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UNF Professors Receive Prestigious RCSA Research Awards

Two University of North Florida scientists received a prestigious Cottrell College Science Award from the Research Corporation for Science Advancement (RCSA), a leading advocate for the sciences and a major funder of scientific innovation and of research in America's colleges and universities.

Southside resident Dr. Christos Lampropoulos, a UNF assistant professor of chemistry, and Mandarin resident Dr. Daniel Santavicca, a UNF assistant professor of physics, each received \$35,000 from RCSA, plus \$10,000 each in matching funds from the University to pursue their research.

"Barely 14 percent of proposals to this program are selected for funding, making these awards to Drs. Lampropoulos and Santavicca true testaments to the quality of their ground-breaking research and their considerable talents at engaging students in hands-on learning opportunities," said Dr. John Kantner, UNF assistant vice president for research in the Office of Research and Sponsored Programs. "This funding contributes to a growing research strength at UNF in nanotechnology, which has tremendous applications in everything from creating novel new materials for engineering to designing nano-scale sensing and delivery systems for medicine."

Lampropoulos and his students are investigating new materials that may prove valuable in the development of so-called "spintronic" devices and perhaps even point the way for new materials to create reliable quantum computers, which use the power of atoms to perform memory and processing tasks.

The next major step in data processing and communications may rely on the intrinsic "spin" of the electron—a quantum physics term relating to the electron's angular momentum—rather than its charge, the basis of today's computers and smart phones.

Lampropoulos and his students will attempt to synthesize and then investigate the structural, magnetic and other properties of these single-molecule magnets, looking

for ways to tweak their performance. They will also assemble these molecules much like Legos© to synthesize novel solid-state materials.

“We can learn a lot from these materials,” Lampropoulos said. “At the very least, we can use this information to better design spintronic devices and quantum computers in the future.”

Santavicca and his students are studying the electrical behavior of superconducting nanowires for applications in quantum electronics. These nanowires—with a cross-section about a million times smaller than a human hair—exhibit a property called kinetic inductance. As a result of kinetic inductance, a slight change in the current flowing through the wire will induce a corresponding voltage. The nonlinear relationship between this current and voltage creates many interesting device applications, noted Santavicca.

Studying quantum effects in tiny bits of matter requires minimizing the tendency of energy to dissipate, a phenomenon exacerbated by the motion of molecules (heat) through which the energy flows. Therefore, superconductors, which are chilled to near absolute zero, provide a stable platform for the study of quantum electronics.

“This research is intended to lay the groundwork for the development of quantum circuits based on superconducting nanowires,” said Santavicca. “Possible applications include amplifiers, mixers, oscillators, as well as quantum bits, the building block of a quantum computer.”

Both professors received their awards under RCSA’s Cottrell College Science program. It was created in the early 1970s to promote basic research as a vital component of undergraduate education at the nation’s public and private small colleges and universities. RCSA was founded in 1912 and is the second-oldest foundation in the United States (after the Carnegie Corporation) and the oldest foundation for science advancement.

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 -rounded education.

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