TEES awards $1.5 million in seed grants to interdisciplinary research teams

Finding solutions to today's complex problems in areas such as energy, health and manufacturing requires researchers to think outside the box—and move outside their comfort zones—to collaborate with colleagues in other disciplines. To support and encourage faculty to engage in interdisciplinary research, the Texas A&M Engineering Experiment Station (TEES) has awarded $1.5 million in seed grants to 10 research teams at Texas A&M University.

"The work we are doing at Texas A&M is transforming lives, but in order to tackle the engineering challenges before us, we must first change our view of how we approach our research," said Dr. Dimitris Lagoudas, associate vice chancellor of engineering and deputy director of TEES. "These seed grants are our way of helping our faculty build outside relationships and support interdisciplinary teams so they can start work on creating mechanisms to solve the large-scale problems facing the world today."

The TEES seed grants provide researchers with enough funding to build a team and gain momentum so they can move forward with their research. As part of the proposal process, research teams were required to explain the big problems their research would address and how they planned to attract outside funding once the seed grant's two-year period ended.

"Historically, faculty prefer to work within their own discipline," said Dr. Costas Georghiades, associate agency director for strategic initiatives and centers for TEES. "But there is much we can learn from our colleagues in other disciplines, and by working together, we can use our collective expertise to find solutions to some of the most complex problems facing the world today. These seed grants are intended to incentivize faculty to work on such multidisciplinary projects."

A cross-university team reviewed 47 submitted proposals and selected 10 for funding. The funded research projects are:

"Collaboration for Modeling and Characterization of Cementitious Materials"
Principal investigator (PI): Dr. Zach Grasley, Department of Civil Engineering. Co-principal investigators (co-PIs): Dr. K.R. Rajagopal, Department of Mechanical Engineering; Dr. Eyad Masad, Texas A&M University at Qatar; Dr. Jay Walton, Department of Mathematics; and Dr. Philip Park, civil engineering.

Research Focus:The team is focusing on one of the engineering grand challenges for the 21st century: restoring and improving urban infrastructure. At the heart of this infrastructure is cementitious materials (building materials), which are the most widely consumed material in the world after water. However, these materials for infrastructure have not changed much in over 200 years. The objective of this project is to generate proof of concept for the application of computational material science and fundamental material model development to transform cementitious materials development, ultimately enabling the design of sustainable civil infrastructure.

"Collaboration for Microbiosystem Innovation, Design and Science (MIDAS)" PI: Dr. Arum Han, Department of Electrical and Computer Engineering. Co-PIs: Dr. Arul Jayaraman, Department of Chemical Engineering; Dr. Byung-Jun Yoon, electrical and computer engineering; Dr. Thomas A. Ficht, College of Veterinary Medicine and Biological Sciences; and Dr. Paul de Figueiredo, Dr. James E. Samuel, Dr. Robert C. Alaniz and Dr. Koichi Kobayashi, Texas A&M Health Science Center (TAMHSC).

Research Focus: Researchers have long recognized the importance and economic impact of microbial communities, but the understanding of the principles underlying their formation and sustenance is limited, namely because existing technologies cannot adequately address the formidable technical challenges associated with investigating these unique and rich biological resources. MIDAS researchers hope to advance the study of microbial communities through the development and use of microsystems technologies (e.g., microbial-communities-on-a- chip, lab-on-a-chip) that enable high-throughput, accurate, flexible, and low cost analysis and control of microbial communities in the laboratory.

"Materials Genomics of Phase Transforming Multi-functional Materials"
PI: Raymundo Arroyave, Department of Materials Science and Engineering. Co-PIs: Dr. Ed Dougherty, electrical and computer engineering; Dr. Ibrahim Karaman, materials science and engineering; Dr. Rodolfo Aramayo, Department of Biology; and Dr. Turab Lookman, Los Alamos National Laboratory.

Research Focus:The Materials Genome Initiative (MGI) proposes the reduction in cost/time associated to materials development through the integration of high-throughput experiments, simulation and informatics. The team will develop preliminary research on the development of novel informatics tools, information infrastructure, advanced high-throughput computational methods and state-of-the-art

October 28, 2014

By: Amy Halbert

Tagged as: research

experimental synthesis and characterization to understand the relationships between the structure and the properties in phase-transforming multi-functional materials for sensing, actuating and energy conversion applications.

"Energy Cyberphysical Systems (ECPS): Experimental Open Source Ecosystem (EXPOSE) for Synchrophasor Research"
PI: Dr. Mladen Kezunovic, electrical and computer engineering. Co-PIs: Dr. Chanan Singh, Dr. P.R. Kumar, Dr. Alex Sprintson and Dr. Le Xie, electrical and computer engineering; Dr. Erick Moreno-Centeno, Department of Industrial and Systems Engineering; and Dr. Radu Stoleru, Department of Computer Science and Engineering

Research Focus:The development of the smart grid requires new technologies and techniques be integrated with existing infrastructure for monitoring, control and protection of the electric grid. However, these solutions must be tested before being integrated into our electric grid. This project will create a testbed for this integration at a level that does not currently exist. This testbed, housed in the Texas A&M Engineering Experiment Station's Smart Grid Center will be available to researchers around the world, both for onsite and virtual use.

