Tuskegee University recognizes the importance of external support of research and sponsored programs and the impact these vital programs have on the development of its students, faculty and society in general. Tuskegee University has a longstanding reputation of being among the nation’s premier minority research institutions committed to the total development of its students and faculty. In this annual report, it is evident that through our Centers of Excellence, academic colleges and other institutional units, our faculty, staff and students (both undergraduate and graduate) are engaged in research that is critical to address the needs of today’s citizens, industries and governments.

Since 1996, the Office of Research and Sponsored Programs in the Division of University Advancement, Tuskegee University has more than doubled its annual funding for research and other sponsored programs. The university concluded 2009-2010 with a total annual funding of approximately $40 million. Credit for this enormous success goes to faculty members and staff in research centers, who continue to search for resources and write winning proposals. The staff members in the Division of Research and Sponsored Programs and various departments of Business and Fiscal Affairs are also to be commended for their enthusiastic support of the researchers in the grantsmanship process. These grants and contracts not only allow us to fulfill the research mission of Tuskegee University but also make a huge impact on our academic programs. Tuskegee University’s two Ph.D. programs in Materials Science and Engineering and Integrative Biosciences are prime examples of programs that are offered solely based on the expertise and resources developed by faculty members.

Our long-term plan focuses on actively expanding Tuskegee University’s research in the areas of nano-biotechnology, information technology, environmental science and engineering, energy, sensors and devices, molecular biology, immunology, toxicology, public health, epidemiology, reproductive and environmental biology, and modeling and simulations.
Tuskegee University and the Navy have partnered to launch a new dimension in the Master of Science in Electrical Engineering with a concentration in Systems Engineering. The program is designed to create guaranteed employment for Historically Black College and University (HBCU) students with specific skills to meet the needs of the defense acquisition community starting with the Naval Sea Systems Command (NAVSEA) Warfare Center.

Nearly three years ago, the Navy approached Tuskegee University with the need to recruit more systems engineers. According to Dr. Delbert (Ace) Summey, Technical Director, Naval Surface Warfare Center Panama City Division (NSWC PCD) and Marcus Hall, class of 1984 Tuskegee University graduate and Head NSWC PCD, Expeditionary and Maritime Systems, the Navy had a concern that most of the recruits wanted to be subject matter experts instead of systems engineers. The NSWC PCD and Tuskegee University collaborated to develop the intense 12-month (three semesters), non-thesis, curriculum outline. A Memorandum of Agreement was signed in the spring of 2009 between NSWC PCD and Tuskegee University for the Electrical Engineering Department to develop the detail curriculum content for the Systems Engineering program. The Navy supported the development of the curriculum and initial program startup resources, and Tuskegee agreed to support the continuation of the program.

In the fall semester of 2009, the first group of 16 students was hired at various NSWC sites during the summer prior to starting graduate studies. The students became NAVSEA employees and received a monthly stipend with all tuition and book cost paid by NAVSEA. These students had to commit to rigorous study to excel in the systems engineering graduate program. The top academic student of the graduating class will receive a $500 honors award. The dimension of the graduate systems engineering program of study complements the existing graduate electrical engineering masters program. Additionally, the program enhances the department’s revenue development in generating support for the graduate program. This pilot program in systems engineering master’s examines the diverse technical needs of a systems engineer who must obtain the integration and interoperability of small and large systems, and subsystems. The courses in this program are radar, sonar, optics, advanced digital signal processing, computer network design, internet security, project management, reliability, advanced engineering economics and random variables. These courses provide the students technical skills to work effectively in the defense acquisition community including NSWC PCD. The program is open for other defense agencies and companies to participate.

The Navy funded the development of the systems engineering courses along with the dedicated integrated lecture, laboratory and videoconference facility. This dedicated facility for the systems engineering masters program allows the students to perform labs in digital signal processing, radar and optics, video recording the lectures, and creating podcast. The video conferencing capability in this facility allows the program to deliver courses to offsite individuals and can easily invite outside technical experts worldwide to contribute to class lecturers without the need to travel. The first group of students completed their studies in July 2010. The Navy rewarded the first group of graduates from the program with a trip to Washington, D.C., to meet the Honorable Sean J. Stackley, the Assistant Secretary of Navy (ASN) Research, Development and Acquisition (RDA). Honorable Stackley is responsible for the research, development, and acquisition of Navy and Marine platforms and warfare systems with an annual budget of more than $50 billion. The students visited the Pentagon, Congress, Washington Navy Yard, Quantico Marine Base, Smithsonian Air and Space Museum, National Museum of the Marine Corps, and attended a parade sponsored by the United States Marines at the Marine Barracks in Washington.

