

WITH THE HELP OF SOUTH CAROLINA RESEARCH UNIVERSITIES, SCRA
DEMONSTRATES LEADERSHIP IN APPLIED RESEARCH AND
COMMERCIALIZATION WITHIN SC



Bill Mahoney, CEO, SCRA

SCRA EXPERTISE DELIVERS ASSURED OUTCOMES

Now in our 25th year of operation, SCRA has expertise in building multi-organizational teams from industry, government and academia. We create teams to solve our clients' problems – by carefully choosing partners to fill technology gaps -- so that the delivery of technology-based solutions for our clients' complex challenges is assured.

In addition to creating teams and managing applied research programs, SCRA adds value and provides technology as a contributor based on deep domain expertise. We develop and demonstrate new technologies and apply off-the-shelf technologies in innovative ways to deliver client solutions. Our experienced management techniques keep researchers focused on relevant outcomes. SCRA utilizes the reach of the team to achieve broad implementation of technology breakthroughs and best-practice methodologies. Our processes and people combine to deliver assured outcomes across entire industries.

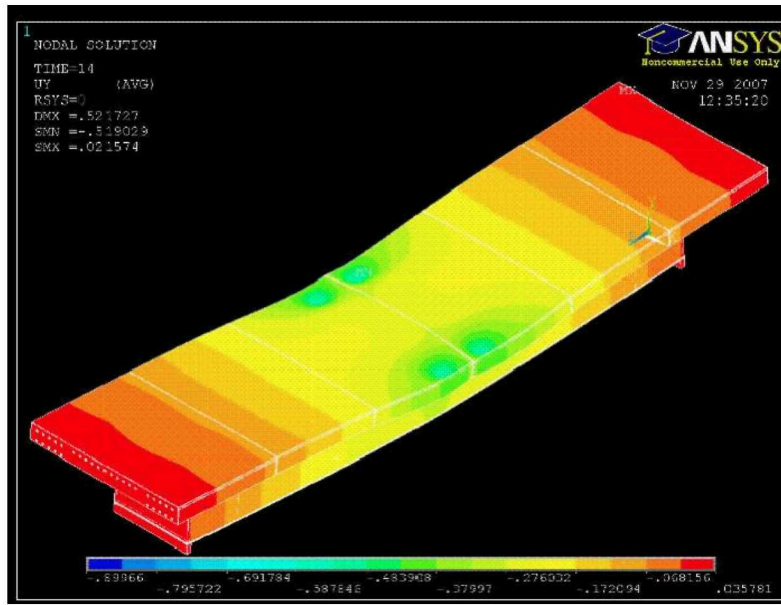
**PROFILES OF SCIENTIFIC RESEARCH AND COMMERCIALIZATION
COLLABORATIONS WITHIN SOUTH CAROLINA**

To illustrate the breadth, depth and scope of collaboration among South Carolina's research universities and SCRA, here are a few recent profiles of activity, from both a research and a commercialization perspective.

**VANADIUM: A STUDY FOR LIGHTER WEIGHT AND HIGHER PERFORMANCE
BRIDGES FOR THE US ARMY**

Dimitris C. Rizos, PhD., Assistant Professor at the University of South Carolina (USC) Department of Engineering and Information Technology has partnered with the US Army Corp of Engineers to design a prototype non-standard, fixed bridge for extensive military testing and possible civilian use. The project objective is to research high strength vanadium steel for the replacement construction of non-standard fixed bridges on military supply routes that become damaged or destroyed during combat. This application has a clear commercial analog in the highway bridge construction industry. The technical characterization focuses on weight savings and increased span lengths realized through the use of the Vanadium. A cost comparison, risk analysis, and structural design assessment and analysis have been included in the study.

Dr. Rizos' team at University of South Carolina has developed a 200-foot bridge model that accommodates 60-ton military vehicles. Computer simulations and Finite Element Modeling are being utilized to evaluate the 200-foot segment of the bridge for various load cases, which checks the design against anticipated design loads and load combinations.



