Professor Sarah Finkeldei wins $4.3 million DOE grant to push nuclear energy research into the future

The grant will help a UCI-lead team study the properties of materials in next-gen reactors.

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Professor Sarah Finkeldei and Professor Shen Dillon in UCI's Nuclear Reactor Facility in Rowland Hall, getting ready to send a sample down to the reactor core for irradiation experiments.

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Lucas Van Wyk Joel

Professor Sarah Finkeldei of the UC Irvine Department of Chemistry, in collaboration with fellow scientists at UCI and Los Alamos National Laboratory (LANL), was just awarded a $4.3 million grant from the U.S. Department of Energy that will facilitate fundamental research on the properties of advanced nuclear energy materials with the aim of understanding how they behave in advanced nuclear reactors. The grant came from the DOE's Office of Basic Energy Sciences, which put out a call for fundamental research proposals for Chemical and Materials Sciences to Advance Clean Energy Technologies and Low-Carbon Manufacturing. It's part of the broader effort to decarbonize the U.S energy sector over the coming decades, and nuclear energy is one of the energy sources the DOE expects will play a major role in helping society make the switch to cleaner energies. Finkeldei, alongside Professor Shen Dillon of the UCI Department of Materials Science and Engineering, will study how radiation, extreme temperatures and stress impact materials in nuclear reactors. "It is of critical importance to gain fundamental understanding how these extreme conditions impact key behavioral properties that could lead to materials' degradation," said Finkeldei. "There is fairly little understanding about fundamental properties in materials at what we call grain boundaries — interfaces that exist between the microscopic crystallites that make up the materials we're interested in." Finkeldei explained how researchers expect the next generation of nuclear reactors to operate under extreme conditions for many decades, and so understanding how materials used in those reactors can degrade over time is key to their long-term stability. "We need to know how advanced fuels are going to behave during their lifetime in a reactor, and how to design materials for next-generation nuclear reactors," said Dillon, who described how the team will be using the data gathered during experiments at UCI's Nuclear Reactor Facility and at the Ion Beam Materials Laboratory at LANL in computer simulations that will attempt to model the long-term behavior of these materials. The new grant will support not just nuclear materials chemistry research, but will broaden the UCI Department of Chemistry's nuclear science expertise by allowing for the hiring of three postdocs and two graduate students in Finkeldei and Dillon's labs. "We are gaining momentum that will position UCI among key players in nuclear materials research," said Finkeldei. "These are extremely exciting times."

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