These students are pioneers who have set a high standard in preparing for defense acquisition under the Navy where instead of flying in the cockpit of a plane they are contributing to the technology to support the Navy and Marine platforms.

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The state of the STEM workforce and performance of K-12 students in STEM disciplines are of grave concern and fuel the anxiety that the technological pre-eminence of the United States is steadily eroding. A number of initiatives have been launched to meet the challenge of erosion of STEM expertise. For example, in the report “Rising Above the Gathering Storm” by the National Academy of Sciences four recommendations have been suggested. The first recommendation is to increase America’s talent pool by vastly improving K-12 mathematics and science education. It has been observed consistently that an environment in which students actively participate is more conducive to learning than an environment where students are passive recipients. A number of active-learning approaches have been used to improve the learning of STEM concepts. These range from hands-on experiences using daily objects to web-based simulations and robotics. This three-year project, ‘Innovative Flight Simulation Experiences for Students & Teachers,’ have been funded under the National Science Foundation ITEST (Innovative Technology Experiences for Students and Teachers) program with Dr. M. Javed Khan, Professor of Aerospace Science Engineering as the Principal Investigators (PI), and Dr. Marcia Rossi, Associate Professor of Psychology and Dr. Chadia Affane-Aji, Assistant Professor of Mathematics as the co-PIs. The program seeks to improve students' knowledge and interest in math and science, and their perceived self-efficacy through classroom engagement of students in an innovative way with a flight simulation learning environment. It specifically targets 8-12 grade students and teachers in Macon County, Ala.

The objectives of this project are:
1. To increase the number of teachers who are trained to teach STEM concepts with innovative, active, experiential teaching techniques through modern technologies.
2. To improve the overall ability of students in solving STEM problems.
3. To improve the attitudes of teachers and students towards teaching and learning STEM concepts, respectively.

The success of this project is contingent upon support from the target population, therefore the project team garnered support from the school district administration prior to proposing the approach to the National Science Foundation (NSF). During the initiation of the project, teachers were engaged into the approach through discussions and planning meetings. Flight simulation software provides a unique medium to learn math and physics concepts. The flight simulation environment is a highly dynamic, physics-based environment where students can experience ‘real-life’ implications of their solutions to math and science questions and problems. The low-cost of the software (~ $100) and the hardware platform (typical <$500 PC) make it an attractive approach for implementation by school systems. Learning modules for math and physics concepts such as slopes, rates, vectors, energy conservation and Newton’s laws are being developed using flight simulation software as the vehicle to explore and understand these concepts. The modules are being designed so that the students can ‘fly’ their solutions and see the connections between the calculations and its manifestation in real life examples. The modules include training in the use of spreadsheet software as a computational and graphing tool.

The project plan includes workshops for teachers to provide hands-on training for integrating the learning modules into their classroom teaching. Workshops for students are also part of the project. The first workshop was held in the summer of 2010 for teachers from the Macon County School District. The teachers were enthusiastic about the approach and provided very positive feedback. A student workshop was also held in the summer of 2010. The teaching modules developed by the project team are planned for classroom integration by the teachers in the next year of the project. The schools will also be equipped with large screen out-of-the-window flight simulation environment and software and joysticks for the existing computer labs. During this integration process, the teachers will be provided support by the project team. It is anticipated that this innovative teaching approach will have a positive impact on student learning and their interest in STEM careers. The project team is supported by students from aerospace, mathematics and psychology majors. This project thus provides a unique opportunity for students to work in an interdisciplinary team and gain useful service learning experiences while mentoring middle and high school students.