"Establishment of a Cytotherapeutic Discovery Pipeline"
PI: Dr. Roland Kaunas, Department of Biomedical Engineering. Co-PIs: Dr. Carl Gregory, TAMHSC; Dr. Jun Kameoka, electrical and computer engineering; Dr. Akhilesh Gaharwar, Dr. Melissa Grunlan and Dr. Daniel Alge, biomedical engineering; and Dr. Brian Saunders, veterinary medicine and biological sciences.

Research Focus:The research team is looking at bone and cartilage repair and will establish collaborations between biomedical and electrical engineering, regenerative and veterinary medicine, and orthopedic surgery to explore the development of advanced manufacturing of injectable materials that mimic the osteogenic niche for bone regeneration. Currently, of the 13 million yearly bone fractures in the United States, about 10 percent fail to repair. This is caused by many reasons including widespread diabetes or osteoporosis, which interferes with healing of bones or joints after injury.

"Nanomaterials and Devices in Extreme Environments"
PI: Dr. Xinghang Zhang, mechanical engineering. Co-PIs: Dr. Haiyan Wang, electrical and computer engineering; Dr. Lin Shao, Department of Nuclear Engineering; Dr. Indranil Roy, Schlumberger

Research Focus:The mission of this team is the revolutionary design and discovery of nanostructured metallic, ceramic and semiconductor materials that can be applied in extreme environments. The three major research thrusts are: nanomaterials and devices under highly corrosive environments, in collaboration with Schlumberger; nanomaterials and devices under extreme radiation environments in collaboration with two of DOE national labs; and nanomaterials under high magnetic field. This research will have application to local oil and gas industries, which tend to reply on advanced materials for high pressure, high temperature corrosive environments.

"Big Data Enabled Proactive Alarm Management of Power Control Equipment"
PI: Dr. Yu Ding, Department of Industrial and Systems Engineering. Co-PIs: Dr. Erick Moreno-Centeno, industrial and systems engineering; Dr. P.R. Kumar and Dr. Narasimha Reddy, electrical and computer engineering; and Dr. Bani Mallick and Dr. JianHua Huang, Department of Statistics.

Research Focus: The electric power grid is more than 100 years old. With the increase of technology, electricity demand has increased, and integration of renewable generation sources has added complexity to the system. These and other factors have led to the move to a smart grid to provide the electricity power needs for the 21st century. However, in a system this complex many problems, which trigger alarms, can occur. Alarm management is about detecting anomalous events as early and as accurately as possible. However, current alarm management is reactive in nature and suffers from the so-called alarm flood problem: the simultaneous activation of many alarms, most of them false, overwhelming the decision function of the alarm management system. This problem requires an interdisciplinary team with big data capability to address challenges in alarm management of mission critical power control equipment.

"Design and implication of novel in situ techniques for studies of advanced functional materials for energy applications"
PI: Dr. Hayian Wang, electrical and computer engineering. Co-PIs: Dr.Xinghang Zhang and Dr. Andreas Polycarpou, mechanical engineering; Dr. Ibrahim Karaman, materials science and engineering.

Research Focus:The development of new materials for energy harvesting and storage applications is at the forefront of scientific research. The ability to study materials in situ at nanoscale or at atomic scale under various environments will lead to breakthrough in understanding of fundamental materials mechanics, physics and chemistry issues in these materials. The materials of interest in this proposal include metallic materials of interest to oil and gas industry, phase transforming materials, such as shape memory alloys and multiferroic materials; materials for battery applications and tribological coatings.

"In silico modeling of microbiota-gut epithelial cell interactions for predicting dietary supplement impact on gut health"
PI: Dr. Ulisses Braga-Neto, electrical and computer engineering. Co-PIs: Dr. Xianoning Qian, electrical and computer engineering; Dr. Robert Chapkin, Department of Nutrition; and Dr. Ivan Ivanov, veterinary medicine and biological sciences.

Research Focus:This project seeks to generate a co-regulatory model of gut microbial actions by looking into the microbial communities and their interactions with gut epithelial cells. Such a model would be a valuable tool in identifying critical dietary risk factors in colorectal cancer (CRC), which several epidemiology studies have suggested is an important risk factor. This team will develop the theoretical framework for modeling the complex gut ecosystem; implement this framework as a software package in the proposedin silicostudies; and validate the models using real data sets from an ongoing human diet supplementation trial.

“Collaboration for Healthy Active Living”
PI: Dr. Tracy Hammond, computer science and engineering. Co-PIs: Dr. Samuel Towne, Dr. Yan Hong and Dr. Marcia Ory, TAMHSC; Dr. Daniel Goldberg, Department of Geography; and Dr. Samuel Forjuoh, Scott and White Health, Temple.

Research Focus:The Collaboration for Healthy Active Living will develop, test and deploy new techniques and strategies that exploit this new ecosystem of data, services, and sensors to improve public and individual health. The core mission is to engineer technologies and techniques for data collection and analyses, facilitate new forms of health research and analyses, and enable novel lines of health interventions, monitoring, and promotion for targeted populations of at-risk individuals.