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GREETINGS!

Alabama A&M University has a significant impact on the local and regional economies. As a major research institution, AAMU will continue to augment the regional economy; provide the nucleus around which brilliant faculty and staff add to bodies of knowledge and who will, in turn, pay millions in federal, state and local taxes; offer a needed source of talent through its graduates, many of whom remain in the greater Huntsville area; provide cutting-edge research and patents; offer continuing education opportunities; coordinate programs to assist elementary and secondary schools to prepare the next generation of leaders, scientists and researchers; launch numerous community forums, cultural events, concerts, plays and lectures, etc.; and lead community improvement efforts through construction and civic engagement of its constituents including alumni and friends.

At the end of the day, AAMU will continue to prepare students for productive and rewarding lives. It will and must continue to play a major role in producing thinkers who understand both the past and can project the future. As a research leader among its peer universities, our primary thrust must be that of providing solutions to problems that impact our local citizens, the state, the country, even the global community. The researchers engaged here must ably build knowledge that will make—when shared with industry, business, education, the medical community, government, and other groups in society—a tangible difference in the quality of life and/or operations of those with whom they share the information.

AAMU faculty researchers play a significant role in new discoveries, including ways of prolonging and improving life, from new scientific discoveries to literature that improves the lives of diverse groups, to the production of intellectual properties such as new studies and improved machinery that benefit society at large.

AAMU will remain a catalyst for positive and productive change!

Andrew Hugine, Jr., Ph.D.
President
As scholars and university administrators, we must engage in ongoing dialogues about scholarly endeavors that acknowledge both our competing interests and our common goals. While this may challenge us to think and be more creative, it needs not threaten or undermine a successful balance of our interests. Let our curiosity be guided by the hunger to remain on the cutting edge of discovery.

Our scientists must seek questions no one is asking and endeavor to bring critical thinking and new approaches to how they address them. On the other hand, as we ask our researchers and scientists to double their efforts and be more creative, we too must be more aggressive in seeking and identifying funding sources that are necessary for their work. This, we do by ensuring that the necessary training opportunities are provided for both our young and new faculty members, as well as our seasoned researchers to help them be more successful in seeking research dollars.

We believe that this level of professional development is to a large extent contributing to the upward spiral in grant awards coming to the University over the last few years. For instance, faculty participation in grant writing is up, and research funding from different sources in fiscal year 2008/2009 shows a 48-percent increase over the previous cycle. In essence, research continues to be a successful endeavor at AAMU.

As we talk about dialoguing, we implore you to continue to read AAMUresearch, another avenue to learn about the great things that are going on at AAMU. We also invite you to send comments or questions, or specific topics you would like to see addressed in future editions.

Teresa Merriweather Orok, Ph.D.
Vice President of Institutional Research, Planning and Sponsored Programs
Science and knowledge

Scientific research is a vital part of securing the future for a knowledge-based economy in the United States, and AAMU takes its role in securing that future very seriously. We hope you enjoyed our first edition of AAMUresearch and that it went some way to explain why our University plays such a critical role in research and discovery.

This second edition of the magazine comes on heels of the selection of a new University president with vast experience in higher educational leadership and administration, who has signaled his intent to further develop AAMU’s reputation as a research-led institution (see Q&A). Also in this edition you will read how Dr. Arjuna Ranasinghe is developing the “BeeZip,” a new model for computer network security. The architecture, he says, solves the problems inherent with systems that require live connections when information is viewed. In the Department of Natural Resources and Environmental Sciences, Dr. William Stone and a team of researchers have been in some “strange and unusual” places. They have been studying bats in northern Alabama caves to learn more about their habitat and diet selection.

The development of technologies that can sense threats to us and our environment is part of the constant search that keeps researchers on the go. For instance, in the Department of Physics, graduate (Ph.D.) student Gregory Stargell and his professors have developed a theoretical approach to describe thermo-induced pyroelectric charging phenomena in ferroelectric semiconductors, which can be applied in the development of radiation sensors.

Also, we believe that the future of AAMU’s science and technology depends fundamentally on how the University attracts, trains, and uses young scientific talents. Thus, at the core of our research activities is attracting a diverse range of talents, especially young people, and providing them with an environment that brings out their best. To recognize these exceptional new talents, AAMUresearch unveils it “Rising Stars” column. Please meet and congratulate our first group of “Rising Stars.” And, continue to send your comments.

Emmanuel S. Freeman
Editor
Letter to the Editor

Dear Sir:

I received a copy of the AAMU research magazine a week ago. I read it from cover to cover. I am so proud of what was recorded in the magazine. I am very glad to know that AAMU researchers are engaged in such a variety of cutting-edge research, and have such esteemed teachers and scientists on the faculty.

I am a 1962 biology graduate of AAMU and my daughter is a 1995 food science graduate. I am proud of the education I received from the University. I was able to study and compete with others all over the United States with an Ed.S. degree in the biological sciences. I recently retired as a science educator on both the high school and college levels. My daughter went on to get advance degrees at Iowa State (M.S.) and Texas Southern University (MBA). Science studies at AAMU have progressed beyond my dreams since the 60s. I know that the quest for scientific understanding started on “The Hill.” The accomplishments of the University make me proud as an alumna. I have personally influenced and steered several students to AAMU to study in the scientific, engineering and math areas.

The reports on genetic engineering of peanut allergens and the production of yam were great. I will inform my family and retired colleagues about these outstanding accomplishments. The “Crystal growth” article was noteworthy. “Dietary chemoprevention of colon cancer” was very informative. I will also share this report with others in the health ministry at my church. “Outreach: AAMU touches community in a big way,” and “lla: A physicist and more,” outstanding.

As a biologist I learned that the laws of physics and chemistry explain the biological world. I have a great appreciation for a great teacher, researcher and physicist. “Speed and heat,” great! I had the opportunity to visit Redstone Arsenal when I was a senior at the University. I was simply amazed then and even more so now with the joint efforts between NASA and the AAMU. In 1962, I did envision great things and the possibilities of scientific collaboration between the two. “Mesonet impacts drought, flood forecasting in Tennessee Valley,” very good and timely. “Healthy eating,” worthy article. These professional articles could be understood even by a novice.

The magazine was easy to comprehend and very well appreciated. I recommend that you send it to all Alumni.

Sincerely yours,

Pauline B. Washington
College Park, Ga.
DEVELOPMENT OF BeeZip
New model for computer network security

By Arjuna Ranasinghe

BeeZip is a new architecture for distributing digital information over computer networks. There are two primary pieces to the architecture: 1) An efficient transport design that solves the problems inherent with systems that require live connections when the information is viewed, and 2) A new message encapsulation that solves the problems of delayed binding of data to presentation software at the time the information is viewed.

Traditional architectures are either data-centric or software-centric. The BeeZip architecture is “presentation-centric.” The object managed by BeeZip is a “Presentation” that is encapsulated in a “Comlet,” which contains both data and presentation intelligence. The Comlets are distributed to BeeZip Subscribers through a private, secure communication path using standard Internet services. Since the presentation intelligence is packaged with the data, the Comlet presents itself when chosen by the BeeZip Chooser.

**Figure 1**

The Paradigm Shift

The BeeZip architecture changes assumptions about publishing information in a computer network. Compare Figure 2 with Figure 1.

In traditional systems, a Publisher must ask: “How do I package usable data formats to be viewed by software on other systems?” In a BeeZip environment, this question becomes: “How do I best present what I want to convey?” This change in thought is both subtle and profound. The emphasis shifts away from thinking in terms of data and the use of separately-installed software. With BeeZip the emphasis changes to providing the best presentation without the limits of traditional systems. For example, if a Publisher had medical information or home-building information to communicate, he or she normally would ask:

1. “How do I email this data?”
2. “How do I place this data on a Web page?”
3. “What software will the reader have available?”
4. “How can the reader download special software if they cannot read the data?”

All of these questions, however, are variations of a single question:

**Figure 2**

**Traditional System**

Software creates Data → Data is transferred to local system → Simple Data is read by viewer → End User

Complex Data is processed by local software
"How do I live within established limitations?"

In BeeZip, each Publisher of information would ask: "How can I best present what I want to convey?" Traditional limitations would no longer apply to the thought process. For example, perhaps the medical information could best be presented as a letter and voice message in concert with a spreadsheet and an image that can be panned and zoomed. In a BeeZip environment, the Publisher would be free to create such a presentation and the presentation would be guaranteed to work on the Subscriber’s system. The Subscriber would be more likely to respond: "I comprehend what you are trying to convey to me" because the system and associated thought process are presentation-centric.

In addition, BeeZip allows the Publisher to know if the presentation has been read and understood, and can maintain control of the presentation even after it has been transmitted to the subscriber.

How the BeeZip Architecture Solves Other Traditional Problems

- Because they are “Presentation-centric,” BeeZip Comlets can combine any presentation intelligence with multiple data sources. Comlets are not limited by data formats or external software.
- Since a BeeZip network has a known Publisher with Subscribers, all virus detection can be performed before Comlets are published. SPAM and attachments are also avoided. The BeeZip network contains only safe, robust presentations from a known Publisher.
- Because it is self-defining, the BeeZip Comlet can be previewed prior to Publication exactly as the BeeZip Subscriber will experience the presentation. If any problems exist, they can be caught and corrected at the preview stage.
- Since all Comlets are encrypted and compressed during transport, the BeeZip network is more secure and efficient than traditional systems.
- Because BeeZip Comlets control their own behavior, it is possible to prevent viewing of information by unauthorized viewers and forwarding of information beyond the intended audience.
- The data within a Comlet is protected from direct access, and can be shredded by the Comlet when it detects specified conditions or in response from the Publisher.
- Because BeeZip Subscribers are associated with a specific Publisher, private label branding is inherent in BeeZip implementations.

BeeZip Compared to Alternative Systems

Most alternative systems try to fit limited innovation within the restraints of existing systems. BeeZip is designed to avoid these limitations.

Email-based Systems

Any system that uses email must contend with the issues of security, fear of viruses, and the need to keep viewing software synchronized with the data formats being attached. In the end, such information is just one more message in a sea of information all dealing with the restrictions of email.

In contrast, BeeZip provides a separate, secure communication path where data is inherently synchronized with the presentation software. The fear of attachments is eliminated. In email-based systems, advanced presentations normally require special software to be installed on the receiver’s system, and this process is repeated as new data formats are introduced. In BeeZip, these problems and limitations do not occur.

General Purpose Viewers

Some systems try to solve the data format issues by providing a separate viewer that can display multiple formats. Adobe Acrobat is such a system. However, such software is designed to be data-centric where the information is displayed in rigid formats by the software in the viewer. In addition, if new formats or displays are to be supported, either software updates or new versions of the viewer software must be installed.

In contrast, BeeZip Comlets inherently view the data they contain. Any data format, or new versions of formats, can be viewed by a Comlet without upgrading the Subscriber’s system. In a sense, the viewer’s system becomes a theater where entire performances are produced and directed by the Comlets received. The viewer does not have to worry about what is needed for the presentation.
Media Players

Media Players allow some forms of multimedia data to be viewed efficiently. However, they are all data-centric architectures designed around specific media data such as music or video or limited combinations where tracks are synchronized within the data.