Above: Example of Simulation Testing Model. Simulations may include stress tests, deflection rates, bridge connection strength

The overall outcome of this work with vanadium will benefit warfighter protection and also provide civilian spin-offs. For example, improved energy absorption in vehicles travelling over the bridges will provide better soldier protection. Other benefits include increased awareness of vanadium's structural benefits among designers and producers of vehicles and buildings. Increased demand for these steels benefits efficiency of US and South Carolina steel-makers.

The Advanced Technology Institute (ATI), an SCRA affiliate, is the Program Manager for the Vanadium Technology Partnership. ATI has strength in achieving program goals set forth jointly by the U.S. Army and industry. The approach also focuses on maximizing return while minimizing risk.

COPPER STUDIES FOR IMPROVED MEDICAL PATIENT CARE; EXPANDED MARKETS FOR COPPER PRODUCTS

Another collaborative program, in progress for the US Department of Defense (DoD) and the Copper Development Association, utilizes the inherent antimicrobial properties of copper. Two studies underway include extensive work being performed in South Carolina. One study is focused on the ability of copper alloy surfaces to kill deadly pathogens and impede cross-contamination. Clinical trials are underway in both South Carolina and in New York City to complete a pilot conversion of touch surfaces in healthcare facilities. The second study is designed to demonstrate the effectiveness of copper components in heating, ventilating and air-conditioning (HVAC) systems to reduce the incidence of harmful microbes that spread throughout buildings and other indoor air environments. University leads on this program are Charles E. Feigley, Ph.D., C.I.H, Professor in the Department of Environmental Health Sciences at the University of South Carolina and Michael G. Schmidt, Ph.D. Dr. Schmidt is the Director of the Office of Special Programs and Professor and Vice Chair Dept of Microbiology and Immunology at the Medical University of South Carolina.

This outstanding program team for DoD, in support of Army Medical Research, is also being implemented by SCRA affiliate ATI. The team will assure outcomes of both improved patient care and expanded applications and markets for copper products. The program brings together a world-class team of medical researchers and practicing clinicians including hospital sites committed to conducting a series of multiple clinical trials at the Sloan-Kettering Cancer Center in New York, and at affiliated hospitals in Charleston: the Medical University of South Carolina and the Ralph H. Johnson Veterans Affairs Medical Center. Project team members from the University of South Carolina's Arnold School of Public Health and the School of Engineering is coordinating activities with fabricators and manufacturers identified by the Copper Development Association to implement copper touch surfaces in selected locations in the three hospitals.

An Independent Advisory Board is monitoring the study progress. The program consists of four program phases: a theoretical study and the establishment of baseline data sets in a lab environment; operation and monitoring of standard and "copperized" HVAC systems in real-world settings; trials conducted in hospital and/or military settings; and integration of copper microbial control with the concepts of green building design.

NUTRITION RESEARCH CONSORTIUM LINKS SOUTH CAROLINA SCIENTISTS AT CLEMSON, MUSC AND USC

The Nutrition Research Consortium (NRC) is administered through SCRA's Public Interest Sector. Based in South Carolina, this consortium helps link nutrition researchers throughout the State. The group addresses nutrition concerns that affect not only South Carolinians, but people throughout the country. With more than 50 of the State's nutrition scientists participating in NRC research and outreach activities, NRC focus areas are wide-ranging, from early detection and prevention of childhood obesity to molecular nutrition studies on energy balance. Additional focus areas include obesity and hospital-based nutrition to prevent patient complications and reduce re-admissions.

Marilyn Laken, PhD., RN, MUSC Professor, cites that the NRC has provided pilot funding for faculty at all three South Carolina research universities: Clemson University, the Medical University of South Carolina and the University of South Carolina – which were absolutely critical to gathering data to help the NRC obtain funding for large grants. For example, funding for nutraceuticals led to a grant to test a naturally- occurring substance for cancer prevention. Another grant will produce a videotape to help instruct caregivers how to feed elderly family members with dementia. The grant is specifically tailored to the African American community, since previous studies only included care to Caucasians. Some grants lead to even larger National Institute of Health grant opportunities to help people within South Carolina. NRC enables important studies that specifically address the needs of South Carolina citizens.

