

**University of South Carolina
Research Centers of Economic Excellence
Programmatic Progress Report
USC Led Proposals
For the Period Ended June 30, 2006**

Nanostructures

Cycle: 2002 – 2003

Award: \$4 million

Institution(s): USC

Chair: Richard Webb

Nanotechnology represents one of the four priority areas of research at the University of South Carolina with interdisciplinary teams working in five separate areas. Richard Webb was hired in June 2004 to fill the Endowed Chair position at USC. Dr Webb is a National Academy of Science member and specializes in nanoscale condensed matter physics. He has since hired Thomas Crawford from the Seagate Corporation in Pittsburg, PA as Associate Professor of condensed matter physics. He has also hired a theoretical physicist to support the nanoscale program, and a search is currently underway to fill a second assistant or associate level tenure track position.

The University has committed more than \$3 million from institutional resources as start-up funds and renovated more than 6,000 square feet of laboratory and office space in the USC Nanocenter to support the Research Center of Economic Excellence (RCoEE) in Experimental Nanoscale Physics. Dr. Webb has organized interdisciplinary teams in five areas of nanoelectronics with more than twelve faculty members from five departments. These interdisciplinary teams focus on:

1. Synthesis/characterization of nanowires in metals and semiconductors for novel magnetism in electronic circuits;
2. High power LEDs, transistors, and optoelectric properties of materials;
3. Nanomagnetism, high frequency switching, and spintronics;
4. Novel superconducting states/materials; and
5. New concepts for nanoscale sensors for magnetic and structural properties.

External collaborations involve faculty at Seagate, UNC-Charlotte, Boston University, LSU, FIT, and the University of Texas. The NSF, DOE, DARPA, ARO, and Seagate provide funding in the amount of \$650,000 to the RCoEE.

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New capabilities have been obtained by member of the team with the purchase of the following equipment for the RCoEE:

- Physical Properties Measurement System - \$300,000
- Atomic Force Microscope - \$150,000
- Femtosecond Pulsed Laser System - \$300,000
- High Vacuum System - \$75,000

Richard Webb and Thomas Crawford are supporting a combined research group of four Post Docs, two graduate students, and two undergraduate students within the RCoEE, and they have submitted five proposals within the last twelve months. Preparations for more proposals for additional funding are underway.

Brain Imaging

Cycle: 2002 – 2003

Award: \$5 million

Institution(s): USC/MUSC

PI: Gordon Baylis

See Attachment A

Polymer Nanocomposites

Cycle: 2003 – 2004

Award: \$3.5 million

Institution(s): USC

PI: David Pond

The Research Center for Economic Excellence (RCoEE) in Polymer Nanocomposites (PNC) currently resides in the University's Nanocenter at Sumwalt College. Ten candidates for the chair position are currently being evaluated, and the first interviews have begun.

The Nanocenter provides \$150,000 per year to support the PNC program which currently supports three graduate students and one postdoctoral fellow. Industrial funding from five companies has been received in the amount of \$175,000 to support the initial phases of the center, and funding has also been secured to build out 18,000 square feet of space in the Horizon I building to house the chair appointee, two junior hires, and the current PNC faculty

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participants. \$901,000 has been awarded by the US Air Force Research Laboratory (Wright-Patterson) to construct and evaluate novel polymer nanocomposite structure for application as high energy storage devices, and \$2 million worth of polymer processing and characterization equipment has been purchased to support the center's emerging program. USC has also provided bridge funding from its Centenary Plan to employ research faculty for up to three years to conduct targeted polymer synthesis and characterization projects until the chair is hired.

More than 20 relationships have been established with manufacturers, plastic processors, and end-use fabricators with facilities in South Carolina, and the center is currently receiving research funding from two and negotiating with two more. Marketing to key manufacturers throughout the US is underway, and the formation of a pre-competitive research consortium is being formed to evaluate the potential applications of inorganic and organic-modified inorganic nanomaterials to improve the performance of a variety of polyester (PET) polymers. The PNC center will continue to evaluate and improve the gas barrier properties (oxygen and carbon dioxide) of PET as embodied in the US and foreign-filed patent portfolio donated to USC by Eastman Chemical Company.