In contrast, BeeZip Comlets can play any media or combination of media. All media players become a subset of BeeZip capabilities. Multiple input streams (and either private or public media formats) can be combined by a BeeZip Comlet to maximize the presentation of information. BeeZip is Presentation-centric, and not data-centric or media-centric.

Applications for BeeZip

This is the greatest area for study and development. BeeZip is a core architecture that can be tailored for specific applications and markets.

Secure Information - BeeZip allows unprecedented opportunities for secure transmission and control of information. Most any organization sees the need of a better solution than email and Web systems. BeeZip also controls unauthorized replication and forwarding of information.

Training - Information can be presented in advanced ways that maximize comprehension and retention of information. Plus, testing can be integrated into the presentations.

E-marketing - Companies need a better solution than SPAM, email attachments, and seldom-visited Web pages.

Customer Relations - Companies want a way to keep their name in front of customers and provide them superior marketing materials and personal support.
DISCOVERING BATS
HABITAT USE IN THE FORESTS OF NORTHERN ALABAMA

By William E. Stone

While most research conducted is performed in a laboratory environment on campus, research into forestry, ecology and wildlife is conducted in some unusual places. One such place is a cave where endangered bats hibernate. A research team with members from Alabama A&M University, the Bankhead National Forest, two state agencies, and the Huntsville Grotto of the National Speleological Society, investigated over 50 caves in the Bankhead National Forest during the winters of 1998-1999 and 1999-2000. We discovered two species of endangered bats both hibernating in two caves (Stone, W.E., M.K. Hudson, and E. Stewart 2000). Since that time, faculty, staff, students and partners of Alabama A&M University have been studying bats to discover more about their habitat and diet selection in the forests of northern Alabama when they are not hibernating.

Bats are surprising creatures. Most of what people think they know about bats is not even true. Bats are not blind, their bites won't make you immortal, and they don't fly into your hair. In fact, bats have more to fear from us than we do from them. Bats are unusual from other mammals in several respects. Bats are the only mammal capable of true flight. They belong to the mammalian Order Chiroptera, second only to Rodentia, the rodents. Most bats live in tropical regions, but bats can be found on all continents except Antarctica. Fossil records of bats go back to the Eocene period, 38-54 million years ago (Findley, James S. 1993). Tropical bats, also known as flying foxes, are large and eat fruit. Bats in temperate regions are small and most are insectivorous. Of course, in temperate regions, cold weather greatly decreases the insects that bats can feed on during the winter.

Thus, bats do another unusual thing: they hibernate (from November to March) to avoid starvation. True hibernation is a dramatic drop in body temperature to just above freezing during the winter season. Finally, bats are unusual because they hunt their food at night using echolocation, a radar-like system that allows the bat to hear echoes of its own high-pitched vocal calls that are reflected off of its prey and other solid objects.

The Bankhead bat team has continuously monitored the bat community in the forest for over a decade by capturing bats in mist nets deployed over streams and in the forest. Although seven other species have been captured using this technique, the two endangered species have only been captured using harp nets at the entrance to one of the caves where they hibernate. By using this technique, Battle and Stone (Battle, B. and W.E. Stone. 2003) were able to capture nine endangered Indiana bats (Myotis sodalis) in the Spring and Fall as they emerged from the cave at night while they were coming out of hibernation or swarming near the cave prior to hibernation. We attached miniature radio transmitters to their backs that weighed less than 0.5 grams and followed them for several weeks. Battle (Battle, B. 2003) reported the types of trees (and a high-transmission power line pole) that bats roosted in, the types of forest stands, and surrounding landscapes that the bats occupied using geographic information systems technology (computerized maps). The bats slept during the day in large white oaks (Quercus alba), shagbark hickory (Carya ovata) and loblolly pine (Pinus taeda) that had been killed by southern pine beetles (Dendroctonus frontalis). Landscapes with more hardwoods, older trees, streams and forest edge were also preferred. Still, all of our
observations were connected to the cave where we caught the bats. We desired to discover more about their summer habitat. At the same time, we began using some new technology that allowed us to record echolocation calls of bats and identify them by comparing them with known calls. However, the two species of endangered bats are closely related to each other and two other species of bats commonly caught in the forest that make it difficult to distinguish species, even using discriminate analysis following acoustical analysis of echolocation calls.

Bats, using forest stands in the Bankhead National Forest that were thinned and prescribed burned, were monitored for three years in the summer using mist nets (Hart-Crawley, A., McBee K., and Stone, W.E. submitted 2009), but no endangered species were captured. However, red bats (Lasiurus borealis), big brown bats (Eptesicus fuscus) and northern long-eared bats (Myotis septentrionalis) were more abundant in heavily thinned stands. Analysis of echolocation calls using Anabat II bat detectors and Analook analysis software revealed that more bat detections were recorded in heavily thinned stands than other forest treatments. Although bats have been monitored in these stands following this aspect of the study, no endangered bats were captured in mist nets during recent summers.

In mid-August 2008, more than 50 bat biologists gathered at the Bankhead National Forest to conduct three nights of intensive bat surveys at multiple locations, known as the “Bat Blitz.” Dr. Yong Wang and I were involved in helping to plan for this event, and it was a great success. Although no “Bat Blitz” team was able to catch endangered bats in mist nets at any of the best sites on the forest, one team was able to harp net one of the hibernaculum caves and catch both endangered species of bats (Keith Hudson, ALWFF, pers. comm.).

(continues on page 38)
Triboluminescent materials possess the property of fracture-induced light emission. Its other name and two prefixes are mechanoluminescence, fracto, and Piezo. This phenomenon can be readily demonstrated by crushing crystalline sugar in a darkened room, after an appropriate time for adaptation of the eyes to darkness, and observing the resulting bluish-white light. This triboluminescence phenomenon (defined as the light emitted when a material is stressed to the point of fracture) has been known since the 16th century. Serious investigations into this phenomenon only began in the 20th century. A large number of materials exhibit this property but only within a small range of low temperature and gas pressure environmental conditions. Materials such as mineral fluoride (CaF₂), sphalerite (ZNS) and wintergreen LifeSavers exhibit this property. Special impact mechanisms and complete darkness are required to observe their triboluminescent properties.

Recently, triboluminescent materials have been proposed as smart sensors of structural damage. To sense damage, these materials can be epoxy bonded or coated in a polymer matrix or embedded in a composite host structure. When the damage or fracture takes place in the host structure, it will lead to the fracture of triboluminescent crystals resulting in a light emission. This will warn, in real time, that structural damage has occurred. The triboluminescent emission of the candidate phosphor has to be sufficiently bright, so that the light signal reaching from the point of fracture to the detector through a fiber optics cable is sufficiently strong to be detected. The majority of the known triboluminescent materials do not emit light with sufficient intensity to allow detection with compact and inexpensive detectors. Authors have studied a number of materials and carried out a successful synthesis of a Eu based organic material known as Europium tetrakis (dibenzoyl-methide) triethylammonium (EuD4TEA), one of the bright triboluminescent materials, which is a potential candidate for application as a damage sensor and could be made into a wireless sensor with the addition of microchip, antenna and electronics. This could also have possible application for finding the structural damage in lunar habitats due to micrometeorites. Plans are underway to develop even better materials and develop a paint with these materials. Initial results on the development, synthesis and characterization of these triboluminescent materials are presented.

Essentially, a luminescent material is a phosphor which converts certain type of energy into electromagnetic radiation. Luminescence can be excited by many types of energy. Photoluminescence is excited by electromagnetic (often ultraviolet) radiation, cathodoluminescence by a beam of energetic electrons, electroluminescence by an electric voltage, chemiluminescence by the energy of a chemical reaction, and triboluminescence by mechanical energy.

Triboluminescent materials produce luminescence due to the creation of new charged surfaces during the fracture of a solid. This phenomena occurs more frequently in crystals whose structure lacks a center of symmetry. This fact points to the piezoelectric origin of the phenomenon. Recent studies [16] attempted to establish a relation between crystal structure and triboluminescence. They reported that noncentrosymmetric crystal structure is necessary but not sufficient for triboluminescent materials. However, the exact physical mechanism that is responsible for the emission of light during mechanical fracture is not fully understood.

A triboluminescent material embedded in, or attached on, a composite structure could act as a real-time damage sensor. Since the triboluminescent light emission is fracture-initiated, no signal would be generated by a triboluminescent sensor until damage occurs. An array of triboluminescent sensors may allow real-time damage location monitoring simply by determining the wavelength
of the emitted light.

In our laboratory, synthesis of an europium complex has been carried out by reacting anhydrous europium chloride with dibenzoylmethane and triethylamine in ethyl alcohol. This complex shows intense triboluminescence which has also been verified in our laboratory. (Aggarwal et al) [Triboluminescent materials for smart optical damage sensors for space applications, M.D. Aggarwal, B.G. Penn, J. Miller, S. Sadate, and A.K. Batra NASA Technical Memorandum 2008 NASA/TM-2007-215410 Web address http://trs.nist.nasa.gov/archive/00000781/]

We plan to investigate if a similar complex can be formed using other trivalent rare earth ions such as terbium and other ion complexes.

Attempts are being made on an international level to use this phenomenon to obtain information about the basic physical processes taking place in the material and to apply this phenomenon to develop sensor devices to monitor stress and damage in the surfaces/composites in the real-world applications. Currently there are no simple sensing techniques for determining in real time, both the location and magnitude of structural damage in a composite caused by a dynamic impact event. Such a sensor, were it available, could act as a sensor for real-time information to the user on the health and safety condition of the structure.

The main requirements for any candidate triboluminescent material that may be used for smart optical sensors are:

1) It should be highly efficient (allowing detection using inexpensive, compact detectors) and that it should emit light over a discrete and thus characteristic wavelength range (allowing integration into an array of sensors to monitor damage location).

2) The triboluminescent light must be emitted only upon crystalline fracture and that the sensors may be embedded within a composite.

3) The triboluminescent material should have a melting point greater than the cure temperature of the composite (> 120°C) to maintain the required triboluminescent particle size distribution, and that the material be chemically compatible with the composite resin.

4) Desirable smart optical sensor triboluminescent material characteristics show that it should generate no false alarm.

5) The sensor must only yield a signal when the damage has actually occurred, with the magnitude of the sensor output directly proportional to the extent of damage.

The triboluminescence (TL) emission spectrum of a triboluminescent material EuD4TEA is shown in Fig. 1. The dominant emission in TL peaks about 614 nm, which is responsible for the orange red color seen visually. Minor emission peaks are seen between 575-590 nm, at 650 nm and 700 nm. A minor peak below 550 nm observed in freshly prepared samples was not seen in the samples stored for 6 months. It may be due to some impurity that evaporated with time as product dries further.