Some of the most important work conducted by NRC simply involves connecting the dots within the universities -- by maximizing their ability to be interdisciplinary. The research universities combine their complementary strengths through the NRC to collaborate, which further increases the potential for extramural funding. For example, University of South Carolina's Sarah Wilcox, an associate professor in USC's Department of Exercise Science and an expert in physical fitness, and MUSC's Dr. Laken combined expertise on a recent program. Their efforts secured a Centers for

Disease Control grant for AME churches to implement a physically fit program throughout the State. USC's Russ Pate, PhD, Professor of exercise science at the Arnold School of Public Health introduced MUSC's Dr. Laken to Dr. Wilcox. The CDC grant led to an NIH grant to improve physical fitness. Another DoD grant was obtained to better enable recruits to complete military training -- after the NRC discovered that 43% of women and 18% of men would fail the US Army's weight requirements.



A strong suit of NRC is its ability to foster trust, which allows the group to identify key collaborators among our universities. Dr. Laken emphasizes how the research universities are working together to foster and commercialize innovative research in nutrition and disease prevention, attracting large-scale research grants to help people in South Carolina.

SCRA AFFILIATE, SC LAUNCH!, FACILITATES APPLIED RESEARCH, PRODUCT DEVELOPMENT AND COMMERCIALIZATION PROGRAMS TO STRENGTHEN SOUTH CAROLINA'S KNOWLEDGE ECONOMY



SC Launch! began less than two years ago as a collaboration among SCRA and South Carolina's research university foundations: Clemson University, The University of South Carolina and the Medical University of South Carolina. SC Launch! was created to facilitate applied research, product development and commercialization programs to strengthen South Carolina's Knowledge Economy. After one year of formal operation, this collaboration extended even further with business, academic and economic development entities as Resource Partners in the SC Launch! Resource Network. These partners are integral to the SC Launch! program because they provide an eco-system of support to start-up companies and entrepreneurs with business counseling, mentoring and training.

The SC Launch! mission is to:

- Fulfill the Innovation Centers Act passed by the South Carolina legislature in 2005;
- Help create start-ups that leverage intellectual property from and partnerships among the research university foundations and the public and private sectors;
- Generate professional-grade research and development and Knowledge Economy jobs in South Carolina;
- Establish a continuing forum to foster greater dialogue between the state's research university foundations and industry;
- Focus SC Launch! client efforts on the development, testing and implementation of new advances in knowledge-based industries;
- Promote the development of knowledge economy industries and applied research facilities in South Carolina.



What is the Knowledge Economy?

A knowledge-driven economy is one in which the generation and exploitation of knowledge play the predominant part in the creation of wealth. In South Carolina, the Knowledge Economy is growing around high-technology industries such as life science, advanced materials and alternative energy. More than 60% of US workers are knowledge workers.

PROGRAMS THAT HELP POSITION SOUTH CAROLINA START-UPS TO PROPEL THE SC TECHNOLOGY BASE

SC Launch! is involved in each step of the innovation pipeline, from discovery assessment through development and deployment, continuing with support during later commercialization activities. Programs include a pre-company and university initiative; an SBIR/STTR Matching grant program, and innovation prizes awarded through The New Ideas for a New Carolina contest, through which SC Launch!, New Carolina, Think Tec and other Knowledge Economy sponsors support innovators and inventors in commercializing their ideas.

