From the Director:

“Change will not come if we wait for some other person or some other time. We are the ones we’ve been waiting for. We are the change that we seek.”
– Obama, February 5, 2008

Arkansas ASSET Initiative (Advancing and Supporting Science, Engineering and Technology) is a multi-institutional, interdisciplinary research program uniting three Arkansas universities — University of Arkansas, Fayetteville (U of A), University of Arkansas at Little Rock (UALR), and Arkansas State University (ASU) and designed to strengthen specialty research themes. These research focal areas have potential for regional and national significance and major economic development potential for Arkansas. ASSET Initiative has overarching goals including:

- strengthening our two integrated research collaborations while enhancing Arkansas’ national academic research competitiveness;
- creating an entrepreneurial environment and translational mechanisms to drive industry-relevant outcomes and regional economic development;
- and enhancing the STEM student-pipeline with special emphasis on minorities and women.

These goals have required a change in our approach to research collaboration and a unified effort by researchers and administrators at three geographically separate institutions in Arkansas. Usually such change does not occur quickly or easily. However, Arkansas researchers have embraced this effort, and ASSET Initiative has made great strides toward those goals. While the project is only eighteen months old, we have created two “virtual centers” that are functioning well as cohesive units. Our Plant Powered Production (P3) Center recently finished the second round of seed grant funding which is producing a critical mass of researchers targeting the biosynthetic capacity of plants. These researchers are using plants as bioproduction “factories” for complex proteins and unique bioactive compounds of importance in industries such as medicine and pharmaceuticals, food nutrients, and biofuels. Researchers in our Wireless Nanosensors and Systems (WiNS) Center have recently returned from the SPIE Conference in San Diego where they hosted a special breakout session on their center and its research efforts. This center is developing organic nanomaterials and wireless communication systems for applications such as nanosensors and point-of-care monitoring devices. The research sections of this newsletter are showcasing the infrastructure development, research successes, and collaborative outreach efforts of these two active research groups.

In this issue of ASSETs we are also highlighting some of the entrepreneurial training opportunities providing support for Arkansas researchers who have intellectual property with commercialization potential. We just finished a special SuperCoach event that was extremely successful and will be hosting an SBIR Phase II workshop on July 9, at the UALR Campus Bailey Alumni Center. We will also be hosting a series of FastTrac® TechVentures™ workshops regionally at each of our participating campuses over the next three months.

Finally, this issue showcases some of the results of our educational outreach activities. STEM Awards provide funds that support technology-rich projects in Arkansas STEM classrooms and STUART awards provide equipment and professional development for middle school science classrooms. We are presently organizing a multi-jurisdictional workshop to be held in August that will focus on Best Practice Educational Outreach models.

ASSET researchers, staff, and partners are active, motivated and innovative. Their efforts have the potential to bring about change in Arkansas: to impact regions economically, to support educational improvement and workforce development and to enhance our research capacity. We are the change that we seek.

– Gail McClure
RECENT NEWS

ASSET Initiative Provides FastTrac® TechVenture™ for Researchers

A new technology by itself doesn’t constitute a company. FastTrac® TechVenture™ helps researchers translate their discoveries into business opportunities. To succeed, entrepreneurs must develop a strong team, acquire capital, understand the market, and attract customers. This special two-day seminar/workshop helps new entrepreneurs define their target customers, develop business and marketing plans, determine the financing needed and where to access it, and assess and build a management team. Arkansas ASSET Initiative is hosting a series of workshops to provide these skills through a grant to the Arkansas Small Business and Technology Development Center (SBTDC).

SBTDC will deliver this series of educational events that will provide training in the necessary skills and understanding of building a business from intellectual property developed in the laboratory. While these activities target our EPSCoR faculty, they are open to all researchers either free or for a small fee. FastTrac® TechVenture™ workshops will be offered regionally to provide easy access for researchers on our three EPSCoR participating campuses.

FastTrac® TechVenture™ offers a unique curriculum. Researchers learn what to consider about starting, operating, funding, and growing a technology or life sciences-based business. This special program of the Kauffman Foundation of Kansas City will be presented by Arkansas SBTDC in a 2-day workshop format on each campus. The workshops will be held April 16-17 on the UALR campus, May 15-16 on the ASU campus, and June 18-19 on the UAF campus. More information is available at www.ArkEPSCoR.org. Registration fee is $190 for non-EPSCoR researchers. Researchers interested in registering for this program should contact Laura Fine (lcfine@ualr.edu).