The observed peaks in TL spectrum can be attributed to the emission from Eu3+ ion. This correlation was obtained by examining the photoluminescence spectrum of EuD4TEA excited by 363 nm line of Ar ion laser. The main emission peak in photoluminescence occurs at 609.5 nm and other peaks are seen at 576.5 nm, 589 nm, 649 nm, and 700 nm. The most intense peak matches with our clearly observed orange red color and is close to the spectrum.

(continues on page 43)
Malek Amir Abunaemeh
(Ph.D. Student-Phys)

Dr. Mohan D. Aggarwal

Dr. Venkata Atluri
"Digital Asset Data Migration" – Support Lockheed Martin in Courseware Digital Asset Migration effort. (Lockheed Martin).

Dr. Swagata "Ban" Banerjee
Co-authored and received Second Place Award for poster presentation on "Forecasting water demand and value for corn and soybean production in Alabama," at the Southern Agricultural Economics Association 41st annual meeting, Atlanta, Ga., January 31 – February 3, 2009, and co-presented "Relationship" between changes in human well-being and land cover types in Alabama's Black Belt," at the Research Directors' 15th Biennial Research Symposium, Atlanta, Ga., March 28 – April 1, 2009.

Dr. James O. Bukoonya
"Market Assessment and Profitability Analysis of Aquaculture Enterprises in Uganda"; Evaluate selected aquaculture enterprises to enable producers and extension personnel to assess the potential of commercial aquacultures. (USAID); and "Microenterprises-Centered Development Strategy: An Education Program for Disadvantaged Entrepreneurs". Conduct entrepreneurial training for small and socially disadvantaged business owners in north Alabama. (Small Business Administration)

Dr. Virginia Caples
"Maintaining a Competitive Edge for Human Capital Development in Extension, Instruction and Research in Agricultural Sciences" – Continue to advance opportunities in teaching, research and Extension in the agricultural sciences; advance cutting-edge research; and enhance facilities and equipment to better support new delivery methods for outreach, workshops, seminars and short course offerings. (Department of Agriculture).

Dr. Duncan M. Chembezi
"Community Outreach for Small and Limited Resource Farmers and Ranchers" – Develop an information management database for access by the socially disadvantaged to help them make informed production and marketing decisions. (Department of Agriculture)

Dr. Matthew E. Edwards
Dr. Chris Enyinda

Dr. Yujian Fu

Dr. Padmaja Guggilla
Presented a paper, "Novel pyroelectric material systems for infrared sensor applications," at the 75th annual Southeastern Section of the American Physics Society, Raleigh, North Carolina, from October 29-November 1, 2008.

Dr. Buddhi R. Gyawali

Dr. Sempson Hopkinson

Dr. Jeannette Jones
"Biology/Chemistry Scholarship Program" - Boost STEM enrollment for low-income minority and female students as well as increase the number of degrees awarded in the two discipline. (National Science Foundation).

Dr. Mohammed R. Karim

Dr. Koffi Konan
"Enhancement of Student Participation and Career Development in Nanobiotechnology” – Develop summer laboratory activities for high school students and provide them with skills in DNA, RNA and protein manipulation. (Department of Agriculture)

Dr. Mira Kruja

Dr. Nickolai Kukhtarev
Presented “Single beam dynamic holographic interferometer with three channels (two optical and one electrical),” and "Photogalvanic and pyroelectric crystal accelerator,” at the HBCU/CMI Collaboration Symposium, Cleveland, Ohio, July 21-22, 2009.
Prof. Tatiana Kukhtareva


Dr. Ermon Nyakatawa

Dr. Zachary Senwo
"Strengthening Soil Science Research and Training at 1890 Land-Grant Universities" - Support workshop to develop strategic road map to strengthen soil science research and training at 1890 land-grant institutions. (Department of Agriculture)

Dr. Anup Sharma
"HBCU-RISE: Research Infrastructure for Advanced Materials and Nanophotonics" - Develop a research infrastructure related to the science and applications of novel advance materials and nanophotonics. (National Science Foundation)

Dr. Jamiu Odutola
"Sensitivity Enhancement of Atom-Optical Cavity Interaction" - Develop a unified network approach for a surface mobility test bed facility. (NASA)

Dr. Thilini D. Ranatunga

Dr. Young Wang
"Assessing Nonnative Invasive Vegetation at Reclaimed Surface Mine Sites of the CPMPR" - Develop models for predicting the potential of invasion by nonnative species based on geographic information system, remote sensed data, and site specific features. (Office of Surface Mining)

Dr. Kenneth Ward
"Capacity Enhancement Project for the Center of Excellence in Forestry at Alabama A&M University" - Recruit and retain students in forestry and related natural resource sciences; and support faculty professional development and strengthen capabilities in teaching, research and public service. (Department of Agriculture)

Dr. Allison Young
"Preparing Underrepresented Minorities for Entrance into the FCS Profession" - Integrate community service and service-learning initiatives that support the University commitment to the development of the total student. (Department of Agriculture)

Dr. Tianxi Zhang
"MHD Simulation of Non-flux Rope CMEs and their Driven Shocks Associated with Impulsive SEP Events" - Investigate non-flux rope coronal mass ejections (CMEs) and their drive shocks associated with impulsive solar energy particles (SEP) events, by using a three-dimensional magnetohydrodynamic (MHD) model. (UAH Sub)
Orok receives national award for "extraordinary leadership"

Dr. Teresa Meriweather Orok, third from left, poses with other honorees including Dr. Dorothy Height, sitting.

Standing next to renowned civil right icon Dr. Dorothy Height, AAMU’s own Teresa Meriweather Orok was among six African American women selected from across the nation to receive the 2009 Minority Business Award, given by the Congressional Black Caucus Foundation. Dr. Orok, vice president of Institutional Research, Planning and Sponsored Programs, received the HBCU Leadership Award for her “extraordinary” leadership, on September 25, in Washington, D.C.

"It is indeed an honor and a privilege to accept this award, and to be reminded of the continuing and fascinating legacy behind it," Dr. Orok said as she accepted her award and a bouquet of flowers from Ron Evans, President of the National Business League (NBL).

She paid tribute to AAMU founder, Dr. William Hooper Council, whose trials and success in industrial education, she said, paralleled those of Booker T. Washington, who originated the NBL. "Indeed their vision was all-encompassing, spanning from their immediate campus communities to the vastness of the African Diaspora," Dr Orok said. "As my university’s research vice president, I am deeply grateful for the peak performance award."

The Minority Business Award, hosted by Mountaintop Marketing Group, is presented each year to individuals including government agency executives, celebrities, prime contractors, law makers and influential individuals from across the country, who show “extraordinary” leadership. This year’s theme is “Saluting Minority Women in Business: Honoring Yesterday, Today, and Tomorrow.”

Other individuals honored at this year’s black-tie affair were Dr. Height, chair and president emerita of the National Council of Negro Women, who received the Lifetime Achievement Award; Tracey L. Pinson, director of the Army Office of Small Business Programs, the Small Business Champion Award; and Joan Robinson-Berry, director of the Boeing Company Strategic Work Placement and Small Business Liaison Office, the Executive Leadership Award. Also honored were Phyllis Shearer Jones, president and CEO of Elan International, the International Business Award; and Aundrea Gregg, a Howard University student, who received the Emerging Leader Award.

Environmental health program gets accreditation

With the endorsement of a major accrediting body, the new undergraduate degree concentration in environmental health science at AAMU, launched just last spring with 5-7 students, is expected to attract significantly greater numbers this fall. The program, the only one offered in the state of Alabama, has been accredited by the Association for Environmental Health Academic Programs. AAMU is now one of only 10 such minority-serving programs in the United States.

Dr. Tefere Tsegaye, chair of the Department of Natural Resources and Environmental Sciences, said the accreditation is "a breakthrough" that will make AAMU more visible in the environmental health science-related fields. Students will also be better positioned for medical degrees. The coordinator of the program is Dr. Elica Moss.
**AAMU Ethiopia project to continue with $13 million USAID grant**

Dr. Teresa Merriweather Orok, VP for IRSP; left; Dr. Eveythe Cargill, School of Education; Dr. Mary Spor, TLMP program director; Dr Larry Powers, Education dean; and Dr. Shirley King, program coordinator, represent AAMU at the launching of a TLMP award-winning video in Washington,  D.C.

The United States Agency for International Development (USAID) has awarded AAMU a three-year, $13 million grant to continue the university's work on improving basic education in Ethiopia. The money is a "follow-on" award under the Textbook and Learning Materials Program (TLMP), a collaboration between AAMU, USAID and the Ethiopian Ministry of Education.

Under the TLMP and a previous $5.5 million USAID grant, the university developed and distributed grades 1,2,6,7 and 8 English textbooks and teacher's manuals to over three million students and their teachers in 11 regions of Ethiopia. It also trained teachers on how to use research-based practices to promote active teaching and learning.

The TLMP, part of USAID's broader $600 million Africa Education Initiative, was launched in 2005 in response to the scarcity of textbooks and learning materials in sub-Saharan Africa. AAMU joins six U.S. schools that play an integral role in the provision of meaningful educational services to six African nations, says Dr. Mary Spor, AAMU's program director.

AAMU President, Dr. Andrew J. Hugine, Jr., described the textbook program as "an opportunity to appreciatively give back to Ethiopia, a country with an ancient and rich heritage, while further expanding our mission on an international scale."

AAMU's Vice President for Institutional Research, Planning and Sponsored Programs, Dr. Teresa Merriweather Orok, said the new award is "an indication of our good work and our continued commitment to excellence."

**Physics, engineering add nuclear concentrations**

With funding from the Nuclear Regulatory Commission (NRC), Alabama A&M University "launched a presence" in nuclear science and engineering this fall, according to Dr. Matthew Edwards, dean of the School of Arts and Sciences.

"The expectation is to have the curriculums and course contents with student and faculty research in place within three years," he said.

To begin the program, the University was expected to launch one concentration in nuclear physics under the auspices of the School of Arts and Sciences, and another in nuclear engineering to be offered by the School of Engineering and Technology.

The new degree concentrations could greatly impact the workforce in the Tennessee Valley and beyond, as well as assist the nation's growth toward a "more green" society, according to Dr. Edwards, principal investigator for the project.

Edwards' co-PIs are Dr. V. Trent Montgomery, dean of the School of Engineering and Technology, and Dr. Claudia Muntele, of the Center for Irradiation of Materials.

Montgomery said for a long time AAMU graduates in other areas of engineering have been working in the nuclear industry as plant inspectors and regulators, but not as nuclear engineers. "What we hope this new program will do is to provide our graduates with the added training and tools that will make them more successful in the nuclear industry," he said.

The NRC is providing a one-year, $100,000 funding for the program.
AAMU site of new AMRDEC center

Giving added impetus to its already well established scientific and research pursuits, Alabama A&M University (AAMU) has received a second “Center of Excellence” designation in less than a year.