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Tuskegee University has a long and honorable history as a leader in the training of African American students. It is therefore with great pride that we announce Tuskegee University (TU) has joined the ranks of other prominent minority serving colleges and universities as a recipient of one of the prestigious Minority Access to Research Careers (MARC) Undergraduate Student Training in Academic Research (U* STAR) awards. The MARC U* STAR is a prestigious award supported by the Minorities Opportunities in Research (MORE), a branch of the National Institutes of Health (NIH). The overarching goal of MORE is to increase the number of underrepresented minorities who enter and obtain leadership positions in the field of biomedical research.

The TU MARC U* STAR is an honors program that provides tuition and stipend support for six eligible students whose career plans include biomedical research. To be eligible students must have completed 65 to 72 credits with a cumulative GPA of 3.2 or better. Upon entry into the program, MARC fellows are required to follow a core curriculum designed to improve their communication and quantitative/mathematical reasoning skills. The curriculum is also designed to engage students in multidisciplinary and interdisciplinary scientific research that focuses on issues facing their communities. The research performed by MARC fellows is mentored by the University’s research faculty. In the past year, the research conducted by MARC fellows encompassed a wide range of subject areas. Research areas covered by MARC fellows included the prostate tumor microenvironment; the use of synthetic peptides to control the growth of breast cancer cells and the development of inflammation and inflammatory induced tumors of the colon; the development and use of hydrogel nanoparticles in drug delivery; and the effects of neonatal exposure to androgens on penile development and fertility. In addition to an intra-mural research experience, the training of each MARC fellow is strengthened by an extra-mural research internship for which they receive support. Our current MARC fellows are completing such internships under the guidance of highly qualified research faculty at Purdue University, University of Cincinnati School of Medicine and National Institutes of Health (NIH).

MARC students are encouraged to showcase their research in the form of both oral and poster presentations at local and national meetings. Although the program was still in its infancy, four Tuskegee students were given the opportunity to attend and present their work at the National Conference of the Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) in the Fall of 2009. This annual conference sponsored by the National Science Foundation (NSF) highlights the research of hundreds of undergraduate students across the country. At this conference, students are encouraged to compete for highly coveted awards for their research presentations. One of these prestigious awards was granted to a newly inducted TU MARC fellow.

Although the TU MARC U* STAR program focuses on undergraduate students at the junior and senior levels, it is expected that this training program will impact students at all levels through shared classroom experiences, seminars and symposiums. The TU MARC U* STAR program will support collaborations and pedagogical reform that enhance student learning across several disciplines. This includes the development of integrative courses in the life sciences (biology and agriculture/veterinary sciences), chemistry, physics, mathematics, computer science and chemical engineering that incorporate mini-research modules in the classroom. The addition of the TU MARC U* STAR training program is expected to further the goals of MORE and Tuskegee University to train highly qualified biomedical research scientists.
The Tuskegee University Robert Noyce Teaching Scholars in Mathematics and Science Education in the Alabama Black Belt project is a partnership among the College of Agricultural Environmental and Natural Sciences (CAENS), the College of Liberal Arts of Education (CLAE) and seven Local Education Agencies (LEAs) consisting of the school districts of Barbour County, Bullock County, Greene County, Lowndes County, Macon County, Selma City and Wilcox County, located in the Alabama Black Belt. The partnership has been formed to address critical shortages of teachers of science and mathematics in schools in the above-referenced LEAs. The project is funded by the Robert Noyce Teacher Scholarship Program of the National Science Foundation.

The idea of the Tuskegee’s Robert Noyce Scholarship Program is to recruit from the large cadre of highly talented Juniors and Seniors at Tuskegee University who are majoring in Science, Technology, Engineering, and Mathematics (STEM) to also pursue a program of study in Mathematics Education or General Science Education and become certified teachers of science and mathematics in the partnering school districts. These recruits (Noyce Scholars) can be seen as individuals with strong STEM backgrounds who might otherwise not have considered a career in K-12 teaching. Recruits will need a fifth year of study at Tuskegee in order to fulfill all requirements for teaching certification. The Noyce Program will offer generous scholarships to all Noyce Scholars during their Junior, and Senior years and also to complete the fifth year of study. Program participants must commit to teaching two years in one of the partnering LEAs for each year of scholarship support.