Hydrogen & Fuel Cell Economy

Cycle: 2003 – 2004, 2004 – 2005, 2004 – 2005

Award: \$2.5 million, \$2.5 million, \$3 million respectively

Institution(s): USC

PI: John Van Zee

The Center for Hydrogen and Fuel Cell Technology continues to enhance the reputation of the University of South Carolina with an impressive record of scholarly and creative endeavors. The center currently resides in the only NSF funded Industry/University Cooperative Research Center for Fuel Cells (I/UCRC), or "USC Center for Fuel Cells". The Future Fuels™ initiative is an aggressive initiative to expand the University's expertise in the area of fuel cells and alternative energy, and it is the top research priority at USC which has the potential to catapult South Carolina into a new economy.

Construction is currently underway on the Horizon Center, a \$55 million public and private facility where Future Fuels™ research will be focused and will include two buildings totaling 235,000 square feet and a parking garage. Semi-annual reports have been compiled with records of published papers and

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presentations made internationally and domestically by faculty members from the center, and ongoing collaborations within the state, nation, and abroad continue to promote and develop enhanced economic opportunities in the alternative energy industry.

Public and private sector alliances such as the South Carolina Hydrogen and Fuel Cell Alliance (SCHFCA) and the Greater Columbia Fuel Cell Collaborative work with the center developing demonstration projects and attracting companies and jobs to the state. The center also continues to increase the number of dues-paying members to the Fuel Cell Center. These members represent companies from all over the world who participate in semi-annual meetings with the University and offer an unprecedented gateway to research collaboration and scholarly interactions that foster innovation and knowledge transfer. International collaborations with the Korea Institute of Energy Research, the Fraunhofer Institute for Solar Energy in Germany and other collaborative endeavors have been solidified through MOU's, and more opportunities are in the pipeline. Liaisons have been identified within each partnership, and interaction with the Savannah River National Lab, the SCHFCA and Fuel Cell Collaborative facilitate the sharing of information with other institutions.

Since the inception of the Research Centers for Economic Excellence program, graduate level courses have been developed in electrochemistry, mathematical modeling, fuel cell engineering, and interfacial engineering. Two new research professors have been hired under the Future Fuels™ research initiative, and the opportunity for interaction among the industrial members of the USC Fuel Cell Center continues to attract excellent students to USC. A search committee is currently seeking and interviewing candidates to fill the three chair positions made available from the Hydrogen and Fuel Cell Economy Centers of Economic Excellence awards.

Solid Oxide Fuel Cells

Cycle: 2005 – 2006

Award: \$3 million

Institution(s): USC

PI: Michael Amiridis

The Center for Solid Oxide Fuel Cells will complete the university's four legs in the Future Fuels™ research initiative.

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The center is newly awarded. However, USC is actively engaged in recruiting a member of the national academy for the endowed professorship. Moreover, we are actively engaged in identifying research partners and endowment opportunities.

Travel & Tourism

Cycle: 2003 – 2004

Award: \$2 million

Institution(s): USC

PI: Patricia Moody

We have sought advice from the CIO of Marriott who is working on “next generation” software and is a potential partner. We have also sought advice from the former CIO of Starwood Hotels as we try to identify the right candidate to hold this chair.

The Provost of the University of South Carolina has funded the endowed chair position through the FEI program, and the College of Hospitality, Retail, and Sport Management will provide the remaining required funds. Coastal and USC will work together to fund a staff, including a software developer, through center funds and respective university funds. The staff will be hired when the Endowed Professor is determined.

The College of HRSM is in the process of assembling an outstanding group of tourism professors including one who is a Fulbright scholar and has been named one of the top thirty tourism researchers internationally. The College of HRSM has a technology program which is integrating some of its professors into this project as well. The college’s Associate Dean of Research and the Research Associate will spend some time working with this team.

The college is developing a Masters Degree in Hospitality Technology Management with cooperation between the School of Hotel, Restaurant, and Tourism Management and the Technology Support program. The faculty and students from this Masters program will work in conjunction with the center when it is up and running. In addition, the college is in the final approval stage of a separate Baccalaureate Degree in Tourism Management that will provide support via new professors. The College of HRSM is also developing a PH.D. program that will supply doctoral students who can work in conjunction with the center.