On June 8, Alabama Congressman Parker Griffith joined university, government and elected officials to announce the establishment of the Center of Excellence in Integrated Sensor Systems. The Center is intended to boost the number of top-notch engineers in north Alabama as well as assist with homeland security. It is the result of a partnership between the U.S. Aviation and Missile Research, Development and Engineering Center (AMRDEC) and the Alabama A&M University Research Institute (AAMURI).

Because of global competitiveness and the technological advances of other countries, we must attract more students with some inclination for math and sciences,” said Congressman Griffith. He presented a check for $700,000 to university officials for the establishment of the Center, which will be headed by Dr. Kaveh Heidary, professor and chair of the Department of Electrical Engineering.

The establishment of this center comes on the heels of another landmark agreement last spring when AAMU became the first HBCU designated a federal “Center of Excellence” in watershed management.

AAMU brings best in nanoscale science to teachers

The summer in-service nanoscale technology training program at AAMU has benefitted 80 teachers over the last three years.

Teachers from as far away as Chicago and South Carolina were among 17 middle and high school teachers who attended a summer in-service training program on nanoscale technology at AAMU last summer.

Funded by the National Science Foundation's National Center for Learning and Teaching (NCLT) in Nanoscale Science and Engineering, the AAMU program has served 80 teachers over the last three years, says Dr. Matthew Edwards, dean of the School of Arts and Sciences.

This year's presenters included Dr. William Seidler, a nuclear materials specialist from Boeing; Dr. Jennifer Weil, director of education for the Nanobiotecnology Center at Cornell University; and Richard Kirk, a retired scientist from Dow Chemical Company, who is president/owner of the Claro Chemical Corporation in Atlanta.

AAMU's NCLT program is part of a 13-university consortium administered by Northwestern University, with other major universities including Purdue, Michigan State University, and the University of Illinois at Chicago.
$600,000 grant to benefit STEM students

Twenty-five incoming freshmen, majoring in biology and chemistry, are benefitting from a $600,000 National Science Foundation (NSF) grant awarded to AAMU last summer. The grant, part of the NSF’s Scholarships in Science, Technology, Engineering and Mathematics (S-STEM) program, is aimed to boost STEM enrollment for low-income minority and female students as well as to increase the number of degrees awarded in the two disciplines.

The principal investigator of the project is Dr. Jeannette Jones, professor of biology. Along with Dr. Jones, the grant, made possible through a competitive proposal to the NSF, is also under the direction of Dr. Florence Okafor, associate professor of biology; Dr. Malinda Gilmore, assistant professor of chemistry; and Dr. Mostafa Dokhanian, assistant professor of physics.

NAFEEO recognizes Edwards’ work in research, teaching

Recognizing his career contribution to research and teaching, the National Association for Equal Opportunity in Higher Education (NAFEEO) has awarded Dr. Matthew Edwards the “2009 Noble Prize,” the organization’s highest honor for individual achievement.

Dr. Edwards, professor of physics and dean of the School of Arts and Sciences, received the coveted award at NAFEEO’s 40th Anniversary Gala and Awards Program in Atlanta. The Noble Prize was created by NAFEEO in 2006 to honor distinguished HBCU faculty members who are “tirelessly fulfilling” the missions of their respective institutions. Edwards was one of seven distinguished educators to receive NAFEEO’s highest distinction.

“It is quite an honor to be recognized among such distinguished group of people for this prestigious award,” Edwards said. “This is not just an honor for me, but also for my colleagues, those I work with everyday, and those at this institution who found me capable enough to recommend me for this award.”
Q&A
Hugine sees bright future for university research enterprise

From genetic engineers using biotechnology to improve food production, to physicists using nanophotonics to detect the early stages of cancer, research is flourishing at Alabama A&M University. Each day on AAMU's campus, researchers and scholars are making discoveries, seeking answers to scientific questions, and creating new works. And in the spirit of endeavor and creativity, the University continues to set high goals. But with all of these activities, is the University adequately fulfilling its research mission? With just four months on the job, President Andrew Hugine, Jr., recently sat down with "AAMUresearch" Editor Emmanuel Freeman to answer this question and many others. Below are excerpts from their conversation (Q&A).

Q: You have extensive experience in working in various areas of higher education. How do you plan to use that vast experience to advance the research enterprise at AAMU?

A: You are correct. Fortunately I have done all of my work in 1890s institutions or land-grant universities. My undergraduate work was completed at South Carolina State University, and doctoral work at Michigan State University. One of the intriguing pieces that I find at land-grant universities is their particular emphasis on research. Fortunately, I have done some research myself in the area of improving the performance of students in mathematics. I clearly understand research and what it takes to make research advance at a university. Those experiences we intend to bring here to Alabama A&M University, an institution that has a proud record of research. There is tremendous potential for us to continue to advance further than where we are. Not only am I an administrator, I am also a researcher and I have come through the ranks from that perspective.

Q: As a public land-grant University, one of AAMU's primary missions is research. From what you have seen, do you think the University is adequately fulfilling that mission? Where do you see challenges, if any?

A: There is a lot of exciting research going on at Alabama A&M University. A week ago we had the opportunity to host Lt. Gen. Patrick J. O'Riley (Director of the Pentagon's Missile Defense Agency) on our campus, and as part of that, we took him on a tour of some of the fascinating research that is taking place on this campus. He was just amazed at the capacity of Alabama A&M University in the research arena. When you look at the research on various resistant crops, what we do in terms of physics and cutting-edge research that helps national defense, and research which helps to grow the economy in this country, Alabama A&M University is doing a very good job in the research arena. Is that to say there is not more to be done? No, it does not. The University can do a lot more, and we obviously want to work in trying to help our faculty and researchers do that. What allows for research: First you have to have the capacity; you have got to have the facilities that will be necessary to support research. If you're going to bring in world-renowned researchers, when they come to the University, it is going to be important that we have the right facilities. They also will need support in terms of their research assistants. That will require us to find dollars within the University or find dollars...
from external sources to provide for those research chairs, and also provide equipment and research assistants that will be needed going forward. As we look at expanding research at Alabama A&M University, we are going to also be concerned about how we can build the capacity to support research here. Many of our buildings are aging; they are not state-of-the-art and that limits the amount of research you can do. We are pursuing some options, we won't get into the specifics about what those options are, but we are going to be making some requests. Those requests are going to deal specifically with enhancing the facilities to support research, then long term, we will work on ways we can enhance funding, in this case, to bring these world renowned researchers to support our efforts at the University.

**Q:** Extramural funding is an essential component of the overall financial picture of a research institution. What is your experience in seeking and encouraging external funding, and what would you do to further enhance an already successful sponsored program effort at AAMU?

**A:** If you look at the university from which I left you will find that we were fortunate in bringing to bear a number of external sources—both private and public. We worked well with our congressional delegation which provided us with some congressionally directed funding. A major initiative there was a transportation research center, that's probably going to be about a $20 to $25 million enterprise when it is completed. We were also able to get some dollars to update science equipment on the campus that were from public sources. Privately, we worked with business and industry to bring in those dollars that were necessary to support research at the University. The same is true here at Alabama A&M University. We are beginning to build those relationships with entities that will be necessary to bring those dollars to the University. Again, we'll be looking at congressionally directed funding as well as external funding to help support the University's research endeavors and to help support the University in general.

**Q:** The Huntsville area is rich in research and development entities. How will you ensure an effective communication and collaboration between AAMU, external agencies, institutions and the research and defense community?

**A:** We are working on that now; we are reviewing the first 100 days of the Hugine administration; we are reaching out to all segments of the Huntsville community—the political as well as the business community—and we will continue to do that. You build relationships by spending time with people and that we have been doing and will continue to do. We must now more aggressively deal with the business communities. I think we have done fairly well with reaching out to the political community and the military community. Our focus will now be on the major companies and corporations, such as SAIC, Boeing and the like, and to build those relationships. And that comes over time. We are confident that they will begin to understand Alabama A&M University for what it truly is. And that it is a tremendous treasure not only to Huntsville, but also to the state of Alabama and to this nation.
Q: Give an example from your experience that demonstrates your commitment to the protection of the University’s intellectual property.

A: That is an area that requires expert legal advice. I look to those persons who are the experts in that field and we’ll reach out to the legal community to be sure that the interest of the University is protected. The lesson of Gatorade at the University of Florida is an example of what can happen at a university based on research that is commercialized. We have the same potentials here at the University but we must protect the interest of the University. I am not taking anything away from the researchers who developed the product, but it would not be fair that Alabama A&M University not benefit from whatever those developments are. And so I believe in going to the experts. We will be looking to the specialists in that field from the legal aspect to be sure that Alabama A&M University’s interest is protected.

Q: The research enterprise at AAMU ranks highly if not higher than some major institutions across the country. In spite of this achievement and many others, the University is rarely viewed positively. What are you doing to change this image?

A: The key to it is that in life either someone else is going to define you or you will define yourself. We must be aggressive in defining ourselves. One of the areas we see going forward is putting more emphasis on marketing. Imagine for a minute if you would; if you had the best product in the world but no one knows about that product, it’s just a product. It is only when you market that product can individuals connect and know that it is available, and only then can you make a difference. So we must market Alabama A&M University using all of the available means at our disposal; from having common talking points at each opportunity when anyone speaks about Alabama A&M University to more defined commercials, to more defined advertisements, to more defined marketing strategies that will advance this University. People connect when you can translate how research is going to help them. It has to be explained and has to be tied to everyday needs of society, and then people are more likely to embrace it. Marketing is going to be key for us to be assured that the story of Alabama A&M University is told.

Q: Research integrity and copyright abuse are major concerns of funding agencies. What will you do to ensure transparency and regulatory compliance at AAMU?

A: That again is a legal matter; you must make sure you have the appropriate policies and procedures to ensure that integrity is there. It means we pull in the expertise and consultants to do the work that needs to be done in order to ensure integrity. Integrity is important. In this environment we expect individuals not to say result is one thing when in fact it is something different. When that happens, it ends careers of individuals and in many instances funding from external sources. We want to put in appropriate procedures and to ensure that those policies and procedures are enforced. Policies and procedures are not worth the paper they are written on unless they are enforced. Our job as administrators is to enforce those policies and procedures once they have been put in place.

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Faculty/staff achievements

**Diane Banks**, Secretary for The School of Arts & Sciences – Awarded certificate as one of the organizers for AAMU-NCLT Summer 2009 Workshop on Nanoscale Science July 13 - 22, 2009.


**Prudence W. Bryant**, Assistant Professor and Head of Reference and Information Services, J. F. Drake Memorial Learning Resources Center – Attended the Information Literacy Workshop, February 10-15, 2008 and Post Information Literacy Workshop, October 10-12, 2008, Johnson C. Smith University, Charlotte, North Carolina.


**Dr. Uchenna Elike**, Professor of Economics and Finance – Conducted a workshop on “Research and Publication” at the University of Port Harcourt in Nigeria at the invitation of the Dean of the Faculty of Management Science, August 3-8, 2009. Addressed about 50 high school students in Abuja, Nigeria, who want to continue their education in the United States.