Noyce Teacher Academies are held at Tuskegee University during the course of the academic year as a strategy to recruit participants into Tuskegee’s Noyce Scholarship Program. These Academies are designed to encourage undergraduate STEM majors to consider careers as teachers of science and mathematics in K-12 schools. Academy activities include 1) presentations by partnering school district personnel and University faculty focusing on general facts about the teaching profession, its misconceptions and rewards; and 2) discussions about methodologies to teach science and mathematics effectively in K-12 schools. These Academies have been extremely helpful in the recruitment of Noyce Scholars.

We anticipate recruiting a total of eighteen Noyce Scholars over a five year period (2009-2014). Our Noyce Program will provide each Scholar with the elements to become successful mathematics and science teachers in schools in the partnering LEAs, including (1) a solid foundation in the STEM major; (2) a high quality teacher preparation including a wealth of instructional training and field experiences; and; (3) continued support to teacher graduates of the Noyce Program long after the grant has ended, which will in turn help with their retention as teachers within the partnering Black Belt school districts. Expected benefits for K-12 students from these districts include enhanced literacy in science and mathematics and increased interest in STEM related careers. The Tuskegee Noyce Scholarship Program is thus poised to prepare future science and mathematics teachers who will make profound and long-lasting impacts on science and mathematics education in the Alabama Black Belt.
Unmanned Aerial Vehicles (UAVs) are increasingly popular and support many civil and military applications. UAVs attract students’ curiosity and excite their imagination. This popularity and excitement led Tuskegee University (TU) to partner with Auburn University (AU) and the University of Texas (UT) at Austin to build and implement an Aerial and Terrestrial Test-bed for Research in Aerospace, Computing, and mathematics (ATTRACT). The challenge is to fly autonomously six to 12 UAVs within a limited air space. Six to 12 terrestrial robots offer a mesh network and computing infrastructure to the UAVs.

The UAVs use the mesh network to communicate between them and to send their position, speed, and other critical flight parameters to a “mother” ground station implemented on a terrestrial robot. Each UAV and each terrestrial robot can act as a router to forward data or control packets for nodes that are not in range of each other.

The UAVs carry a microcontroller that insures a stable flight along preloaded or dynamic waypoints. However, due to battery limitations and computation limitations of the microcontroller, the microcontroller does not compute the path to reach a target while avoiding other UAVs. So path planning is computed on one of the terrestrial robots (“mother” vessel) because these vehicles are equipped with powerful computation Linux based platform.

Funded by the National Science Foundation, the ATTRACT project is a two year collaborative project involving a multidisciplinary team coming from aerospace engineering, electrical engineering, computer science, and mathematics. Fourteen students and six faculty members are working on this project.

To date, six terrestrial robots were built and are operational. Students are enabling these robots to navigate indoor and outdoor. The team pursued two directions to acquire the UAVs:

1) Buy one commercial UAV and
2) Assemble and build amateur UAVs.

Tuskegee University was in charge of assembling and test flying the commercial UAV (Procerus). The cost of a commercial UAV is $12,000. Because the cost to assemble the commercial UAV is expensive, Auburn University is attempting to assemble cheaper UAVs based on the Multiplex Easy Frame UAV.

The TU team and AU team thoroughly and successfully test flew the Procerus on June 29 at Tuskegee University. The tests are promising. Auburn University completed the assembly of three UAVs that can autonomously fly one at a time. Soon, three UAVs will autonomously fly at the same time in the limited space with the support of the terrestrial robots. Students are implementing a conflict and collision avoidance algorithm on the terrestrial robots that will guide the UAVs.
ACNM is one of four centers of excellence in the state of Alabama, funded by the National Science Foundation (NSF), under the Experimental Program to Stimulate Competitive Research (EPSCoR). The scope of the Alabama EPSCoR is to enhance the state’s research infrastructure and competitiveness in selected areas including NanoBio Materials Science and Engineering. Tuskegee University leads a consortium of several doctoral granting institutions in the state in the area of nanostructured materials. The partners of the ACNM include Alabama A&M University, Auburn University, the University of Alabama, the University of Alabama at Birmingham and the University of South Alabama.