Research Day at The Capitol

On January 26, 2009 Arkansas Senators and State Representatives met with Arkansas university students to discuss their most recent research findings at Arkansas Research Day in the rotunda of the State Capitol in Little Rock, Arkansas.

More than thirty leading researchers from institutions and colleges throughout the state discussed how their work could have a beneficial impact on Arkansas’s economy.

“Young leaders like these are creating new opportunities to help build an economy based on technology and knowledge,” said State Representative Monty Betts, D-Searcy. “They’re on the brink of exciting advancements, and today we were able to see their progress.”

Research Day is an annual event organized by the Arkansas Science & Technology Authority that highlights the technological advancements and achievements of the State’s research institutions and universities.

Supercoach Entrepreneurial Training Workshop

Arkansas ASSET Initiative provided special funding to the Arkansas Small Business and Technology Development Center to host a very special one-day entrepreneurial training event, Tuesday, March 3. The Supercoach Entrepreneurial Training “Taster” workshop illustrated the tools and techniques for coaching early stage science and technology entrepreneurs. This demonstration workshop was based on a proven methodology and is an ideal way for decision makers and stakeholders to experience the program along with new venture entrepreneurs. Participants witnessed the power of just a few of the one-page “thinking about the business” tools that are a part of the Supercoach program. One Arkansas EPSCoR scientists from each of the three participating universities, U of A, ASU, and UALR, plus a UAMS researcher served as the new venture entrepreneurs.

The event promoted a technology entrepreneur mindset within the university research and economic development communities. The participants addressed different challenges faced by entrepreneurs in Arkansas, including the retention of skilled businessmen and women in the state, limited funds, and the realization that scientists and engineers can make great entrepreneurs. Entrepreneurial coach Sharon Ballard said, “those who know what is possible can change the world.”
EDUCATIONAL OUTREACH

STUART Training Workshop

Twelve teams of middle school teachers attended a two-day training workshop on the Classroom Performance System (CPS) as part of a STUART grant they received earlier this year. The STUART-Grant Program, which is part of the NSF EPSCoR Outreach project and funded by the Winthrop Rockefeller Foundation, provides funds to Arkansas public middle school teachers to use technology in their classrooms for teaching science. The $5,500 grants provided teachers with the CPS system, CPS Chalkboard, a projector, and a laptop computer.

CPS, a student response system provided by eInstruction, allows teachers to keep their students engaged in the classroom using CPS computer software and student handheld response pads. The software is controlled by the teacher, and each student is assigned a response pad that he or she uses to answer questions during lecture or educational classroom activities. The response pads also offer a way for more hesitant students to be involved in classroom activities. Additionally, the software provides immediate feedback, which enables teachers to assess their students daily instead of waiting until the exam. The CPS Electronic Chalkboard allows the teacher to draw, navigate, and interact with the laptop from anywhere in the room.

The CPS training by eInstruction provided teachers with the opportunity to learn and use the program. “This hands-on training has been priceless; I don’t have to worry about getting back to the classroom and not being able to work the program,” Ulanda Branch of West Memphis Middle School. “I really enjoyed the training on the CPS systems. I can’t wait to get it into the hands of my students, because the instant feedback and hands-on materials are both invaluable,” Leslie Lyons of RBMS Bentonville.

Malvern High School Receives STEM Award

STEM Partnership awards provided by the Winthrop Rockefeller Foundation were granted to the Malvern High School EAST class and the Pre-AP Biology class for the development of the MSSD Environmental Study Center. Working as partners and using 3-D modeling software, the classes designed and created raised gardens, track boxes, and areas for native plants. Students are presently photographing and creating animated examples of the native species to create field guides to be used by future biology students.

Schirmer Attends Training Course

ASU graduate student Seth Schirmer, working with Dr. Malathi Srivatsan, studies the effect of carbon and magnetic nanotubes in promoting directed growth of axons neurons. Through support from ASSET and the NSF, he recently participated in an intensive three-day workshop on spinal cord injury research methods at the W.M. Keck Center for Collaborative Neuroscience at Rutgers University.

At the workshop, Schirmer learned to perform surgery, use the MASCIS Impactor, provide post-surgical care, sample and analyze the spinal cord tissue, and score functional recovery.