**Dr. Sampson Hopkinson**, Assistant Professor of Biology – Named Regional Editor, USA, *International Journal of Agriculture Environment & Biotechnology*, January 2009.


Dr. Padmaja Guggilla, Assistant Professor of Physics – Received the Dean's Choice Most Effective New Faculty Award in the School of Arts and Sciences.


Rising Stars...

Compiled by Patricia McDonald and Emmanuel S. Freeman

To recognize exceptional academic work by young faculty across all disciplines, "AAMUresearch" unveils its "Rising Stars" column. "Rising Stars" recognizes faculty members who are early in their careers and who demonstrate the potential to establish nationally and internationally peer-acclaimed scholarship within their research fields. We see individuals in this column as examples of the opportune convergence of scientific training, with an acute appreciation of the research environment in which they find themselves. Although the selection of this first group of "Rising Stars" is based purely on their length of service at AAMU - three years or less - they have built up enviable resumes. Already some have published books and papers in their areas of research, one has earned recognition as "Most Effective New Faculty of the Year," all of them have been part of major grant proposals and/or awards, and several are award winning presenters at major professional conferences. To be sure, their work and examples impact a significant sector of the AAMU research and academic community. In the future, "Rising Stars" selection will be recommended by deans, chairs and peers.

Please congratulate our first group of "RISING STARS!"

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**Dr. Sudip Bhattacharjee** is an assistant professor in the Department of Civil Engineering at AAMU. He joined the faculty in the fall of 2006. His main area of research is the fatigue characterization of viscoelastic materials, through laboratory tests and theoretical modeling. He has conducted research on hot mix asphalt, one important viscoelastic material used in construction, funded by the National Cooperative Highway Research Program (NCHRP). Under this research, he developed a method of analysis of fatigue behavior of pavements using continuum damage mechanics (CDM) based fatigue modeling. His research has shown that the CDM can be used to determine the fatigue endurance limit of viscoelastic materials within a very short period of time and can be used to design long-lasting highway pavements. Currently, Dr. Bhattacharjee is involved in a National Science Foundation funded project to implement Superpave design principles in civil engineering. His areas of teaching include aspects of material characterization, general engineering courses, numerical simulations and solid mechanics. He has published several articles and presented at various national and international conferences.

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Since her recent hire into the Department of English and Telecommunications as an assistant professor on tenure track, **Dr. Kathryn Seidler Engberg's** scholarship is beginning to gain notoriety. Last December, her first book, *The Right to Write: The Literary Politics of Anne Bradstreet and Phillis Wheatley*, was published by University Press of America. *The Right to Write* examines how the early American poets Anne Bradstreet and Phillis Wheatley gained agency within a traditionally patriarchal field of literary production. Tracing the careers of Bradstreet and Wheatley through the 17th and 18th centuries, Engberg shows that these women used their positions within society to network themselves into publication. This is not simply a historical and literary examination of the field of literary production; this study provides new conceptions of early American women's writing that are valuable to feminist inquiry. Engberg's research is innovative and recaptures an oft-overlooked part of early American literary history. As a result of her recent publication, she has been asked to be a presenter at the upcoming Renaissance Society of America's conference in Venice, Italy, held April 2010. She has attended several conferences during the past few years, including the College English Association, at which she spoke on innovative ways to use facebook.com in the classroom as a learning management tool. Beyond her research, she was part of a team that won the recent $2.2 million HBCU-Up grant initiative from NSF. She will be developing and implementing summer bridge programs, professional development workshops, and coordinating the SI component of the grant. Currently, Dr. Engberg is working on some new research on Toleration literature in 17th century America.
Dr. Yujian Fu earned her Ph.D. in Computing and Information Science at Florida International University in April 2007. Soon after, she joined the Department of Computer Science at AAMU as an assistant professor. Her research areas include software verification, quality assurance, runtime verification, software architecture, security and formal methods. She studies safety and mission critical systems to investigate the concurrency and correctness properties using formal methods. She has several publications to her credit on the verification of software design models in the architecture level. Dr. Fu is also interested in the correctness of object-oriented programming languages. Along that line, she has developed a method to demonstrate the correctness of a restricted Java program based on the interleaving execution sequence. Her most recent work focuses on the design and verification of evolutionary problem of embedded safety critical systems. Since joining AAMU Dr. Fu has been actively involved with three journals and serves on several conference committees. As principal investigator, her current project, "Architecture-driven Embedded System Evolution," was funded by Title III. She has since submitted two other proposals to the National Science Foundation.

Dr. Malinda Gilmore's overall research interest is in the effect of atmospheric pollutants on environmental systems (i.e., humans, animals, etc.), and also determining the effects of agricultural emissions on ambient air quality. The assistant professor of chemistry in the Department of Natural and Physical Sciences joined the AAMU faculty in 2008. A published author, Dr. Gilmore is currently investigating the mechanisms of O₃ toxicity on human bronchial epithelial cells with emphasis on the role of lipid ozonation products. Her book, *Drosophila Melanogaster - Biosensors of Atmospheric Oxidative Stress* (VDM Verlag Dr. Muller Aktiengesellschaft & Co. KG), on the effect of atmospheric pollutants on environmental systems, was published on March 12, 2009.

In addition to a full teaching load, Dr. Gilmore has also been involved in many campus activities geared toward enhancing student learning and achievement. She served on the annual STEM Day Committee, and the Forensic Chemistry Program Committee. She is the campus advisor for the National Organization of Black Chemists and Chemical Engineers (NOBCChE) and the American Chemical Society Student Affiliated Chemistry Club, as well a mentor for the Changing Lanes program. With respect to extramural programs, Dr. Gilmore also serves as program advisor of the Health Careers Opportunity Program (HCOP). As co-principal investigator, she has been a part of several successful grant proposals to the National Science Foundation, the National Institutes of Health, the Science and Engineering Alliance, and Title III. Dr. Gilmore holds a B.S. degree in chemistry from Texas Southern University and a Ph.D., also in chemistry, from the University of California-Davis.

Dr. Padmaja Guggilla, assistant professor of physics, joined the faculty in the School of Arts and Science in August 2008. She holds a Bachelor's degree in engineering from her native India, an M.S. in electrical engineering from the University of Alabama in Huntsville, and a Ph.D. in physics from AAMU. Dr. Guggilla carries a full course load of teaching and performing active research in the field of infrared sensors, nanotechnology, and energy harvesting technologies (photovoltaic devices and solar cells, etc.). Since joining the faculty, Dr. Guggilla has engaged in a number of collaborative works with senior faculty members in her school. She has attended and presented papers at various professional development workshops and conferences, and published five papers in journals and conference proceedings. Her hard work and dedication earned her the distinction of "Most Effective New Faculty of the Year" in the School of Arts and Sciences. She was also a nominee for the "Best Teacher Scholar of the Year Award." Among some of her other achievements, Dr. Guggilla has written and co-authored several grant proposals, among them "Information Technology Consultant for the Department of Mental Health and Mental Retardation," a collaboration with the Morehouse School of Medicine; and "Architecture of High Efficiency Nanofeature Solar Cells (AHENS)," a Title III mini grant. She has served on a number of in-house committees such as Website Development, News Letter, and STEM Day, etc. She is proud to say, "I designed the STEM logo for AAMU which was well appreciated."

(continues on page 39)
Extension braces for new changes

By Wendi Williams

Dr. Maria Leite-Browning, an Extension animal scientist, works with goat herds at the Tennessee State University Research Farm in Ashland City, Tenn.

National Extension programs at 1890 land-grant institutions like Alabama A&M University (AAMU) are gearing up to take advantage of expanded funding sources for teaching and research. On October 1, 2009, the Cooperative State Research, Education and Extension Service (CSREES) became the National Institute of Food and Agriculture (NIFA) as stipulated in the Food, Conservation and Energy Act of 2008, better known as the Farm Bill. The reason for the name and other organizational changes are to make the organization comparable to the National Institutes of Health (NIH) and the National Science Foundation (NSF) by raising the profile of agricultural research, education, and Extension, the third component of AAMU's three-fold mission. Like the NIH and the NSF, NIFA will award competitive external grants for research, particularly in the area of agriculture as it pertains to strengthening national security and developing new technologies, such as biofuel.

According to its Guiding Principles, NIFA, like its predecessor CSREES, will continue to focus on food sciences, agriculture, human health and wellness, communities, and the environment. Greater emphases will be placed on establishing multi-disciplinary programs that encompass research, education and Extension. Research is eventually transformed into effective educational resources that positively impact the lives of people and the communities in which they live.

As a result of these organizational changes, Extension programs at small 1862, 1890, and 1994 land-grant schools will have a chance to expand or engage in new agricultural, animal health and disease, and forestry programs.

For example, in 2006, Extension and AAMU researchers Dr. Maria Leite-Browning, Dr. Julio Correa, and Dr. James Bukunya surveyed goat producers in Alabama and the results of that survey are still being used to develop small ruminant programs designed to enhance management practices for novice and seasoned goat producers. This year, Extension launched a Master Meat Goat Herdsmen Program to integrate animal nutrition and sustainable alternative livestock production practices to produce healthy food and other products, and to ensure future growth of the goat meat industry.

In addition, Dr. Browning partnered with her husband and researcher Dr. Richard Browning at Tennessee State University to determine the feasibility and cost-effectiveness of breeding Spanish, South African Boer, and New Zealand
Examining the effects of traditional and hip hop literacies on African American males

By Kimberly White Glenn

The research surrounding the education of African American males is dire. These data are so dire that Hale (2001) referred to the education of African American males as “educational malpractice.” Porter (1997) posits, “America’s educational system reveals so many truths about this society, especially in its treatment of African American boys.” For example, Jackson and Moore (2006) assert that “throughout the educational pipeline—elementary, secondary and postsecondary—in the United States, many African American males lag behind both their African American female and Caucasian male counterparts.”

On myriad standardized reading tests, African American males score the lowest. A glaring discrepancy is the reading achievement gap. This discrepancy is of paramount importance because reading may be the greatest obstacle to academic success, Johnson (2005). Consequently, African American males and the achievement gap have become the focus of many research studies. In spite of the quantity of research on the achievement gap, the research is wanting on successful pedagogy for instructing African American males in reading. African American males who survive “through the gauntlet” (Cose, 2002) of American life, may arrive at colleges and universities lacking reading acumen for ascendency in academia. To combat this deficiency in literacy, Historically Black Colleges and Universities (HBCUs), and other institutions of higher learning have implemented courses—remedial or developmental—to improve the students’ reading skills for the reading requirements of academia.

Method

Thirty-one African American male students were targeted for this study. Of those targeted, 23 consented to and completed the study. These intact groups were enrolled in the college reading courses by their university advisors because they scored less than 78 on the Computerized Adaptive Placement Assessment (COMPASS).

Experimental Design

Creswell (2005) stated that an experimental design has “procedures in which the investigator determines whether an activity or materials make a difference in the results for participants” (p. 51). This experimental design examined if two treatments (traditional African American literature and hip-hop literature) were effective in the reading acquisition of African American males.

