UC SANTA BARBARA

THE Current

April 29, 2019
Sonia Fernandez

A Transuranic Explorer

Relative to the other elements on the periodic table, the actinides — found at the bottom of the table — are little-understood. And it's no wonder: That series, which includes well-known elements such as uranium, plutonium and thorium, are radioactive, which makes them difficult and dangerous to handle.

But as we contemplate a future of carbon-free energy, examine strategies for remediating our existing nuclear waste, consider new therapies for cancer and other devastating diseases, or generate more sophisticated materials, deepening our understanding of this somewhat mysterious group of elements has become essential.

UC Santa Barbara graduate student Selena Staun is poised to do just that. As one of 70 recipients of the latest U.S. Department of Energy (DOE) Office of Science Graduate Research (SCGSR) awards, Staun will have the opportunity to conduct research at Los Alamos National Laboratory, studying the behaviors of actinides and contributing to a foundation of knowledge that is vital for future science and technology.

"I am thrilled with Selena's selection for this award," said her thesis advisor Trevor Hayton, a professor in the Department of Chemistry and Biochemistry. "She is a very deserving candidate. Because of the high radioactivity of the transuranic elements, we cannot do this work at UCSB, and this award allows Selena to expand the scope and impact of her dissertation research. Her work at Los Alamos will allow chemists to make better predictions about the behavior of the actinide elements in the

environment.”

Staun has been working in the field of actinide chemistry since 2013, when she was an undergraduate at Purdue University in the laboratory of Suzanne Bart.

“I have come to realize actinide chemistry is still underexplored and I want to continue to help further this field by working on chemistry I am passionate about,” said Staun, who entered the chemistry doctoral program at UC Santa Barbara in 2016, joining Hayton’s research group.

As a participant in the program, Staun will continue her graduate student research in collaboration with a DOE laboratory scientist. The award funds support for inbound and outbound travel to the laboratory, and a monthly stipend of up to $3,000 for living expenses while at Los Alamos.

“I am looking forward to working alongside highly trained transuranic chemists, especially my mentor, Dr. James Boncella, at Los Alamos National Laboratory for an extended period of time,” said Staun, who in 2018 won the Outstanding Service to the Department Award. “I plan to expand my thesis research, synthesizing complexes with actinide-nitrogen (An-N) multiple bonds, to one of the minor actinides, neptunium (Np).

“Currently, only one Np-N multiply-bonded complex has been reported, showing how rare these complexes are and how much work needs to be done,” Staun added. “This research aims to increase our understanding of actinide-ligand bonding, which in turn is directly related to nuclear waste separation.” She is grateful to Hayton, she said, for “suggesting that I pursue this high impact opportunity that will allow me to grow as an actinide chemist by learning skills and training not obtainable at UCSB.”

The DOE SCGSR program seeks to prepare graduate students for science, technology, engineering or mathematics (STEM) careers critically important to the DOE Office of Science mission by providing graduate thesis research opportunities at DOE laboratories. The research projects proposed by the new awardees demonstrate strong alignment with the priority mission areas of DOE Office of Science that have a high need for workforce development.

“These graduate student awards prepare young scientists for STEM careers critically important to the DOE mission,” said U.S. Secretary of Energy Rick Perry. “We are proud of the accomplishments these outstanding awardees already have made, and look forward to following their achievements in years to come. They represent the

future leadership and innovation that will allow American science and engineering to excel in the 21st century.”

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.