Prairie Grove Varadan Visit

Prairie Grove High School, located in a small northwest Arkansas town, recently initiated the Intel Club where students meet each week to study and learn about new technologies. After reading an article in Fayetteville’s newspaper about nanotechnology research at the U of A, the eleven charter members of the club decided to learn more about nanotechnology and where nanotechnology trends are heading.

To begin their quest for information, the students spent two days reviewing online information and video podcasts about nanotechnology. Jeanine Woods, the club’s advisor, knew that her students wanted to learn more and invited Dr. Vijay Varadan, WINS Center Project Leader at the U of A, to meet with her students.

Dr. Varadan gave a presentation titled “Nanotechnology and its Applications in Healthcare and Clean Green Energy” and introduced the students to practical applications of nanotechnology to show them how this area of science will impact people everywhere. “It was fascinating. I didn’t know they could do those kinds of things with plastic,” said Chris Perkins, a senior at Prairie Grove High School.

Later in the semester, the students will hear from a member of Arkansas’ legislative body on the future of technology in Arkansas.
University of Arkansas WiNS
Researchers Offering A New Course of “Nanotechnology in Medicine”

Dr. Vijay K. Varadan, Director of Wireless Nanosensors and Systems (WiNS) Center at the U of A, said “Recent advances in nanomedicine offering ground-breaking methods for the prevention, diagnosis and treatment of some fatal diseases will be taught in an online class to the students at three different campuses, U of A, UALR and ASU”. After a substantial amount of work for this online course to be offered in the above three campuses supported by NSF EPSCoR, the first lecture started this Spring Semester and is being transmitted through the ACCESS GRID on-line network system.

“In our classroom, students are introduced to new scientific and engineering challenges in nanotechnology focusing on medical areas” he said. This course will be offered to senior and graduate level students with various backgrounds in engineering and science such as electronics, computer science, biology, chemistry, physics, mechanics and materials.

Researchers Use Nanowires to Develop Neural Probe That Will Limit Damage to Cells and Biological Tissue

Engineering researchers at the U of A have developed a new neural probe with significantly greater electrical charge storage capacity (48.6 Coulombs/cm²) surpassing other major research groups, including Stanford and USC. Because storage capacity is directly related to density of electrical current needed to stimulate nerves and muscle cells, the probe can transfer charge into biological cells and tissues using less voltage — and less battery power — and thus can operate longer with less tissue and cell damage.

“Our goal is to develop functional systems that can simultaneously stimulate nerves or muscle cells and record physiological changes in the human body,” said Dr. Hargsoon Yoon, research assistant professor in the College of Engineering and lead researcher on the project. Dr. Yoon with Dr. Vijay Varadan, WiNS Center Project Leader, are developing a system that will include nanowire electrodes, wireless communication and a power source for bio-packaging.

These neural probes integrate free-standing, “hetero-structured” nanowires, made of gold and iridium oxide nanowires grown vertically on a polymer or titanium substrate with an outer, functional layer of iridium oxide, providing charge storage capacity. This design will improve the function and reliability of neural prosthetic devices with superior biocompatibility and mechanical strength compared to similar silicon structures. Findings of the project were published in Nanotechnology 2008 and will be included in an upcoming issue of IEEE Transactions on Biomedical Engineering.

ASU Lab Focuses on Nanomaterials and Neuron Interaction

Dr. Malathi Srivatsan’s neuroscience laboratory at ASU is being outfitted with pieces of equipment enabling scientists to study the interaction of nanomaterials with the nervous system in real time. The procurement and assembly of the Multichannel Multi Electrode Array system was completed in 2008.

Dr. Srivatsan is the campus lead for the ASU Wireless Nanosensors and Systems (WiNS) Center.

Dr. Srivatsan is collaborating with Dr. Vijay Varadan and his research group at the U of A, where nanomaterials for this research are custom fabricated.

Dr. Mahadevappa Badanavalu, postdoctoral fellow in Dr. Srivatsan’s lab, cultured neurons in the presence of nanomaterials. These neurons formed a network, and researchers were able to start recording the electrical signals from these neurons as they began to communicate with one another.
UALR Plans HPC Facility
The first High Performance Computing (HPC) facility at UALR is on its way!