Procedures

In the fall semester of 2007, the investigator taught three developmental reading courses. Three methods of instruction were infused into college reading courses. One course was infused with traditional African American literature, the second course was infused with hip-hop literature, and the third course was a skills-based reading course. Students were observed through the “lenses of ethno methodology” to study how African American males create and understand their daily lives (Garfinkel, 1967).

Each of the three groups was administered two pretests and two posttests. The first pretest was the COMPASS, which is used to determine placement for all incoming students placement. Flippo and Schumm (2000) examined reading tests and found that they were the most common assessment that postsecondary institutions administered. The Flippo and Schumm data from 100,000 examinees found the accuracy of the Compass test to be .86 and with a marginal reliability of 0.90.
To minimize the threat to validity, a second pretest was administered to the all participants. The investigator, under standardized conditions, administered the Nelson-Denny Test (NDRT), form G. Filippo and Schumm reported that the publishers of the NDRT used the Kuder-Richardson Formula 20 reliability coefficients to determine reliability. The reliability rate for the vocabulary subtest ranges were 0.92 to 0.94 and the subtest ranges were .85 to .89 for the comprehension subtest.

Results

At the end of the semester, the participants were administered two posttests. The university administered the COMPASS and the investigator administered the Nelson Denny Reading Test. The COMPASS and NDRT were administered to assess the reading increases in the experimental groups. A paired-samples t-test was conducted to determine if there was a significant change in COMPASS scores from pretest to posttest. The t-test revealed a significant increase in the students' COMPASS scores from pretest (M=67.21, SD =7.59) to posttest (M=72.50, SD =11.84), t (23) = -2.43, p < .05. A paired-samples t-test was also conducted to determine if there was a significant change in NDRT scores from pretest to posttest. The means and standard deviations of pretest and posttest NDRT scores revealed a significant increase in the students' NDRT scores from pretest (M=9.15, SD =2.59) to posttest (M=10.62, SD =1.63), t (23) = 3.06, p < .01. The results suggest that college reading courses significantly improve standardized reading scores. In addition, the traditional skills-based approach was beneficial for underprepared students. Moreover, two additional treatments: traditional African American literature and hip-hop literature pedagogy were also engaging and academically rewarding. These data suggests that culturally relevant literature also significantly increases standardized reading scores.

In addition to quantitative data, qualitative data were also collected. A questionnaire based on a four-point Likert scale was administered to examine attitudes toward reading. Figures 1 and 2 are the results of the questionnaire.

![Figure 1](Image)

![Figure 2](Image)
The analysis of the written survey questionnaire found that positive attitudes towards some reading behaviors emerged as a result of the course. The participants agreed that they understood what they read in class, but they were unlikely to respond that they did not avoid reading or that they read when they did not have to. Furthermore, the African American males overwhelmingly identified a desire to read about black history and hip-hop culture. Reading is viewed as a chore, not a pleasurable experience. Tatum (2003) also found invisibility in the texts that adolescent African American males encountered while in middle school. Traditional African American author, Ellison (1952), wrote in the prologue of his novel Invisible Man, "I am invisible, understand, simply because people refuse to see me."

Discussion

Morrell (2005) indicated a need for new literacy studies (NLS). According to Morrell, the objectives of NLS are to provide a socio-cultural framework that goes beyond engagement and connects culturally relevant literature with academic instruction. Tatum's (2000) research supports Morrell, and provides quantitative support for reading improvement that utilized African American literature as instruction. In addition, Richardson's (2006) examination of African American literacies and hip-hop literacies found both viable pedagogies for instruction.

PENTAGON'S MISSILE DEFENSE BOSS VISITS AAMU

The Director of the Pentagon's Missile Defense Agency (MDA) made a three-hour visit to Alabama A&M University recently. During the campus visit, Lieutenant General Patrick J. O'Reilly held a one-hour noon lunch meeting with AAMU President Andrew Hugine, Jr., before talking briefly with various University administrators.

"Lt. Gen. O'Reilly's visit provided us a coveted opportunity to showcase our numerous capabilities," commented President Hugine. Gen. O'Reilly also made a presentation to students in the School of Engineering and Technology building, and toured labs in the engineering school, the Department of Physics and the AAMU Research Institute before departing.

During his career, Lt. Gen. O'Reilly served in both command and staff officer positions in a variety of operational units including the 1st Cavalry Division, the 3rd Support Command, Germany, and as an Assistant Professor of Physics at the United States Military Academy. As an Acquisition Officer, he served as Program Manager for Directed Energy Programs, PATRIOT PAC-3 Missile, Terminal High Altitude Area Defense (THAAD) Missile System, Ground-based Midcourse Defense (GMD) Program, and as the Army Program Executive Officer for Combat Support and Combat Service Support.

Gen. O'Reilly is a graduate of the U.S. Military Academy and has master's degrees in Physics, National Security and Strategic Studies, and Business. He is a graduate of the U.S. Army Command and Staff College, the U.S. Naval College of Command and Staff, and the U.S. Army War College.

- Jerome Saintjones
Schematics for optimization of supersonic nozzle shapes for multiple systems using the tecplot software

By Arjuna Ranasinghe, Fayequa Majid and Steven Hughes

Abstract and Introduction
A major focus at NASA is the next generation of transportation vehicle systems for access to space. Advanced concepts with rocket-based combined cycle vehicles are receiving attention. New and more powerful design software is needed for application to these next generation reusable launch and space transportation vehicles.Multidisciplinary design tools will be required which contain all mechanical engineering fields including fluid dynamics, stress analysis, thermal modeling and controls technology. The preliminary design of these new vehicles requires many estimations of the aerodynamic performance, mechanical and thermal loads, as well as stability and control.

NASA has always been concerned with space vehicle safety, but there is now a renewed awareness of its importance in design of the next generation of access to space vehicles. Risk reduction for these new systems is a high priority item and includes the airframe structure, propulsion system components, thermal protection systems, fuel tanks, navigation equipment, and the overall health of the integrated vehicle. These requirements dictate a heavier reliance on computer software and simulation of the behavior of these components under widely varying loading conditions.

These next generation of NASA propulsion systems will need to be much more efficient than current design. Certain of these systems could consist of multiple nozzle arrangements for a single motor. Mixing of these nozzle flows can be very non-uniform resulting in significant pressure gradients in the exit plane. Proper design of these individual nozzles should be able to reduce the pressure variations across the exit plane. In addition, the maximum thrust of each nozzle can be designed into the contour and the exit to throat area ratio [1].

Project 1: Performance Study
An optimization study will be performed to maximize thrust and reduce the exit cross-section pressure gradients for a supersonic nozzle. The exit-to-throat area ratio will be varied as well as the contour shape. Optimized results starting with this initial shape must be compared with final results as an initial project. The nozzle thrust consists of the sum of the momentum flow rate across the nozzle throat plane, which should remain fixed, and the net force on the nozzle boundary in the forward direction, which varies with nozzle shape [4]. As an undergraduate senior project, one may look at the fluid flow through a two-dimensional single nozzle rocket motor. A senior project in mathematics may conduct an independent study on “Performance of Real Nozzles” based on the book entitled “The Dynamics and Thermodynamics of Compressible Fluid Flow” by Ascher H. Shapiro. This study may be expected to be completed in three to six months. Modeling such a rocket engine will result in the ideal Bell-Shaped two-dimensional single nozzle rocket motor that has the pressure gradient zero at the exit plane. One may also compute the optimizing ratio of the exit (away from the y-axis) to enter (on the y-axis) areas of the engine [2 - 3].

Project 2: Plotting Results and Experimental Testing of the Model
As a continuation of Project 1, students will experiment with the pressure gradients and Mach number patterns of the optimized bell shaped model found in the Project 1. The program TECPLLOT can be used to plot the results [5]. TECPLLOT is sold commercially by Amtec Corporation. It is the most widely used plotting program in the mechanical engineering field. It is a powerful tool for visualizing a wide variety of technical data. It offers X-Y plotting, 2-D and 3-D surface plots in a variety of formats, and 3-D volumetric visualization. The code cost about $900 for a PC version. An example of the Mach number contours is shown in Figure. 1 and the pressure contours are shown in Figure. 2. These figures were made with the TECPLLOT code by the authors of this article.
Figure 1 Mach number Contours for Bell-Shaped Nozzle

Start 1 Nozzle Contour - Bell Shaped

Figure 2 Pressure Contours for Bell-Shaped Nozzle

Start 1 Nozzle Contour - Bell Shaped
Continuous quality improvement
A paradigm shift in the management of HBCUs

By Howard Wright

Abstract
To continue the historical mission of educating under prepared students, historically black colleges and universities (HBCUs) must remain economically viable and relevant. Remaining viable and relevant requires HBCUs to examine the extent to which they are currently using continuous quality improvement to resolve issues they face.

Introduction
The closure of Bishop College, Daniel Payne College and Kittrell College due to financial and accreditation problems is a stark reminder that the future of Morris Brown College, Knoxville College, Selma University and other marginally surviving HBCUs is uncertain. This uncertainty is further compounded by questions of the relevance of HBCUs in the post civil rights era. There are also management challenges related to declining enrollment, deteriorating infrastructure, accreditation challenges, accountability issues, and fiscal pressures. In addition, questions are also asked about the response of HBCUs to low student retention and graduation rates, poor customer service, presidential and administrative turnover, governance, and competition for minority top students from online institutions and predominately white institutions (Wright, 2008).

The practice of CQI at HBCUs
While there is no evidence indicating that the institutions are poorly managed, there are indications that several HBCUs are experiencing challenges meeting the fiscal and academic requirements necessary to meet the accreditation standards established by Southern Association of School and Colleges (SACS). This is evident by the disproportionate number of HBCUs that have lost their accreditation or been placed on probation over the past two decades (AAUP, 2007).

In spite of these challenges HBCUs are expected to manage their human and financial capital with transparency and responsibility. SACS issued a position statement warning institutions under its jurisdiction that they will be held accountable for programs and services irrespective of any reduction in funding. SACS, in its manual, The Principles of Accreditation: Foundation of Quality Enhancement, stated that they "expect institutions to dedicate themselves to enhancing the quality of their programs and services within the context of their missions, resources, and capacities, be engaged in an ongoing program of improvement and be able to demonstrate how well it fulfills its stated mission ....document quality and effectiveness in all its major aspects" (SACS, 2006).

The introduction of the Quality Enhancement Plan (QEP) sets the tone for the new era in the accreditation process. In this new era, institutions are expected to show evidence that they are practicing an assessment driven continuous quality improvement process. The practice of quality in the form of Continuous Quality Improvement (CQI) is not new to HBCUs. Studies by Ibekece (2006) and Wright (2008) have found an awareness and practice of CQI among faculty, administrators and retention directors in over two thirds of the HBCUs they studied. Wright (2008) found that retention directors at HBCUs practiced strategic management, benchmarking, process management, balance score card, and the Baldrige Criteria for Educational Excellence individually or in combination as part of their retention management strategy.

