

WTAMU Receives MRI Grant for Nanotechnology Research

CANYON, Texas—For the second consecutive year, West Texas A&M University is the recipient of a Major Research Instrumentation (MRI) grant, totaling more than \$230,000 from the National Science Foundation. The grant will be used to purchase a high-temperature X-ray diffraction system (HT-XRD) for research on nanotechnology and resilient-building materials.

The equipment will be housed in the University's new core lab in the Palo Duro Research Facility and will allow researchers to investigate material properties under controlled temperature and pressure conditions. Construction of the new lab is under way and should be completed by fall 2015. The XRD is a critical tool in the development of new materials, increasing the lifespan of materials and

improving production processes. The addition of the XRD will support research on nanoaluminum, nanodiamonds and resilient materials and infrastructure while enhancing the research experience for a regional, emerging Hispanic Serving Institution and more than 1,500 K-12 and higher education students.

"The XRD is a critical piece of equipment for engineers as we develop novel materials for the future," Dr. Emily Hunt, principal investigator and professor of mechanical engineering, said. "Our research faculty is active and growing, and we will continue to see cutting-edge materials developed at WTAMU."

The grant will be administered under the direction of Hunt and WTAMU faculty

members Dr. Oliver Mulamba, assistant professor of mechanical engineering, Dr. Kenneth Leitch, assistant professor of civil engineering, and Dr. J. Arn Womble, assistant professor of civil engineering. Collaborators are Dr. Matt Jackson, assistant professor of mechanical engineering, Dr. Erick Butler, assistant professor of environmental engineering, Dr. David Parker, professor of environmental science and engineering, Dr. Nathan Howell, assistant professor of environmental engineering, Dr. Gerald Chen, associate professor of engineering technology, and Dr. Jim Rogers, associate professor of environmental science.

After the XRD is installed, the principal investigators and collaborators will focus on nanoaluminum, nanodiamonds and resilient infrastructure in

three initial research projects.

• **Nanoaluminum**— Researchers will use the XRD to measure stress states at the nanoscale to determine how manipulation affects particle reactivity. The research could lead to advances in nanoaluminum energy storage capabilities.

• **Nanodiamonds**— The XRD will be used to study the high bond energy of the nano-sized diamond and the effect of its surface when used as an additive in metallic mixtures. The alloys may enable advances in aerospace applications, where weight and temperature resistance are vital and may hold promise for prosthetics and implant technology.

• **Resilient Infrastructure**— The XRD will be used to probe atomic distances and provide

information at the microscale about the structure of infrastructure materials. By analyzing structures before and after damage, it is possible to estimate wind loads, ground accelerations and blast intensities structures can withstand. Data could lead to the development of structural materials optimized for use in areas with high probability of natural and man-made hazards.

"I am very excited about the opportunities that this type of equipment provides to our current and future students," Hunt said. "All of our undergraduate engineering students will be able to use the XRD for materials analysis both in their classes and for undergraduate research. This type of equipment is one of the building blocks for a graduate program in engineering."

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