UALR’s Wireless Nanosensor and System (WiNS) Laboratory has installed a supercomputer that allows researchers to complete computational work that requires a much more massive resource than a desktop computer, as is the case with many scientific applications. The theoretical peak performance of the UALR supercomputer is 5.45 Tflops, or 5.45 trillion floating point operations each second, which can be fully utilized only if workload is balanced properly.

One of the challenges supercomputer users face is efficiently parallelizing their program, and they invest a great amount of their time doing so. Furthermore, the developed code may not always be optimized to fully take advantage of the supercomputer.

The UALR team has deployed Star-P — a special tool to automatically parallelize MatLab and Python code with a minimal coding — tremendously improving parallel code generation while significantly reducing the time researchers spend trying to optimize. Now potential MatLab and Python users can obtain optimized parallel code, and they also can publish their discovery quickly, adding competitive edge to their research.

UALR Anechoic Chamber
Serves as Testing Facility

A state-of-the-art anechoic chamber has been constructed at UALR to design and test antennas developed at UALR for use in wireless devices. The antennas will be integrated with nano-sensors fabricated at the U of A that collect data and send to remote servers for processing and analysis.

Researchers within the EPSCoR wireless research group WiNS have invented several nanostructured antennas. The researchers and the university have filed for a patent on the new device. The researchers are Hussain Al-Rizzo, Alex Biris, Taha Elwi, and Daniel Rucker. Three of the researchers, Al-Rizzo, Taha Elwi, and Daniel Rucker are EPSCoR WiNS Center researchers and Dr. Biris is with the Department of Applied Science and the UALR Nanotechnology Center.

The equipment in the anechoic chamber was manufactured by Cuming-Lehman Chambers, and the installation was completed in December 2008.

Technical Specifications
- Frequency range 400 MHz – 18 GHz
- Minimum guaranteed performance voltage standing wave ratio (VSWR) of -35 dB at 400 MHz

Anechoic Chamber Equipment
- Agilent PNA Network Analyzer 10 MHz – 40 GHz
- Agilent PSA Spectrum Analyzer 3 Hz – 26.5 GHz
- Agilent MXG Signal Generator 100 kHz – 31.8 GHz
- ETS-Lindgren multi-axis positioner, controller, and measurement software

Equipment Available for Research Related to Implantable Medical Devices
- SAM phantom head model
- SPEAG SAR measurement frequency range: 10 MHz - 6000 MHz
dynamic range: 5uW/g - 1000 mW/g
spatial resolution: 2.5 - 7 mm
directivity: < ±0.3 dB
- Agilent 85070E Dielectric Probe Kit frequency range: 200 MHz to 20 GHz
high temperature probe: -40C to +200C
large 3.5 mm aperture that provides a larger sensing volume than other probes
Arkansas EPSCoR P3 Seed Grants

Arkansas ASSET Initiative has awarded a total of $2,309,860 in funding for Rounds One and Two of the P3 Center Seed Grant Program. These seed grants are designed to create a cluster of research strength focusing on plant bioproduction topics that have synergistic cross-campus impact. Our goal in this EPSCoR program is to generate the intellectual and infrastructure resources to address the fundamental biology of plant-based bioproduction in a way that integrates geographically dispersed programs, mentors a group of promising young researchers to ensure competitiveness in this arena, builds a national reputation of leadership in plant-based bioproduction, and drives economic development.

Recent recipients of P3 Center Round 2 Seed Grant Program funds are spotlighted along with a description of their research topics.

**Determination of Factors Affecting High-Level Protein Accumulation in Transgenic Maize Seed**

**PI:** Elizabeth Hood, ASU  
**Co-PI:** Xiuzhen Huang, ASU

This research will use corn seed as a bio-factory to make proteins for uses in industry. For example, corn seeds are making cellulase enzymes that will help to make ethanol from corn stalks and rice straw. Researchers are exploring genetic factors that cause the enzymes to accumulate in the corn seeds at really high concentrations, because this will allow the enzymes to be produced inexpensively.

**Enabling Crop Deregulation with Software: a Prototype**

**PI:** Daniel Berleant, UALR  
**Co-PIs:** Elizabeth Hood, ASU; Richard Segall, ASU

Genetics can be used to develop important and valuable crops that are significantly better than existing varieties. Collecting information to show that a new crop strain has no problems compared to existing varieties is essential to obtaining permission to grow the new strain commercially. This project will assist by automatically collecting needed information by extracting known facts from the vast body of published work.