According to Dev (2006), continuous quality improvement models are ideal for showing evidence of continuous improvement. They assist institutions in examining their work systems and performance indicators, they engage leadership, define strategic and operational planning, create measures and assessment, and evaluate work process.
Wright & Ibekwe found the major benefits of CQI at HBCUs were collaboration between other university partners improved communication with other departments, and improved academic program effectiveness and student learning outcomes.

Briggs, Stark & Poplawski (2003) support the use of CQI as a useful strategy in academic programs. They found that it creates collaboration in addressing issues with the curriculum, creates more responsive program planning, is useful for departmental self-study, and provides a forum for discussion about program planning. Wright (2008) however, found a lack of financial resources, turf protection, a lack of accountability and committed leadership as major obstacles encountered in practicing CQI in retention management at HBCUs.

Requirements for CQI Success

According to Dew & Nering (2004), successful institutions can improve their performance by making micro-level process improvements at the individual and departmental levels. The advantages gained from these micro-level departmental improvements include improvement in services for students and faculty, program visibility, cost-effective vehicles for change, and empowerment of staff and faculty to improve the operational efficiencies in their service areas. According to Imai (1986), this continuous improvement cycle sets the foundation for an organization to continuously address it operations.

The process is most evident in the Baldrige Criteria for Educational Excellence (2006). According to the Baldrige Criteria, units within the organization should continuously focus on leadership and governance responsibilities, strategic development, customer engagement, measuring, analyzing and improving organizational performance. The organization should focus on managing information technology; and engage the workforce in the planning process, and managing their work process. It is through the establishment of these processes within the respective units and throughout the campus that HBCUs will be able to continuously resolve the many challenges impacting the institutions.

Conclusion

The reality facing HBCUs is that the dynamics of the higher education landscape is changing. To combat this change HBCUs must increase revenue through enrollment growth, implementing cost controls measures, improve retention and graduation rates, and improve efficiency and customer service while meeting all the standards of accreditation. Cost controls and efficiency cannot occur unless there is an integrated approach to operational improvements within the institution’s work system. This requires continuous improvements in productivity and efficiency by every faculty and staff in every department at the respective institution. These incremental improvements are the basis of productivity and drive large-scale improvement over time (Imai, 1986).
A decision support system model for enterprise risk management in higher education

By Chris I. Enyinda

Introduction
Risk represents anything that inhibits an institution's ability to achieve its objectives. Indeed, risk is the quintessential part and parcel of doing business. With heightened concern regarding steady decline in student enrollment, accreditations, attrition of qualified faculty, budget crisis, proration, mismanagement, lawsuits, unviable programs, abject lack of process improvement and/or activity based management in many institutions demands forward thinking boards and C-level executives (presidents, chancellors, vice presidents) to embrace enterprise risk management (ERM) in order to survive and prosper.

ERM is an integrated and holistic approach that enables an institution to identify and evaluate a portfolio of risks, supporting it to proactively mitigate and control the effect of risks. Arguably, ERM can help to strengthen an institution's internal controls. Internal control is "a process, effected by an [institution's board of trustees, presidents, chancellors, vice presidents] and other [senior leadership] to provide reasonable assurance regarding the achievement of objectives in the following categories: effectiveness and efficiency of operations; reliability of financial reporting; and compliance with applicable laws and regulations" (COSO, 2004).

Unlike their counterparts in the private sector that traditionally consider risk in strategic planning, a survey by the Association of Governing Boards (AGB) of Universities and Colleges reported that higher education is too far behind in embracing ERM. Sixty percent of respondents indicated that their universities never used comprehensive, strategic assessment to identify critical risk factors to mission success. Only five percent of respondents said that their universities have excellent practices for ERM of critical risk factors to mission objectives (AGB, 2009).

Some of the strategic drivers encouraging higher education's risk profile are the emerging educational delivery systems; inability of governance processes to support strategic objectives; increasing opportunities to leverage intellectual capital; excess physical capability; quality of academic program; and increasing customer expectations (e.g., financial aid, student life, access, capacity) (Cassidy, et al., n.d). The purpose of this research is to leverage AHP to quantify risk in some institutions and develop ERM measures.

Methodology
The AHP model approaches decision making by arranging the important components of a problem into a hierarchical structure as shown in Figure 1. Level 1 describes the goal. The goal of the decision model is to minimize university-wide risk. Based on review of literature, level 2 contains the categories of risks prevalent in higher education. They are briefly explained: 1) Strategic risk entails high level goals, aligned with and supporting the mission;
2) Operational risk (e.g., employment practices, process management, internal and external fraud, improved services and business practices) is the effective and efficient use of the institution's resources; 3) Financial risk is the protection of institution's assets; 4) Compliance risk represents the institution's adherence to applicable state/federal laws and regulations; 5) Reporting risk is the reliability of the institution's external and internal reporting; and 6) Reputation risk is associated with the damage caused by any of the above risks that reflects how the university is perceived or valued. Level 3 consists of the alternative response options to the risks in level 2.

![Figure 1 Analyst Heirachy Process Model]

**Data collection and analysis**

A survey questionnaire approach was used to gather the relational data to assess the order of importance for higher education risks. From the hierarchy structure, a questionnaire was developed to enable pairwise comparisons between all the factors at each level in the hierarchy. The pairwise comparison process elicits qualitative judgments or opinions that indicate the strength of the experts' preference in a specific comparison according to Saaty's 1-9 scale. Experts who are knowledgeable in higher education provided their responses to several pairwise comparisons where two categories at a time were compared with respect to the goal.

**Empirical results**

Results of the pairwise comparison of the major risk criteria shown in Figure 2 indicate that compliance risk is the most important risk to manage followed by strategic risk, operational risk, and financial risk, respectively.

![Figure 2 Major Decision Objection Priorities]

<table>
<thead>
<tr>
<th>Risk</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance Risk</td>
<td>.364</td>
</tr>
<tr>
<td>Strategic Risk</td>
<td>.295</td>
</tr>
<tr>
<td>Operational Risk</td>
<td>.112</td>
</tr>
<tr>
<td>Financial Risk</td>
<td>.111</td>
</tr>
<tr>
<td>Reporting Risk</td>
<td>.094</td>
</tr>
<tr>
<td>Reputation Risk</td>
<td>.023</td>
</tr>
</tbody>
</table>

Inconsistency = 0.05 with 0 missing judgments.
The performance sensitivity analysis in Figure 3 is used to investigate the sensitivity of the alternatives to change in the priorities of the major risk criteria. For the C-level executives in the higher education, risk mitigation or reduction is the most important response option followed by risk avoidance. Risk mitigation (reduction) measured strongest with respect to strategic risk followed by financial but weak in the area of reporting.

![Figure 3 Performance Sensitivity Analysis on Risk Minimization](image)

**Conclusions and managerial implications**

In today's higher education and economic landscape, many institutions are under intense pressure to reinvent their business models and proactively manage their portfolio of risks. ERM represents an integrated approach to understand, mitigate, and manage the portfolio of risks confronting an organization. Its premier goal is to ameliorate the quality of decision-making throughout an institution. Therefore, fostering ERM culture must become a top priority for boards, presidents, chancellors, provosts, vice presidents and other senior leadership to drive growth and improve stakeholder value expectations. Indeed, mitigating and managing risk is about exploring the merits and demerits of change management in order to make real-time and informed decisions imperative for customer value, institutional performance, and strategic competitive advantage. Arguably, providing strategic direction for an institution means knowing what drives the creation of value and what disrupts it. This in turn means that the pursuit of opportunities demands understanding the risks to assume and those to avoid. Managing risks as a system can help an institution to improve its situational awareness, which in turn will enable it to respond to risks more proactively. Also, an institution will have a better opportunity to attain its strategic goals if it comprehends the underlying sources of disruptive risks. Indeed, an institution will be able to create better value from available resources by eliminating the need to redo projects after disruptions, caused by poor management and increased risk. Therefore, for an institution to improve performance and gain sustainable strategic competitive advantage requires C-level executives to actively embrace ERM.
Although we had done this before, we had never netted this cave in the summer because Indiana bats are reported (Callahan, E.V., R.D. Drobney, and R.L. Clawson. 1997) to roost in trees, not caves. Gray bats roost in caves during the summer (Humphrey 1982) and Battle (2002) reported this as well. At last, we have an indication about where Indiana bats are located during the summer season and that they may use caves for daytime roosting when all previous studies have only documented roosting in trees. This, in turn, could indicate that the endangered bats may not be as vulnerable to forest disturbance as we assumed and could suggest some strategies to improve habitat for these species and lead to their recovery. However, some students and I were able to visit the hibernaculum cave only once in 2009 to investigate roosting by Indiana bats in the caves before the National Forests in Alabama issued a state-wide cave closure because of the risk of spreading white-nose syndrome. White-nose syndrome is a fungus that has decimated hibernating populations of Indiana bats in the northeast. Thus our investigation to answer the question of summer time habitat use of the forest by this endangered species will have to wait until we can harp net the caves again next summer.

During this past summer, a student and I continued to mist net over streams that are downstream from thinned and burned sites we have investigated in the past. We were interested in the diets of four species of bats that were captured using analysis of the guano, or fecal droppings. We determined that the tri-colored bat (Perimyotis subflavus) had a more diverse diet of insect types (Orders) than red bats, northern long-eared bats, and evening bats (Nycticeius humeralis). We also discovered the digested remains of a bark beetle, most likely the destructive southern pine beetle, in the guano of one of the captured bats. We continue to be surprised by the forest bats we study.
Dr. Buddhi Raj Gyawali, a research assistant professor in the Department of Agribusiness, joined AAMU in August 2008. He holds an M.A. in International Development and Social Change, an M.S. in Agribusiness, and a Ph.D. in Natural Resources and Environmental Sciences. Dr. Gyawali’s research includes geospatial modeling of land use, land cover and agricultural productivity, rural rebound and urban sprawl, agro-forestry-based income earning opportunities, microenterprise development, income inequality and rural poverty, community resilience, and sustainability indicators. He is the first researcher to use Census Block Group level data in the U.S. to examine human well being and land cover change relationship, and has published two articles using this data. Since August 2008, Dr. Gyawali has authored or co-authored 12 grants proposals. He is currently collaborating with researchers from Auburn, Tuskegee, Rutgers, and South Carolina Universities, and the National Network of Forest Practitioners (NNFP), the Black Belt Foundation, and the Community Based Land Grant Consortium. Dr. Gyawali teaches Computers in Agriculture and Forest Resource Economics courses. Dr. Gyawali published “Human Well-being and Land Cover Types in the southeastern U.S.A.” in the International Journal of Ecology and Development, and has presented and co-presented papers and posters at several conferences and workshops. Dr. Gyawali’s goal is to continue to work on spatial and temporal models of land use, agricultural productivity and to develop relevant and nationally and internationally recognized multidisciplinary research programs.
Q: In previous interviews since coming to AAMU, you have been reluctant to articulate a vision for the university, opting instead to let a vision be derived from a collective point of views. Under the Hugine administration, how do you aim to ensure that AAMU remains on the cutting-edge of research?