SC Launch! also focuses to identify, nurture and help grow high-impact knowledge economy companies. SC Launch! offers funding through grants, loans and equity investments up to \$200,000 per entity. SC Launch! zone managers and Resource Partners throughout the State work with prospective companies to prepare them for the rigors involved in acquiring follow-on financing from angel and venture capital investors. Additional, important programs include support of landing parties – companies that relocate to South Carolina and make a commitment to grow the knowledge economy here; and demonstration projects, which have included important work in exploration and application of alternative energy throughout our State. One such company, Selah

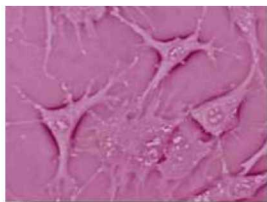


Technologies, began with research from Clemson University. Selah is a nanomaterials innovator and manufacturer

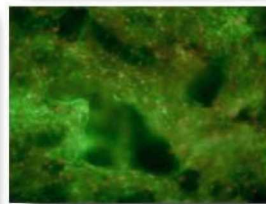
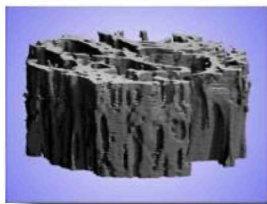
with two distinct and compelling platform nanotechnologies. Its mission is to consistently deliver high quality nanomaterials and nanotechnology-enabled products to the global marketplace in an ethically sound manner. The company produces Selah Dots ® - carbon-based quantum dots that have a broad range of potential applications that include tumor-guided surgery and use in biosensors.

PRE-COMPANY AND UNIVERSITY INITIATIVES ARE AN IMPORTANT PRIORITY

SC Launch! makes pre-company and university initiatives a priority to assist in turning promising research into commercial realities. Here are a few recent examples:



Developing **enabling technologies** for the pharmaceutical, biomedical and life science industries.



Clemson University and KIYATEC take drug discovery out of the lab and into the marketplace. The KIYATEC - Clemson University interaction is one that demonstrates the benefits of business and South Carolina university research working hand-in-hand to apply an important technology. The technology was originally invented in Clemson University's Department of Bioengineering as a means to create 3-D tissue constructs (i.e. "tissue engineering") for implantation to repair or replace diseased tissue. While a worthy goal and one that will be possible some day, KIYATEC management, led by CEO Matthew Gevaert, Ph.D., recognized it to be not commercially

feasible in the near future because of today's financial and regulatory environment. They did, however, recognize the value of the technology for an application which will be quicker to market but still quite valuable - drug discovery - and are focusing their efforts on this much more commercially viable path forward. Through an interaction in which each group contributed ideas aligned with their unique "raison d'être" - discovery in one case and product in the other - they are creating a solution that neither alone would have generated.

Another example of promising South Carolina technology and its link back into potential SC university research projects is illustrated with SensorTech. SensorTech offers a new, patent-pending contact sensing technology that can accurately measure force, pressure, torque, or impact, and has the ability to be formed into any shape and size. Here's how this venture began: Andrew Clark, Ph.D., completed the Technology Entrepreneurship Certificate program at Clemson University's Spiro Institute for Entrepreneurial Leadership – which was designed for folks like Andrew who are earning a graduate or doctorate-level degree in engineering and science and want to complement that study with an understanding of entrepreneurship.

Dr. Clark had also invented a new bioengineering technology as part of his doctoral program in Bioengineering. He disclosed it to Clemson, the University patented it and the

Spiro Institute arranged for MBA students to work with the Clemson Office of Technology Transfer to explore its market opportunity.

The next year, when he was ready to graduate and form his company, SensorTech, with Chuck Pringle, the Spiro Institute arranged for another team of MBA students to assist the young company in developing information needed for the launch.

Andrew Clark is a good example of a top bioengineering PhD graduate from a South Carolina university who has chosen to stay in SC and work for an entrepreneurial venture here because of these connections – a prime example of their value. Similarly, Joanna Isbill, an undergrad in materials science who is pursuing a dual MBA and MS in Bioengineering at Clemson, served as the team leader on the SensorTech project. With her experience with SensorTech, she is considering an entrepreneurial career path for herself as well. These strategies, programs and collaborations provide an opportunity for these highly educated students to find career opportunities in SC rather than leaving the State.