Outreach to the community including K-12 students and teachers, is also one of the goals of the Alabama EPSCoR. Tuskegee University offers several outreach programs including Research experience for High School Students, Research Experience for Teachers, Nanobio Science Academy for Teachers, and Science and Technology Open House.

The three research thrust areas of ACNM which involve a substantial number of students; undergraduate through Ph.D., are briefly described in the following paragraphs.

Polymeric Nanocomposites: In this work, structure-processing-property relations of thermosetting polymers with functionalized carbon nanotubes are being studied. In addition to these studies, research tasks are being carried out that will establish, experimentally and theoretically, the relationships of electrical/thermal properties to nanoparticle dispersion state in nanocomposites. At the macro level, we are developing carbon/carbon nanocomposites for high temperature applications. Structural nanocomposites with glass and carbon fabrics and nanophased epoxy are fabricated and characterized for their durability aspects. Study of the response to dynamic loading like high strain rate and high velocity impact through experimental and finite element approaches are being carried out.

Magnetic Nanoparticles for Drug Delivery: In the quest to identify and implant to improve drug efficiency for both patient convenience and more effective therapeutic uses, novel areas of research have been explored and developed. Drug targeting tumors or cancerous regions are especially needed due to the nonspecific toxicities exhibited by anti-cancer drugs that limit their use. Magnetic nanoparticles used in biorelated applications are the result of a new class of magnetic materials called nanobiomagnets. Nanomagnets have a promising future in biomedical applications due to their size compatibility with cells, viruses, and genes. Because iron is naturally found within the body, it is an ideal candidate for in vivo magnetic applications. In this project, we are synthesizing and characterizing iron, iron carbide and/or iron oxide nanoparticles from sonochemical techniques using organometallics as the primary precursor. Magnetic properties, drug delivery and toxicology studies are being conducted in collaboration with researchers at Auburn and Alabama State universities.

Advanced Green Composites: In recent years, demand for green composites has increased due to the increased concerns about energy conservation combined with newer legislative laws relating to the proper disposal of composites and other related materials. In addition to the environmental benefits, green composites are just as capable of producing materials of comparable strength and toughness as other non-environmentally friendly materials. Under this project, a kenaf reinforced soybean oil biocomposite is being developed as well as banana fiber reinforced green composite. In another study, extracting cellulose nanofibers such as cotton, flax, hemp, jute, and sisal by acid treatment, and dispersing them in polymers, prepare prepregs, and molding them into composites and then characterize them for their mechanical properties are are in development. The research also investigates the processing techniques for manufacturing multifunctional cellulose nanocomposite fibers. In this work, dispersion of magnetite nanoparticles is being investigated.
Enhanced Communication and Collaboration Among Undergraduate STEM Disciplines (HBCU-UP)

Principal Investigator: Roberta M. Troy
Director: Danielle N. Gray-Singh

The HBCU-UP grant, funded by the National Science Foundation, draws upon the complementary strengths of Tuskegee University’s (TU) STEM departments to devise a highly integrated and collaborative science curriculum.

The program is anchored in the Biology Department under the leadership of Dr. Danielle N. Gray-Singh, who also serves as the director of the grant. Biology is one of the largest majors on the campus and is uniquely positioned to: (a) erode (or blur) the boundaries between STEM disciplines as biology has become heavily dependent on mathematics and computers to solve its questions and (b) to populate TU’s first interdepartmental, interdisciplinary concentrations in biophysics/bioengineering and quantitative genomics. It serves more than 1,200 students and provides research incentives to 20 faculty members across aerospace engineering, biology, chemistry, computer science, math, physics, and psychology.

Highest priority is given to aligning science curricula to ensure that theory, theme and concepts are echoed across the first- and second-year sequences in biology, math, computer science, chemistry, and physics, to prepare students for the rigor concentration in either biophysics or quantitative genomics. For example, collaboration between the Departments of Biology and Computer Science is establishing a High Performance Computing Center (HPCC). In this connection, a High Performance Cluster Computer has been installed in the Department of Computer Science. A workshop was recently conducted for the faculty and students of Tuskegee University to familiarize them with this resource. Other workshops will follow. Dr. Muhammad Ali in the Department of Computer Science is spearheading the establishment of the HPCC. He is also taking a leadership role in developing a Quantitative Genomics curriculum. Two courses have been developed for this curriculum Introduction to Bioinformatics and Introduction to Biocomputing. Introduction to Bioinformatics will be taught for the third time in fall 2010 with an enrollment of 32 students, up from 19 and 17 students the previous two semesters. Introduction to Biocomputing will be offered in spring 2011.

