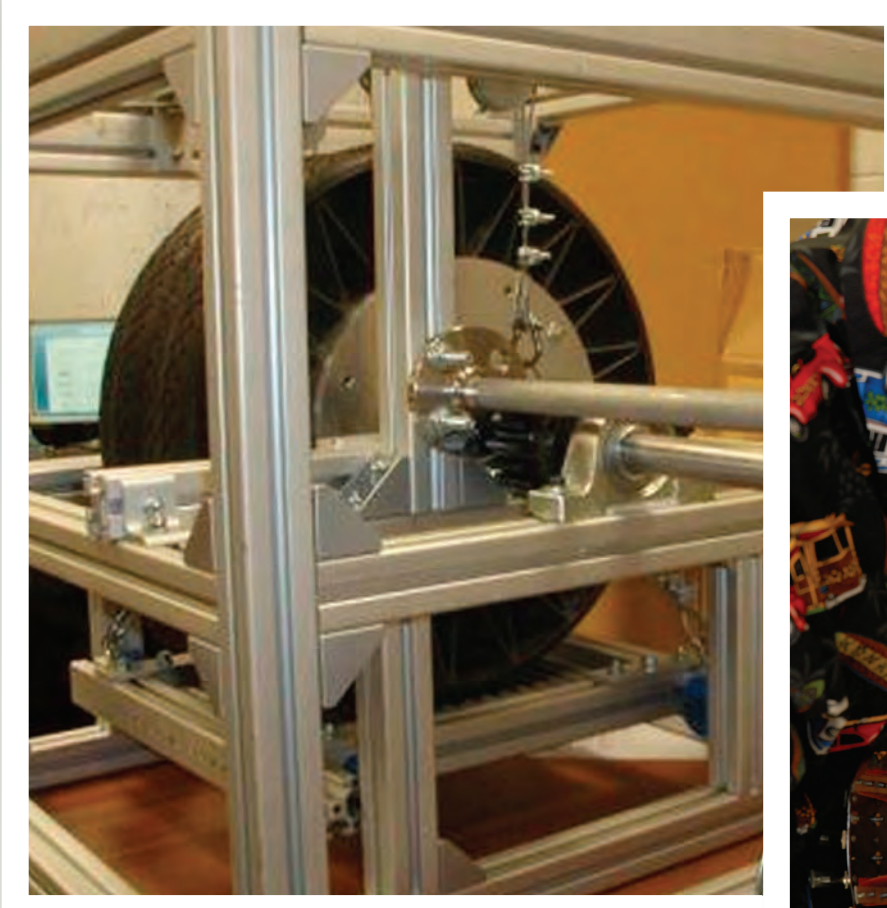


South Carolina EPSCoR/IDeA Transformative and Translational Research

Space



Dr. Joshua Summers and Clemson University



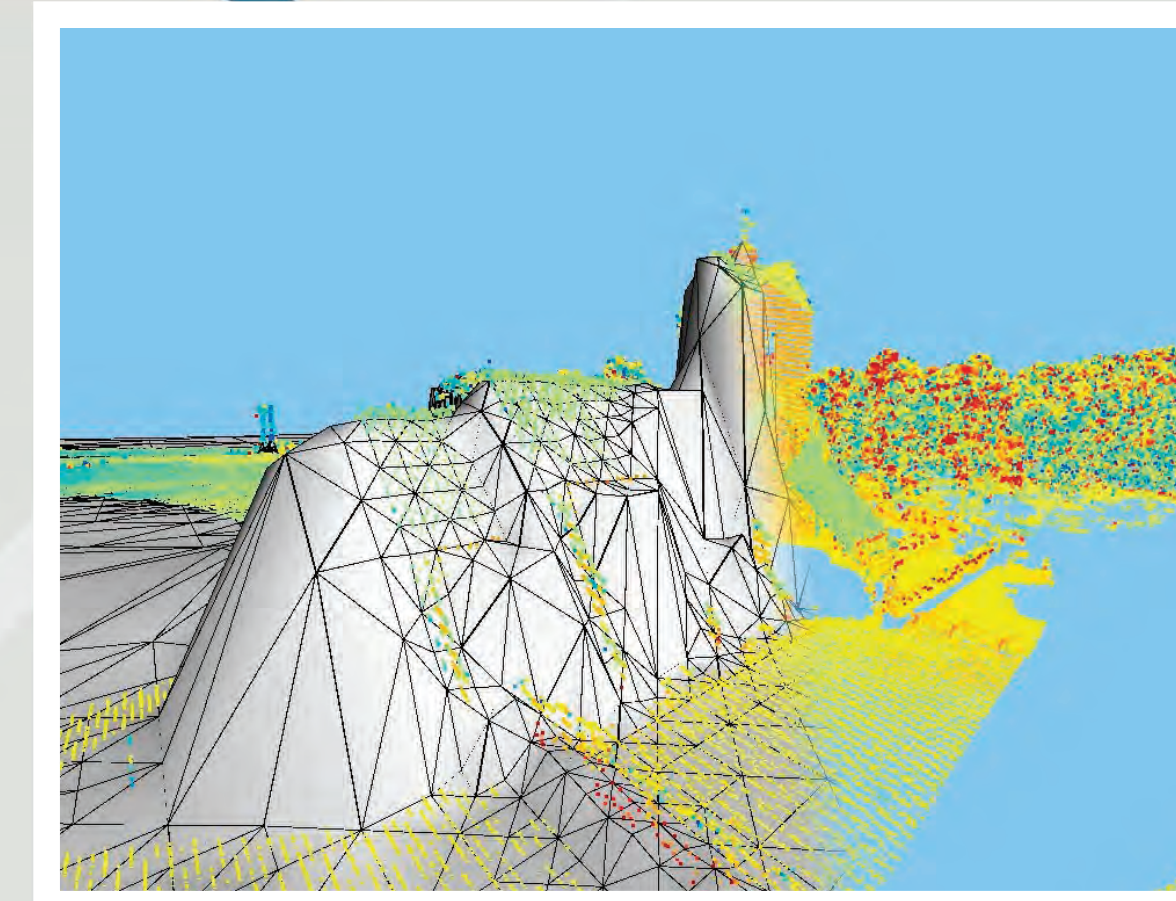
Clemson University

EPSCoR/IDeA researchers at Clemson University are working in collaboration with Michelin, Milliken and the NASA Jet Propulsion Laboratory to design and test useful and efficient wheels for space vehicles. These wheels are comprised of spokes made with high-strength material and a replaceable outer tread that provides uniform pressure across the surface to prevent sinking in softer terrain and to allow for greater traction. Rovers equipped with these new wheels will enable astronauts to explore a variety of extraterrestrial environments.

This research spun out of a senior design class project, for which Clemson mechanical engineering students developed new ideas for creating metallic replacements for rubber wheels. The researchers have designed testing equipment and computational models to learn more about the endurance limits of the Michelin-manufactured lunar wheels. This research could lead to improved tread materials that are able to withstand abrasive terrain.

The images show the cryogenic testing equipment developed to test the manufactured lunar wheels (left) and Dr. Joshua Summers and undergraduate Samantha Thoe inspecting the metallic prototype (right).

