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UNF Awarded Distinguished NSF Grant for High-Tech Molecular X-Ray Diffractometer

Faculty researchers in the Department of Chemistry and the Department of Physics at the University of North Florida were recently awarded a grant from the National Science Foundation's Major Research Instrumentation program, a notable award for the University since only one in five proposals are selected for funding.

"This grant advances UNF's goal of developing interdisciplinary collaborations necessary for tackling some of the most complex scientific challenges and is proof of the leading role of UNF as a research and education hub in Northeast Florida," said Dr. John Kantner, UNF associate vice president for Research. "It provides an unrivaled opportunity for our students to engage in experiential learning on state-of-the-art instrumentation and see the future of cutting-edge research in action."

The research faculty team, led by Dr. Christos Lampropoulos, UNF assistant professor of chemistry, was awarded $407,491 to support the purchase of a single-crystal X-ray diffractometer, which is a high-tech instrument used for determining the structure of small molecules and macromolecules. It will allow researchers to identify the positions of atoms within the molecular structure, as well as the bonds between the atoms and many other details.

"X-ray crystallography is a fundamental analytical method and with this instrument we can understand how materials are built on the atomic scale. Thus, it is a necessary tool for developing new materials with novel properties," said Lampropoulos.

Single-crystal X-ray diffractometry is the ultimate structural characterization method for chemical compounds and molecular materials, providing information about bond lengths and angles, and the 3-D picture of molecules, polymers and even proteins. For solid-state materials, it allows for better understanding/tweaking the materials' properties through the identification of structural defects and asymmetry at the atomic level.

The research efforts that this high-tech instrument will enable include investigations in new materials and their applications in memory storage devices, energy harvesting, gas storage and delivery, sensors, as well as drug delivery and catalysis. The team's research projects span all STEM disciplines, including chemistry (inorganic/materials chemistry, organic/organometallic

chemistry, and chemical education), condensed matter physics, and the general area of materials science and engineering.

This new instrument will be used for more than just faculty research. It will also be accessible to UNF undergraduates for educational STEM training and hands-on participation in cutting-edge research. Additionally, the instrument will be incorporated in both the chemistry and physics undergraduate curricula, outreach activities both for the general public and for high school students and teacher education events on the UNF campus.

The interdisciplinary collaborations built around the XRD will additionally engage faculty and student collaborators at the Mayo Clinic, Florida Institute of Technology, Jacksonville University, McNeese State University and Stetson University.

The UNF Department of Chemistry's mission is to provide excellent educational experiences in the classroom and in the laboratory at all levels and in all sub-disciplines of chemistry, with the goal to foster in its students a solid background in the foundational aspects, an understanding of the scientific methods of inquiry and an appreciation of the significance and relevance of chemistry in daily life.

UNF, a nationally ranked university located on an environmentally beautiful campus, offers students who are dedicated to enriching the lives of others the opportunity to build their own futures through a well-rounded education.

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