**Pave the Way for Deciphering the Development of Transfer Cells in Economically Important Crop Plants**

**PI:** Hong Li Wang, UALR  
**Co-PI:** JD Swanson, UCA

The research will develop valid methods and use model plant, Arabidopsis which contains transfer cells, to study the functions of wheat transfer cell specific genes, and test a hypothesis that similar genes and gene networks are required for the development of transfer cells in different transfer cell systems and in different species.

**Photoregulation of Phenylpropanoid Antioxidant Production in Tomato**

**PI:** Stephen Grace, UALR  
**Co-Pls:** Mariya Khodakovskaya, UALR; JD Swanson, UCA

Flavonoids comprise a large and diverse group of plant phytochemicals that serve important functions in plants and show increasing promise as health promoting substances. We will study the light regulation of flavonoid biosynthesis in tomato, an important Arkansas crop. This project will allow researchers to develop strategies to optimize flavonoid levels in plants for enhanced stress tolerance and nutritional improvement.
Professor Receives Prestigious British Petroleum Award

Dr. Jianfeng Xu, assistant professor of Biochemical Engineering at the Arkansas Biosciences Institute and the ASU College of Agriculture, was presented with the 2008 British Petroleum (BP) Young Scientist and Student Award at the 13th International Biotechnology Symposium and Exhibition Oct. 12–17, 2008, in Dalian, Northeast China. The International Biotechnology Symposium and Exhibition is held only once every four years and is recognized as the premier international conference in the field of biotechnology.

Dr. Xu was selected from more than two hundred applicants to receive this global award. At the conference, 10 experts in the field judged Xu on his poster, “High-yield Expression of Therapeutic Proteins with Extended Serum Half-life in Tobacco Cells,” and his oral presentation, “Develop a Platform for High-Yield Secretion of Therapeutic Proteins in Plant Cell Culture.” Dr. Xu was also judged on a question-and-answer discussion session.

Dr. Xu was presented his award by Professor Werner Arber, 1978 Nobel Laureate in Medicine of the University of Basel, Switzerland. He was also presented with an award of $1,500 by John Morgan, Senior Vice President of British Petroleum (BP), Group Research & Technology.

The overall theme of the Symposium for 2008 was “Biotechnology for the Sustainability of Human Society.” The symposium examined the milestone achievements and successes in biotechnology and discussed how biotechnology can contribute to global sustainability in the 21st century.

Dr. Xu is part of the Arkansas Experimental Program to Stimulate Competitive Research (EPSCoR) Plant Powered Production (P3) Center. The P3 Center is a research partnership between ASU, U of A and UALR, and is funded by the National Science Foundation, the Research Infrastructure Improvement program (RII): Arkansas ASSET Initiative (Advancing and Supporting Science, Engineering and Technology), and the Arkansas Science & Technology Authority.

The P3 Center offers cross-disciplinary opportunities to engage with cutting-edge advances in plant-based bioproduction technology. The P3 Center focuses on enhancing research infrastructure and cross-disciplinary, multi-institutional collaboration, linking research competitiveness with outreach and entrepreneurship to ensure knowledge-based economic development.

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**Regulation of specialized ("secondary") metabolism in tomato by genetic manipulation of the phosphoinositol pathway**

**PI:** Mariya Khodakovskaya, UALR

**Co-PIs:** Fabricio Medina-Bolivar, ASU; Nawab Ali, UALR; Stephen Grace, UALR

This project will enhance the overall understanding of molecular basis of increasing antioxidant production and stress tolerance in plants, two traits that could dramatically increase crop value. Researchers are going to identify key genes and gene network involved in stress tolerance and activation of antioxidant production in tomato plants. Researchers will also create new reproducible biological source of antioxidants by establishment high-productive tomato “hairy roots” cultures.

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**Cardiovascular Response to Plant-Based Anti-Inflammatory Agents**

**PI:** Latha Devareddy, UAF

**Co-PI:** Anne Grippo, ASU

Postmenopausal women suffer increased risk of heart disease, due in part to atherosclerosis. Atherosclerosis, in turn, may be caused by elevated levels of blood cholesterol and other factors. Our project will investigate the role of compounds present in blueberries (anthocyanins) and grapes (resveratrol) in the prevention of heart disease in postmenopausal women.