The use of technology is at the core of many HBCU-UP initiatives. For example, technology will be infused in the teaching of calculus, a compulsory course for the majority of our STEM majors. Learning calculus and other STEM subjects through dry lectures and standard textbooks often confuse today’s student. In order to trigger interest and convince students of the power and usefulness of mathematics, Dr. Chadia A. Aji and Dr. Mohammed A. Qazi of the Department of Mathematics will teach sections of a calculus course with the use of MATLAB, software that is widely used in both academia and industry. It is known for its ease and convenience combined with powerful computing and graphing built-in functions. Teaching calculus using MATLAB will not only help students illustrate, visualize, and better understand key concepts of mathematics, but also motivate, inspire, and prepare them for industry or research positions. The MATLAB laboratory projects in calculus will also help students learn MATLAB for mathematics, science and engineering applications. Moreover, students will use MATLAB to solve real world problems. By plotting curves using built-in MATLAB commands, students will illustrate, visualize, and understand key concepts of mathematics, science, and engineering.
Tuskegee-Cornell Partnership for Research and Education in Nano-Materials (PREM)

Principal Investigator: Shaik Jeelani

A long-term partnership for research and education in nanomaterials, between the Center for Advanced Materials (T-CAM) at Tuskegee University (TU) and the Materials Research Science and Engineering Center (MRSEC) at Cornell University has been established, under the Partnership for Research and Education (PREM) program, sponsored by the Division of Materials Research at the National Science Foundation (NSF).

This partnership is based on a very productive relationship TU had with Cornell for many years through two NSF funded Engineering Education Coalition grants (SYNTHESIS Coalition, 1990-1997; and PRODUCT REALIZATION Coalition, 1995-1998). These grants had a significant impact on the development of the materials science and engineering (MSE) program at TU. Recent interactions between TU and Cornell were through two NSF grants to TU, under the Center for Research Excellence in Science and Technology (CREST) and the Nanoscale Interdisciplinary Research Teams (NIRT) programs. Through these grants, the TU and the Cornell faculty have jointly investigated the effects of modifications to the surface of the nano reinforcements on the interfacial properties of nanocomposites and also studied the influence of geometry of nanosized objects on their response to external fields.

Tuskegee-Cornell PREM team has focused on the following specific research tasks:

1) Synthesis and Characterization of Cubic Cobalt Oxide Nanocomposites:

Cubic cobalt oxide nanocomposite system is of interest because suspensions of cubes are expected to exhibit enhancements over traditional spherical particles for applications such as liquid body armor as it would achieve shear thickening behavior at a lower shear rate when compared with spherical nanoparticles. In order to maintain long term stability (> 30 days) of this system for armor application, studies of the intrinsic viscosity of the system with and without poly vinyl pyrrolidone (PVP) have been conducted and estimated it to be ≈5.03. Rheological behavior of this system depends on the viscosity being studied.

2) Surface Chemical Investigations of Inorganic Guest-Organic Host binding

Under this task, studies on the effect of silicon carbide (β-SiC) nanoparticles (~30nm) sonochemical coating on silicon dioxide (~ 200nm) nanoparticles and infused into SC-15 epoxy resin to increase the thermal and mechanical properties of SC-15 epoxy for structural applications has also be conducted. In order to increase the SiC binding with the polymers, sonochemically coated SiC nanoparticles by three types of polyhedral oligomeric silsesquioxane (POSS) namely: OctaIsobutyl (OI), EpoxyCyclohexyl (EC) and GlycidylEthyl (GE) POSS. XPS (X-ray Photoelectron Spectroscopy) analyses were carried out to explore the chemical composition and surface characters of SiC nanoparticles and POSS coated SiC nanoparticles. TEM analyses also revealed that the POSS were uniformly coated on the SiC nanoparticles are taking place.