A: I am pleased that I did not put out a vision for Alabama A&M University. A vision is something that has to be bought into from the University. The University already has a vision. The vision statement is in the University’s Strategic Plan, “Framework for Excellence.” This is among the best strategic plans I have seen. It lays out a clear vision, a vision of research, a vision for excellence, education, a vision of cooperating with business and industry, a vision of state-of-the-art technology; it really lays out a good outline of what this University should be about. And in moving forward, what we need to do now is to translate the vision from paper and implement it into reality. I could not fashion anything more dynamic than what’s here. It has everything; it expands on our programs, our research, and enhances the academic model of student retention. The only thing I would add to this is that we have a need to address deferred maintenance on the campus because you have to have adequate facilities. The vision is in place; I don’t see reinventing the wheel. So we’re going to be calling on individuals to rally around what’s here, because this was the collective effort of AAMU. What’s in the “Framework for Excellence” is a vision going forward that defines who we are and where we need to go. Among the “who we want to be” is to improve our overall ranking among institutions. I think right now among HBCUs we are ranked number 32. We can do much better than that and move ourselves up the ladder into the Top Ten. That’s where Alabama A&M University belongs, that’s doable. We have to look critically at the programs we are offering, and ask whether we have the state-of-the-art programs that are still meeting the needs of society today.

Q: Owning a research institute—an entity generally associated with major institutions—is a major pride for AAMU. What is your plan to ensure that the Alabama A&M University Research Institute exemplifies transparency and increases its efforts in becoming not only self-sustaining but offers a revenue stream for the University as in the case of other institutes?

A: AAMU is fortunate to have a research institute. Most universities our size do not have a research institute. So what we have to do is ensure that the Research Institute is meeting the needs for which it was developed. It serves a very critical purpose; we just have to make sure we are operating in that direction. There are distinct roles for different entities of the university. There must be a clear understanding of the role of the Research Institute versus the University. Secondly, there must be a clearly defined revenue stream that comes back to AAMU for the University’s benefit. We’re working through that aspect. To me it would be a lost to the University if we in anyway did not have the Research Institute. When you have moved to the cutting edge of something and you’re ahead of the game, I am first to say let’s find a way to deal with it and move forward. To lose the Research Institute could be one of the worst things that could ever happen to Alabama A&M University.
Q: One of the strengths of a research institution is how it involves its undergraduate and graduate students in research activities. How do you plan to ensure that this practice will continue at AAMU? Discuss the benefit of research to academics as well as to the community.

A: Yes, I do understand that 80-90 percent of the projects that we have involve graduate and undergraduate students research. You build researchers of tomorrow by involving them in the research of today. And so we will continue to monitor that very carefully, to be sure that we use every opportunity to include undergraduates and graduates in the research that we do. The President Pro Tempore of the (AAMU) Board of Trustees, Dr. L. Shelton Riggins, often talks about the research projects that he was involved in here as an undergraduate. He received a grant for about $10,000. The research supported by the grant has had an indelible impact on him going forward. These are the same kinds of experiences that other students have as they do research as undergraduates. Research is designed not only to create new knowledge but it also contributes to the educational process of the University. When you look at the relationship between the educational programs and research, the stronger the research the stronger the educational programs. Truly there is that tripod mission of instruction, research and service coming together at the University.

Q: Describe your experience with interdisciplinary research and teaching activities. How will you establish interdisciplinary connections at AAMU?

A: Research is not departmentalized to a particular discipline. What you do in research, cuts across many different disciplines. For example, research that might be focused on transportation engineering might have to call upon the social scientists to research the impact on the community. We may have to call upon the biologists to research the impact there might be on some environmental aspects. So, when we look at research we clearly understand that it is interdisciplinary.

Q: Marketing! Marketing! Marketing! Huntsville, Madison County is a diverse and multifaceted community. How have you been connecting with the various elements? Describe the reception so far.

A: It's been fine, quite excellent. We have reached out to a number of individuals. We will continue to reach out to individuals in the Huntsville community. We will use every opportunity we can to connect through community organizations, the faith community, business community, and the like so that we get to know Huntsville and Huntsville gets to know us as the face of Alabama A&M University.
Kiko goats in the United States. Goat meat production is one of the fastest growing livestock sectors in the United States, and goat meat is being recognized as an alternative red meat because it has less saturated fat and cholesterol than chicken, beef, pork or lamb.

Extension Horticulturist Dr. Catherine Sabota has been collaborating with researchers at Auburn and Tuskegee Universities on medicinal plants such as shiitake and oyster mushrooms to promote the development of the medicinal plant industry in Alabama. Mushrooms have been used in cancer therapy, to lower blood pressure and cholesterol levels, and to increase oxygen utilization and antioxidant properties. To irrigate the mushrooms, Dr. Sabota has installed an environmentally sound rainwater collection system that is capable of catching 85 gallons per inch of rainfall from a 144-square foot catchment area. Three of these catchment systems are installed as demonstration models on shiitake mushrooms farms. Rainwater collection promotes water conservation and can be used to water lawns, to clean equipment, or to irrigate crops, landscapes and gardens.

Extension has also moved into the forestry arena with its Saving Towns thru Asset Revitalization (STAR). STAR uses the Alabama Five-Year Urban and Community Forestry Plan to explore the connection between green space development and its impact upon humans. Strategic landscaping has been proven to increase the life span of older adults and attract customers to businesses, which is a good investment considering the current economic climate.

While it may take some time for the dust to settle at the newly formed National Institute of Food and Agriculture, its ultimate goal is to strengthen the research component of Extension and allow Extension services, or in the state of Alabama with the only Extension system, to get back to its roots. Originally, Extension was born out of the need to teach agriculture, military tactics, mechanical arts, and classical studies to working class citizens. Simply put, Extension “took the university to the people.”

Extension’s role in education and research has evolved over the years just as the children, youth, adults and communities it serves have evolved. What is constant, however, is its ability to transform innovative and timely research into effective programs and other educational resources that impact countless Americans, particularly growing urban, underserved, and nontraditional populations. The Alabama Cooperative Extension System is in an excellent position to accept the challenges that NIFA will bring.

Shiitake mushroom logs and water catchment system at AAMU Winfred Thomas Research Station in Hazel Green, Ala.
peak of 614 nm. This can be observed in the laboratory and a photograph of the phenomenon shown below.

These sensors can then be made wireless with the use of fiber optics, photodetectors and RF as transmission medium. Essentially RFID technology can be utilized which is an automatic identification method, relying on storing and remotely retrieving data using RFID transponders. An RFID tag can be incorporated into the sensor for the purpose of identification using radio waves. Chip based RFID tags contain silicon chips and antennas.

In summary, Europium tetrakis (dibenzoylethid) triethylammonium EuD4TEA exhibits strong triboluminescence, which makes it a potential candidate for use in a sensor to detect a fracture in real time in a composite structure for space applications. Further research is in progress.
Generation of self-focused electron beam and X-rays by compact ferroelectric crystal accelerators

By G. Stargell, N.V. Kukhtarev, T. V. Kukhtareva and J.C. Wang

Abstract

We have observed generation of the electron beam by the pyroelectric crystal placed in the vacuum chamber. Heating/cooling cycles of the crystals in the modest vacuum (P ~ 1-5 mTorr) produce uncompensated surface charges and strong electric field (~ 100 kV/cm) on the polar crystal faces. These fringing fields ionize ambient gas and accelerate electrons to high energies (~100 KeV). For photosensitive LiNbO3 crystal electrical charging and generation of electrons may be done by laser illumination, via photogalvanic effect or heating, via the pyroelectric effect. These generated electrons can be detected by the fluorescent ZnS screen, by the X-rays produced by placing copper masks and dental X-ray film in the electron beam.

Introduction

Some of the doped pyroelectric and ferroelectric materials exhibit a semiconductor-type photorefractive effect with photo induced changes in electrical conductivity and refractive index. These are known as good candidates for the optical storage and optical processing using holographic grating recording. Recently, new applications of pyroelectric materials as crystal accelerators for generation of electron beam, X-rays, and neutrons were realized using thermal cycling of the pyroelectric crystals.

Electron Beam Is Produced By the Pyroelectric Effect

We have also studied the pyroelectric effect in the ferroelectric LiNbO3 crystal doped with iron (Fe). During the heating from 25–100 °C and cooling from 100–25 °C cycles in a vacuum chamber, we have observed the electron and X-ray productions. The pressure in the vacuum chamber was 1–5 mTorr. We heated the crystal from 25 to 100 °C. During the heating cycle we did not observe any electron productions outside of the crystal surface. The schematic experimental setup is presented on Figure 1.

Figure 1

The Schematic of the Experimental setup before it was placed in the vacuum chamber. The leftmost part is the ZnS screen.

Figure 2

Electron beam, f ~21 mm, 4 mm x 10 mm long LiNbO3 crystal. This was formed during the cooling down process from 100 – 25 °C.

The purpose of the screen was to see whether the electrons are due to the surface charge. This is similar to the effect that happens in a cathode ray tube monitor, where the beams are shot onto the screen. The results that were evaluated are in Figure 2.
X-Ray Production through the Pyroelectric Effect

We have observed X-ray generation in 1 mm thick LN: Fe placed before the Cu-KCl screen. During the heating cycle of 25-100 °C, we have detected the Bremsstrahlung irradiation, during the cooling cycle at T=100 °C, the Cu K line appeared E=8.047 keV. The entire spectra, during this cycle, are similar to the spectra we got for LiNbO3: Fe: Ce during the first heating-cooling cycle. The pressure in the vacuum chamber was 2 mTorr, the distance between crystal and target of 2 cm at that time.

Therefore we looked into an experimental setup as shown in Figure 3, to determine whether X-rays are being produced.

The crystal went through the same process as it did in the previous section, where the crystal was put in a pressure of 1-5 mTorr and it went through a heating and cooling cycle from 25 to 100 °C and 100 to 25 °C. The results that were produced can be seen in Figure 4.

Figure 3 This is the experimental setup. The crystal is approximately 2 cm from the dental x-ray film and a mask for testing imprinting was placed in between the film and the crystal.

Figure 4
(a) The developed film after the heating and cooling cycle (b) The film and the mask setup before the experiment was conducted.

The film did not produce the resolution we wanted because the crystal was overexposed. Therefore we concluded that by moving the crystal to a further distance it will cause the crystal to expose more of the film evenly and show the effect of self-focusing the electron beam.

Conclusion

We have developed a theoretical approach for the description of the thermo induced pyroelectric charging phenomena in the ferroelectric semiconductors. Some of the applications of this concept are: XRF elemental analysis, Compact Electron/ion beam lithography, Radiation sensor (self-powered, onsite, in-vivo), and compact ion source for mass spectroscopy that is used for analytical chemistry.