Defense and Homeland Security

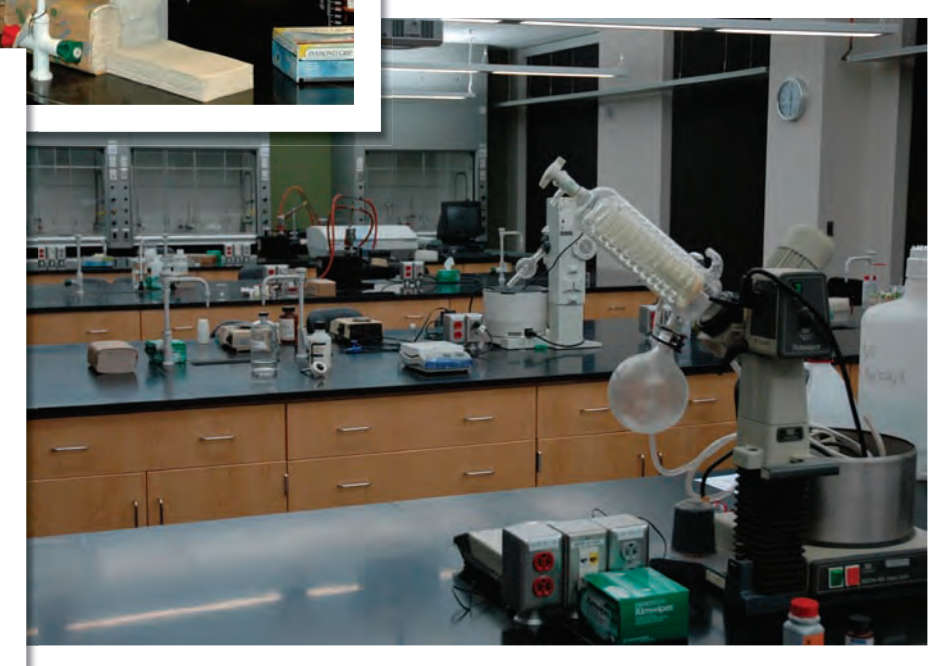


Dr. Ronald DeVore and the University of South Carolina (Raw Sensor Data: AFRL/MNG VEAA Data Set #1)

With EPSCoR/IDeA support, the Industrial Mathematics Institute at the University of South Carolina is developing new processing techniques that can delve into data sets and immediately extract useful data. Industrial societies rely on information buried in enormous amounts of data that carry extremely fine detail. The usefulness of this data rests on the ability to extract (in real-time) the embedded information that is essential to a given mission. The current state of the art in data processing is far from providing the efficient and faithful representations required in most applications. The size and resolution of data sets is growing at a significant rate, making it more difficult to use this data effectively by hindering immediate comprehension and response. The impact of this effort will be felt in national security and defense applications, such as autonomous vehicle navigation, mission planning and assessment, as well as in several commercial sectors. Students involved in this research are exposed to state-of-the-art processing techniques and their use in military and civilian applications.

The image shows a church and surrounding terrain derived from a data set of points scanned by electronic sensors.