THE UNIVERSITY OF SOUTH CAROLINA AND CARBONIX TACKLE THE DIFFICULT TASK OF TAMING A COMMON ALLERGY

Another important connection between scientific research and commercialization in South Carolina is happening between CarboNix and the University of South Carolina. CarboNix was formed specifically out of research technology performed in the Chemical Engineering department at USC by Dr. Mike Matthews. In an effort to commercialize this technology, Dr. Tony Bocanfuso, working with the USC Technology Transfer Office, contacted Al Quick, a USC College of Engineering grad and local entrepreneur, to take a look. Al was already a seasoned, retired senior executive from a major corporation and a veteran of a high-tech start-up that was sold after nine successful years in business. Dr. Matthews, currently the Chemical Engineering chair at USC and Al, agreed that there was a commercial opportunity in the technology and partnered to form CarboNix. While both men have technical backgrounds and management experience, in CarboNix Mike provides the technical expertise and Al provides the business background and start-up company experience. The USC Research Foundation owns stake in the venture through both equity and royalty from the technology licensing and CarboNix holds exclusive rights to the technology.

It's a perfect formula - Mike provides the technology and Al provides the business expertise. The technology was originally based on a sterilization technique that does not require high temperatures, harsh chemicals or radiation. Dr. Matthews found that he could achieve their desired results of killing bacteria and bacterial spores using liquid carbon dioxide.

While it appears that there is a significant medical opportunity commercially for this technology, it will take time to gain required agency approvals. Since it is often difficult to interest investors in a venture that is most likely five years out, the two will continue with that path for the long term. Meanwhile, the team began looking at more near-term revenue streams using essentially the same technology. They believe that they have identified an application that may provide a near-term revenue stream and won't require the lengthy FDA approval cycle. Their work focuses on the tenet that many people suffer from allergies and asthma, frequently triggered by certain proteins in dust mite excretion. These attacks result in many lost work and school days. Dust mites are present in the bedding of almost every home and are difficult to control. CarboNix has identified a

process using liquid carbon dioxide to not only kill the mites but more importantly denature the protein in the dust mite waste that causes these attacks. Work is currently underway to commercialize the process.

The team hopes to generate jobs and significant revenue to further strengthen the knowledge economy in South Carolina. If work goes as planned, it's a unique application of basic science to a serious problem – dust mite allergies – that will come from South Carolina university research. The Company has engaged several experts from other Schools at USC, including its Public Health, Medicine and Business departments, to participate in the activity. This is a great example of how a new focus on commercializing the technologies developed in our South Carolina research universities can play a significant role in economic development for the state. With a greater focus on developing technologies and commercializing them, Quick is confident that companies like CarboNix will continue to spring up all over the state with help of partners like SC Launch! and others.

SBIR/STTR MATCHING GRANT PROGRAM AWARDS INNOVATION IN SOUTH CAROLINA

The SC Launch! SBIR/STTR Phase I Matching Grant Program is designed to award matching funds to South Carolina-based companies that have been granted a Federal Small Business Innovation Research Phase 1 award. Since this program was initiated in June, 2006, seven South Carolina companies have received awards:

- Cell & Tissue Systems
- First String Research
- Innegrity
- Microbial Fuel Cell Technologies
- Tetramer Technologies
- Selah Technologies
- Sensor Electronic Technology

SC LAUNCH! CIRCLE OF INNOVATION

SC Launch! provides an opportunity for individuals and organizations to have a direct impact on South Carolina's competitiveness agenda. The Industry Partners Act allows individual or corporate donors to take a South Carolina tax credit against income taxes, insurance premium taxes and certain license fees for 100% of the contribution amount. This enables Circle of Innovation members to be in the vanguard of South Carolina's shift to a Knowledge Economy.

CONCLUSION: DELIVERING ASSURED OUTCOMES AND POSITIONED FOR FURTHER GROWTH

Since its incorporation in April, 2006, SC Launch! has supported (as of January, 2008):

- 150 applications
- 37 companies who have received funding
- 81 companies who have received support services

Program results include:

- Loans and equity investments to 14 companies
- 23 Pre-company/university grants
- 4 landing parties who have relocated to South Carolina
- 7 demonstration projects
- 7 SBIR matching grants
- 25 innovation prizes with New Carolina

Four SC Launch! companies have secured \$30M in follow-on venture capital