Chemical Society. She joins UA as associate professor of chemistry and biochemistry. Prior to joining the university, Xiao was a senior scientist at Pacific Northwest National Laboratory, leading fundamental research and practical applications of energy materials and systems.

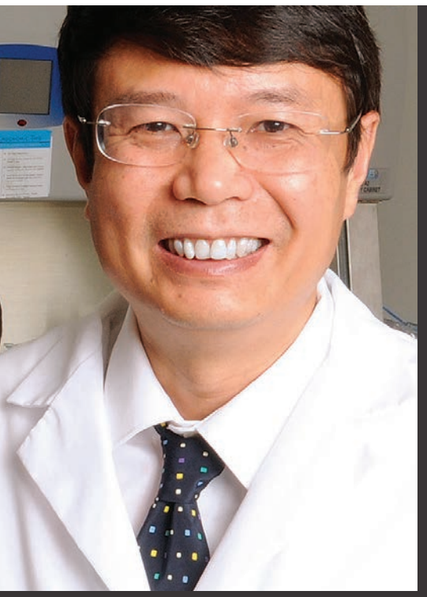
*"It is my honor to become an ARA Scholar and initiate exciting cross-cutting research in energy storage technologies. The funding support from ARA allows our research team to identify innovative solutions for energy challenges through extensive collaborations with industries."*

## Ranil Wickramasinghe
Ph.D.

**2010 ARA Scholar**

***Professor and Ross E. Martin Chair in Emerging Technologies in the Ralph E. Martin Department of Chemical Engineering at the University of Arkansas (UA)***

Ranil Wickramasinghe has established a Membrane Science, Engineering and Technology Center at UA where he and his team focus on research that will lead to new advanced membranes and membrane-based separation processes for applications in the manufacture of human therapeutics, water treatment and production of biofuels.



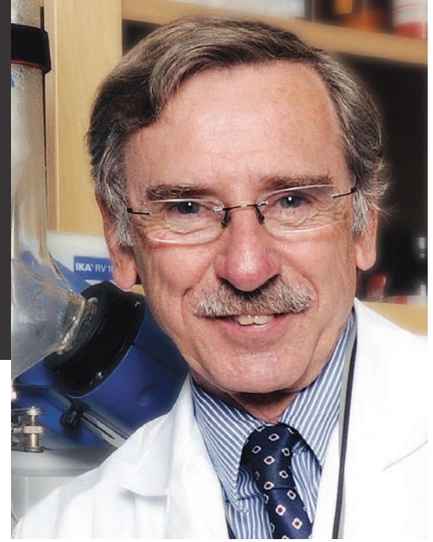
## Daohong Zhou
M.D.

**2010 ARA Scholar**

***Deputy Director of the Division of Radiation Health, College of Pharmacy; Associate Director for Basic Research, Winthrop P. Rockefeller Cancer Institute, University of Arkansas for Medical Sciences (UAMS)***

Daohong Zhou applies his expertise to cancer and stem cell research. He and his team of scientists focus on radiation and chemotherapy-induced stem cell injury, as well as leukemia. They are seeing substantial and encouraging results as they develop new strategies to promote ex vivo expansion (growth out the body) of hematopoietic stem cells (HSCs) that are responsible for the production of all blood cells. These HSCs can be used to treat leukemia and lymphoma by transplantation.





## Peter A. Crooks
Ph.D., D.Sc.

**2011 ARA Scholar**

***Chairman, Department of Pharmaceutical Sciences; Simmons Chair in Cancer Research, University of Arkansas for Medical Sciences (UAMS)***

Peter Crooks has been involved in drug discovery research for over 35 years and currently has several drugs in various stages of clinical development. He and his team work in the field of anticancer drug research where they focus on new, effective treatments for a variety of complex cancers including leukemia, brain tumors, pancreatic cancer and liver cancer.

## Carolina Cruz-Neira
Ph.D.

**2014 ARA Scholar**

***Director of the George W. Donaghey Emerging Analytics Center, University of Arkansas at Little Rock (UALR)***

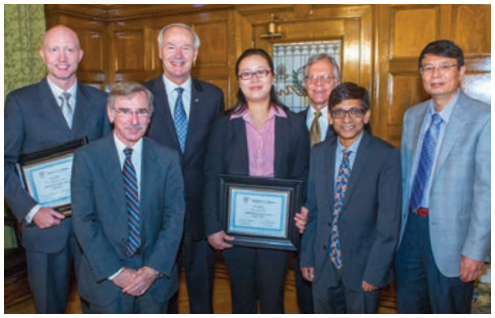
Carolina Cruz-Neira has created and deployed a variety of technologies that have become standard tools in industry, government and academia, the most well known being the CAVE virtual reality system. An ACM Computer Pioneer and IEEE Virtual Reality Technical Achievement Award recipient, her work with advanced technologies provides value to a wide range of disciplines and business.

## Gareth Morgan
M.D., FACP, FRCPath, Ph.D.

**2014 ARA Scholar**

***Director of the Myeloma Institute for Research and Therapy and Deputy Director of the Winthrop P. Rockefeller Cancer Institute, University of Arkansas for Medical Sciences (UAMS)***

Gareth Morgan's work in the field of molecular genetics in blood cell cancer stands at the forefront of molecular studies related to multiple myeloma. His influential work includes characterizing the myeloma genome and defining specific subsets of the disease that have prognostic importance. The author of more than 450 articles for leading journals, his work is leading molecular research related to myeloma.



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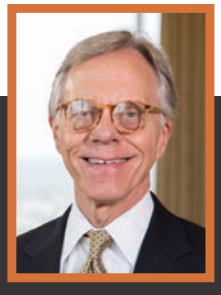


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