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We believe this center has great potential to collaborate with major corporations and to secure contracts in the area of tourism around the world. We are building international collaborations with universities and Ministers of Tourism in several countries including China, Uruguay, Guatemala, Brazil, and others in which future projects and collaborations can take place. Several faculty members and the Dean of HRSM will travel to Uruguay in November to meet with the Minister of Tourism and the leading public university. One of the agenda items is the delivery of the Masters in Tourism Technology.

We are laying the foundation in preparation for securing the Endowed Professor who will then begin leading the project and forging relationships. We are still in the process of selecting the Endowed Chair to lead this Center. Along with Coastal Carolina, we have formed a search committee. At this point, we have brought one candidate to campus who is internationally known in this area and is Greek by birth. In early November, we are bringing a professor who is reported to be the leading tourism technology researcher in the country to campus for an interview. Once we have the appropriate leader for this center, we will move forward with hiring a staff and setting an agenda. Our plan is to work in conjunction with major hospitality and tourism corporations to develop "next generation" software.

Childhood Neurotherapeutics

Cycle: 2005 – 2006

Award: \$6 million

Institution(s): USC/MUSC

PI: Rosemarie Booze

The Childhood Neurotherapeutics Program directors from USC, MUSC and GHS have been meeting and discussing the recruitment strategies for the endowed chair professorships. Scientific partnerships have been initiated in the area of Childhood Neurotherapeutics between USC and MUSC. Critical scientific studies of neural precursor cells have been designed which require interfacing between USC, MUSC and GHS. Additional grant funding has been applied for based on the Center interactions.

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Healthcare Quality

Cycle: 2005 – 2006

Award: \$5 million

Institution(s): USC/MUSC/Clemson

PI: Robert McKeown

The Center for Healthcare Quality will be an economic force that leads SC toward national prominence in a new era Health Sciences South Carolina (HSSC) members and from the Duke endowment will ensure the center gets off to a fast and robust beginning. The information technology on which the center is based is already attracting commercial interest.

Institutions have appointed joint-working groups in translational research, medical informatics, and the data portal. Discussions have begun to identify potential network, processing, and storage opportunities with IBM, Collexis, and HealthPathways.

The nature of the HSSC collaborative and the inter-institutional committees and working groups are the initial means of sharing across institutions. The IT infrastructure will facilitate much more efficient time-sensitive and case-effective means of inter institutional and public-private collaboration.

UNIVERSITY OF SOUTH CAROLINA
 RESEARCH CENTERS OF ECONOMIC EXCELLENCE
 FINANCIAL STATUS REPORT
 JUNE 30, 2006

	Part 1			Part 2a				Part 2b		
	Private	State-Match	Total	Endowment Earnings	Non-endowed Gifts	Grants	Other	Total	Endowment Earnings	Non-endowed
Center of Excellence										
Nanofabrication	\$ 1,686,811	\$ 1,370,000	\$ 3,056,811	\$ 425,281	\$ 250,000	\$ 86,732	\$ -	\$ 762,023	\$ 158,851	\$ 172
Brain Imaging	\$ 1,382,292	\$ 500,000	\$ 1,882,292	\$ 25,481	\$ -	\$ 868,006	\$ -	\$ 991,487	\$ 29,342	\$ -
Polymer Nanocomposites	\$ 367,265	\$ 1,192,820	\$ 1,560,185	\$ 79,251	\$ -	\$ 1,278,520	\$ -	\$ 1,357,771	\$ 10,158	\$ -
Hydrogen Fuel Cell Economy I and II		\$ 1,114,145	\$ 1,114,145	\$ 32,453	\$ -	\$ 1,486,125	\$ -	\$ 1,528,578	\$ -	\$ -
Travel and Tourism Technology	\$ 825,000	\$ 800,000	\$ 1,625,000	\$ 36,577	\$ -	\$ -	\$ -	\$ 36,577	\$ 17,056	\$ -
Fuel Cells/Hydrogen Economy										
Solid Oxide Fuel Cells										
Childhood Neurotherapeutics										
Center for Healthcare Quality										
	\$ 4,361,368	\$ 4,777,065	\$ 9,138,433	\$ 599,033	\$ 250,000	\$ 2,881,377	\$ 868,006	\$ 4,878,416	\$ 215,407	\$ 172