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**Perception and Modification of Biopolymers by Filamentous Fungi: Towards the Metabolic Engineering of Fungi to Complement Plant-Based Bioproduction Strategies**

**PI:** Burton H. Bluhm, UAF

**Co-PI:** Jackson Lay, UAF

To produce ethanol from crop residues, plant matter must first be broken down into fermentable sugars. However, crop residues are made of complex carbohydrates that are not easily digested. We are studying fungi that naturally digest crop residues, with the long-term goal of genetically engineering these organisms to maximize bioethanol production.
**Collaborative Efforts**

**P3 Researchers Make International Connections**

Researchers of ASSET Initiative P3 Center are travelling nationally and internationally in speaking engagements that are effectively promoting and increasing the notoriety of the research group. Presentations at conferences and invited presentations at universities and research institutes allow P3 researchers to network with scientists of similar or complimentary expertise and enhances the competitiveness of the P3 Center.

**Dr. Medina-Bolivar Invited to Speak in China**

Dr. Fabricio Medina-Bolivar, Plant Metabolic Engineering at ASU (ABI), was recently invited to give a talk at the 6th Annual Congress of International Drug Discovery Science and Technology (IDDST) in Beijing, China. The Congress included renowned speakers from academia and industry, including Nobel Prize laureates. During his stay in China, Dr. Medina-Bolivar also gave a lecture at the Chinese Academy of Sciences Laboratory of Biochemical Engineering.

**Dr. Lorence Invited to Speak in Mexico**

Dr. Argelia Lorence, Metabolic Engineering at ASU (ABI and Department of Chemistry and Physics), was an invited speaker at the 7th Pan American Symposium -Mexico 2008 Cuernavaca, Mexico. While in Cuernavaca, Dr. Lorence served as international evaluator of the Academic Program in Pharmacy offered by Universidad Autónoma del Estado de Morelo. During this trip Dr. Lorence worked with international collaborators to submit a proposal to fund a UAEM post-doctoral student in the ASU laboratories of the Lorence Group.

**Dr. Savary Chairs Panel in British Columbia**

Dr. Brett Savary, ASU (ABI) and College of Agriculture, served as co-organizer and moderator of the panel “Biorefinery Co-Products” at the Biotechnology Industry Organization's Pacific Rim Summit on Industrial Biotechnology and Biofuels held recently in Vancouver, BC.

**Dr. Xiuzhen Huang Presents in Shanghai**

Dr. Xiuzhen Huang, ASU Computer Sciences and P3 Seed Grant recipient, recently presented a paper at The Third International Multi-Symposiums on Computer and Computational Sciences 2008, held at the Medical School, Shanghai Jiao Tong University, Shanghai, China. While at the symposium, Dr. Huang developed collaborations with researchers from both bioinformatics and from medical science.

**Dr. Cramer presents at the Salk Institute**

Dr. Carole Cramer, P3 Center Project Leader and Executive Director of ASU (ABI), presented a talk at the Salk Institute Plant Biology Laboratory 25th Anniversary Symposium in La Jolla, California. Dr. Cramer highlighted results from her research groups’ experiments in using plant lectins as potential carriers of medical and veterinarian proteins.

**Cramer & Hood Present at Alternative Crops Conference**

ASU leaders Dr. Carole L. Cramer, P3 Center Project Leader, and Dr. Elizabeth Hood, PhD, Distinguished Professor of Agriculture, ASU and President & CEO of Infinite Enzymes, recently presented a forum at the Planting Seeds for the Future: West Tennessee Alternative Crops Conference at the University of Memphis Infinite Enzymes was a sponsor along with the +Tennessee Department of Agriculture and the Memphis Bioworks Foundation, which is dedicated to developing new agricultural technologies and processing, resulting in a stronger bioeconomy in the Mississippi Delta, impacting both workforce development and the economy.

**WiNS Center Featured at International Conference**

Arkansas ASSET Initiative WiNS researchers were featured in a special breakout session, “Nanowire, Nanotubes, and Nanostructures,” at the SPIE International Conference, Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring, March 9–13, 2009, in San Diego. Conference participants were especially interested in the WiNS’ engineering, biological, information technology and systems approach to finding solutions to problems.

WiNS researchers also presented individual talks at multiple panel discussions and posters during the event. Attending the conference were Drs. Vijay Varadan, Jining Xie, Lingeng Chen and Hargsoon Yoon of the U of A, Dr. Malathi Srivatsan of ASU, and Drs. Seshadri Mohan and Guoliang Huang of UALR.