3) Studies on the Effect of functionalization on the morphology, cure kinetics, multifunctional properties, and fracture behavior of MWCNTs with thermosetting polymers.

Under this task, the teams have studied the effect of functionalization of MWCNTs on the thermal, thermomechanical, and mechanical properties of high temperature epoxy systems. Additionally, studies related to the effect of functionalization of the fracture behavior, electrical properties as well as the high strain rate loading of nanocomposites are being studied. In all cases, the nanocomposites with functionalized MWCNTs showed higher properties when compared with the system having pristine MWCNTs due to increased covalent bonding between polymers and MWCNTs through functional groups.

Outreach activities carried out under this program include: Research Experience for High Schoolers (REH), Research Experience for Undergraduates (REU), Research Experience for teachers (RET), Nanobio Science Academy for Teachers, Science and Technology Open House and Mentoring Workshop.
The Center for Biomedical Research (CBR), supported by a grant through the National Institutes of Health (NIH), under the Research Centers at Minority Institutions (RCMI) program serves as the cornerstone for biomedical research at Tuskegee University (TU). The Project Director (PD) is Dr. Cesar Fermin, Associate Dean for Research and Advanced Studies and the Principal Investigator (PI) is Dr. Tsegaye Habtemariam, Dean for Research and Advanced Studies. Both are associated with the College of Veterinary Medicine, Nursing and Allied Health (CVMNAH). The CBR represents a core institutional infrastructure, when taken in combination with a high quality human resource base, is vital for the implementation and maintenance of a state of the art biomedical research enterprise. The overarching but complementary goals of the CBR are: a) to support and promote the newly created Ph.D. program in Integrative Biosciences (IBS), and b) to focus biomedical research upon two of the health disparity diseases that includes cancer and autoimmune diseases (specifically HIV/AIDS and lupus).

The CBR builds upon a vision of studying health-related problems through the use of in-vivo, in-vitro and computational models. These interrelated modeling approaches provide powerful alternatives in advancing biomedical research. A laboratory animal facility provides in-vivo animal models for advancing research. To further strengthen the CBR, new faculty with expertise in molecular biology, research on cancer, HIV/AIDS and lupus as well as bioinformatics and computer modeling has been recruited. These strategic activities seek to interrelate research in animal health with human health via the One Medicine-One Health framework.

CBR scientists partner internally with the new Center for Bioethics in Research and Health Care (NCBRH) at TU, and promises new avenues for innovative research with ethics at its core. The Center utilizes a multidisciplinary, community-based approach to examine and articulate issues in health care research and delivery and public policy involving and affecting African-Americans and other vulnerable populations. External partners include University of Alabama, (Birmingham and Tuscaloosa), private and government agencies.

Tuskegee University’s newest Ph.D. program in Integrative Biosciences (IBS), launched in the fall of 2006, with the support of RCMI funds, is an innovative program designed to creatively integrate research, education and service. The IBS Ph.D. program selectively leverages the combined strengths of the College of Agricultural, Environmental, and Natural Sciences (CAENS), the CVMNAH, and the university’s major research centers in biosciences, to produce graduates who are competent and skilled scientists, problem solvers, critical thinkers, excellent communicators, and team players. The IBS Program also leverages the combined resources and support of nine departments and countless research cores and centers. The CBR currently provides annual support for two IBS research assistants who serve as technical resource personnel for several projects related to IBS research. Additionally, CBR core facilities support projects for 75% of the IBS PhD students. Approximately 50% of these students will focus on biomedical research with implications on health disparities in underserved communities. Graduates from this PhD program will become key scientists and future research leaders who could succeed in generating effective solutions to the complex problems faced by the rural communities with respect to health disparities.

Information Sharing: Beginning in 1997, using RCMI funds and other resources, an Annual Biomedical Research Symposia was held highlighting health issues that disproportionately affect humans in the black belt counties of Alabama and other areas. Biomedical research results are shared nationally and globally via presentations given in China, India, and Africa to name a few. CBR Scientists published or submitted 44 journal articles, 66 abstracts and three books/chapters. Detailed information about the CBR is found at: http://www.onemedicine.tuskegee.edu/RCMI/index.htm.

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