Science and Engineering Facilities

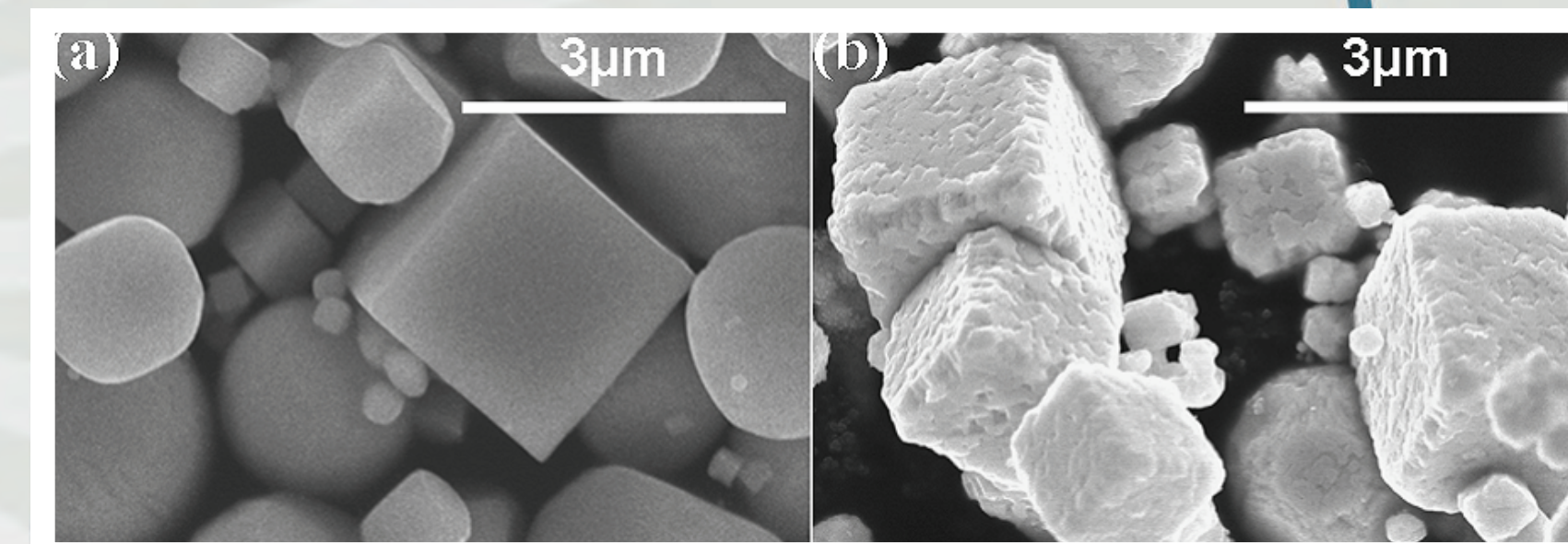


SC EPSCoR/IDeA

Furman University has expanded its capacity to train tomorrow's science and technology workforce with EPSCoR/IDeA funding and a prestigious Howard Hughes Undergraduate Science Education grant. This support, along with the construction of the \$62 million Townes Center for Science, allows undergraduate students to engage in advanced scientific research.

The new Townes Center (pictured here) expands opportunity for collaborative research with local technology-based companies and prepares Furman graduates as science professionals. As international technical and industrial commerce increases in South Carolina, the demand for a workforce versed in scientific research will rise dramatically.

Energy



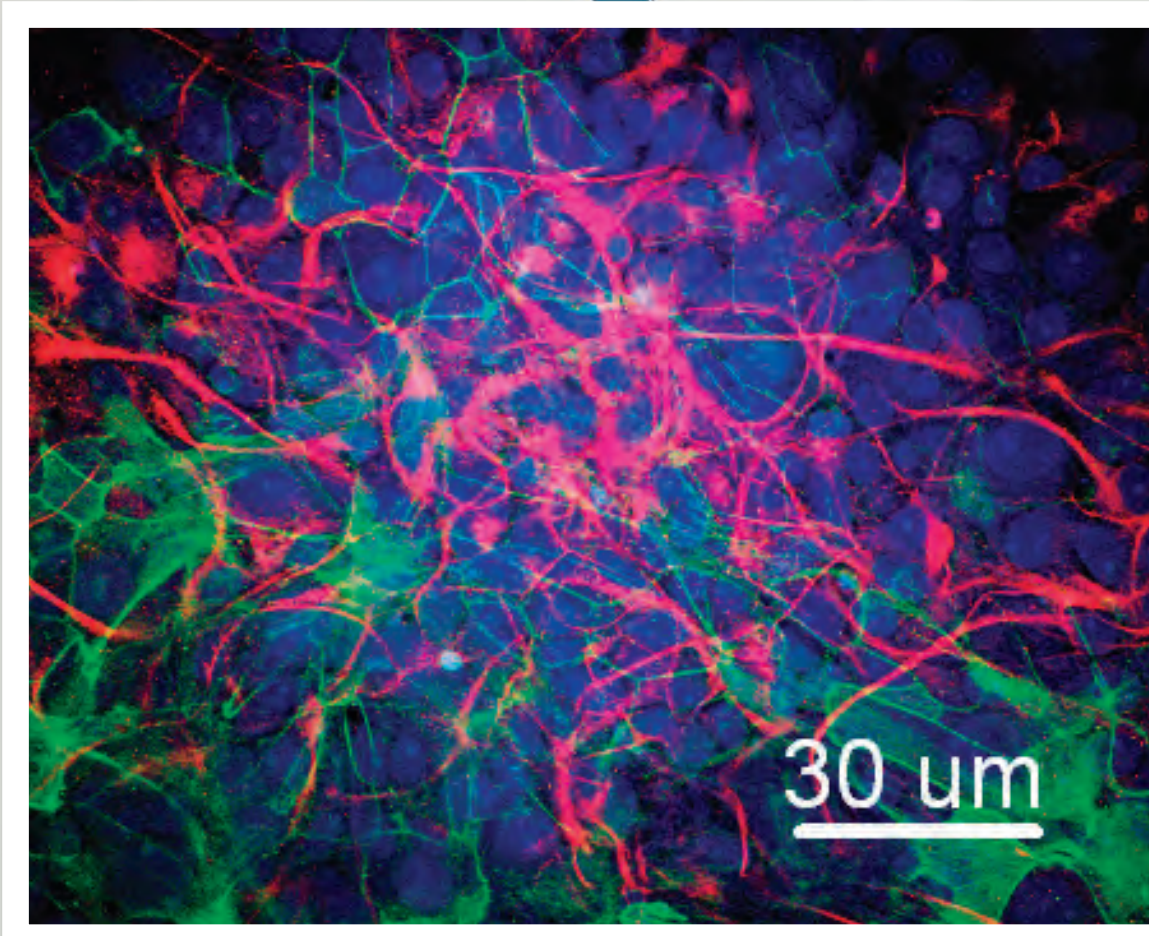
Dr. Terry Tritt and Clemson University

Researchers at Clemson University are investigating the thermal and electrical transport properties of new materials. These thermoelectric materials are used to recover waste heat from engine exhausts and turn heat energy into useful electrical energy. The recovered heat energy can supplement the demand for fossil fuels. The collection of heat energy using conductive materials could help streamline solar energy farms, making the process more viable for broad scale implementation.

South Carolina EPSCoR researchers are developing a Department of Energy research center in next generation thermoelectric materials for power conversion. Collaboration with Oak Ridge National Laboratory in Tennessee will allow students to garner education and training through interaction with professional scientists and sophisticated research facilities.

This electron microscope image depicts grown nanocrystals before (left) and after (right) they have been exposed to a hydrothermal process to improve their efficiency to conduct heat and electricity.

Health



Dr. Xuejun Wen and Clemson University

South Carolina EPSCoR/IDeA faculty are engaged in new biomedical technologies for regeneration of tissue and cells. Biofabrication, or layer-by-layer additive biomanufacturing, is a transformative concept that uses a scaffold-free, self-assembly approach to tissue engineering. South Carolina has exclusive strengths in this developmental biology-inspired approach.

Technology developed at the Medical University of South Carolina to regenerate dopamine neurons can be translated to the clinical setting for the treatment of Parkinson's, Alzheimer's and Huntington's diseases. Existing human cells are directed to transform into functional neuronal cells. The image depicts new dopamine neurons derived from directed cell generation.



SC EPSCoR/IDeA

Workforce Development

As part of the workforce development and diversity plans for South Carolina EPSCoR/IDeA, postdoctoral fellows gain valuable teaching experience at minority serving institutions. This improves their teaching skills for academic careers, while enhancing the research education of undergraduate students. The postdoctoral fellow brings contemporary research practices into the classroom under the guidance of a teaching mentor. Students increase their understanding of scientific methodology and expand their awareness of research as a career. Other outcomes include collaborative research opportunities between faculty at the undergraduate institutions and the visiting postdoctoral fellows. As one of the postdoctoral fellows described, "The internship helped diversify my resume because research and teaching are a winning combination in academia. Most of my colleagues in research don't have an extended experience in teaching. Thanks to the program, I started a research project with my teaching mentor and we are still working on the project I started there, which involves two undergraduate students."

The image depicts Dr. Angelica Rocha teaching a biology course at Benedict College, South Carolina's largest private historically black college.