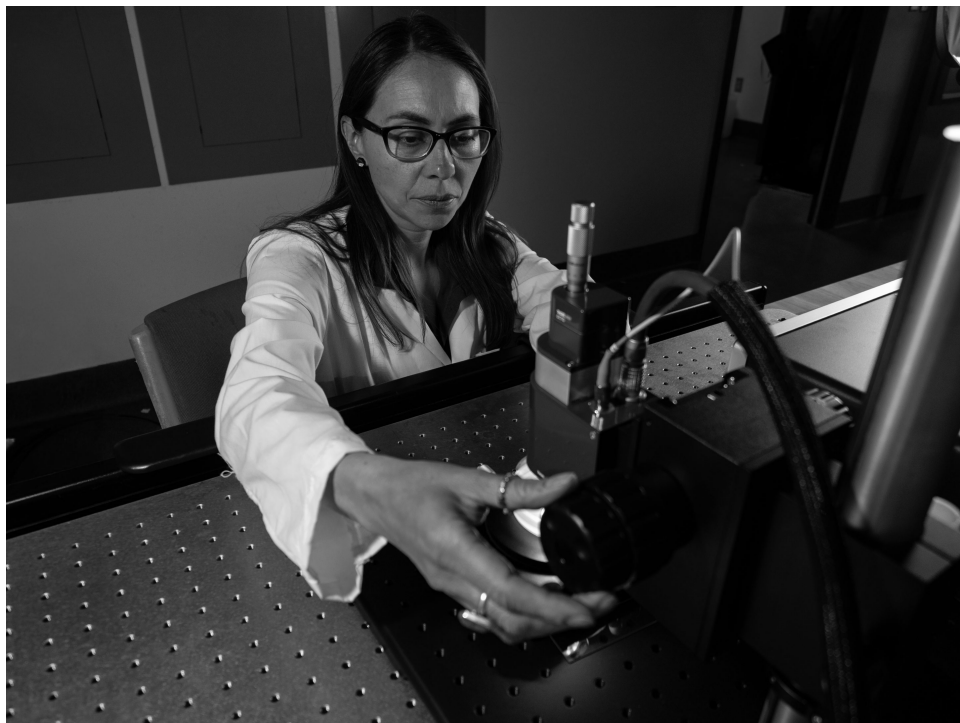


USU Researchers Receive Major Grant to Study Electrical Activity in Fungal Networks

07/15/2026

Fungi form extensive living networks that influence nutrient cycling, ecosystem resilience and environmental health. Despite their importance, fungi remain one of the least understood organisms on Earth.



Assistant Professor of Biological and Chemical Engineering Erika Espinosa-Ortiz received a \$900,000 grant to study the electrical activity of fungal networks.

Utah State University professor and researcher Erika Espinosa-Ortiz and her team received a \$900,000 grant from the W.M. Keck Foundation to explore if fungal networks use electrical activity to sense and respond in organized, meaningful ways.

"We know fungi exhibit electrical activity, but we don't understand if it has any kind of biological meaning or if it's just incidental," said Espinosa-Ortiz, an assistant professor of biological and chemical engineering and principal investigator of this project. "A big challenge is that we don't have the tools to properly study the electrical phenomena."

In prior research, groups have used needle-like electrodes to measure electrical activity in fungi, but their invasive nature can make the measurements less accurate. Other groups have used fluorescent dyes to visualize electrical events, but that technique also has limitations.

Espinosa-Ortiz and her team will develop a non-invasive tool, using genetically encoded fluorescent proteins. These proteins will change in brightness as a response to variations in electrical potential of the fungi cell membrane, allowing the team to see the electrical activity within the fungi.

The team will then record the electrical activity responses that occur when the fungal network is exposed to environmental and biological disturbances. This will generate large imaging datasets that show electrical activity over time. Machine learning tools will identify patterns and determine if specific disturbances are associated with distinct electrical responses.

"We want to see how signals emerge, spread and change across an entire network," Espinosa-Ortiz said. "That kind of information has not really been accessible in fungi, particularly at the network level."

Observing these signals could lead to new applications of fungal systems in areas such as environmental monitoring, agriculture and biotechnology. The imaging platform could also provide a new way to study electrical activity in other non-neuronal organisms.

The project is made up of multi-disciplinary experts.

Jixun Zhan, a collaborator from the biological and chemical engineering department at USU, will support the development of the fungal strains used in the study.

Utah State assistant professor of biological engineering Lukas Buecherl will contribute to genetic engineering approaches for implementing fluorescent proteins that make non-invasive imaging possible.

Venkatraman Siddharthan is a neuroscientist, microscopic imaging expert and senior researcher in the Animal, Dairy, and Veterinary Sciences Department at USU. He will lead the advanced live-cell imaging and continuous, non-invasive monitoring of electrical activity in fungal networks.

Yanqing Su, from the University of Oklahoma, has expertise in machine learning to develop tools for analyzing large-scale imaging datasets of fungal electrical activity when introduced to disturbances.

Espinosa-Ortiz started studying fungi in her Ph.D. program. She said fungi are often overlooked and challenging, but that's what she loves about them. She is the director of the [Fungal Biotechnology and Engineering Lab](#) that explores the application of fungal systems for bioremediation and the development of alternative bioengineered materials.

About the W. M. Keck Foundation

The W. M. Keck Foundation was established in 1954 in Los Angeles by William Myron Keck, founder of The Superior Oil Company. One of the nation's largest philanthropic organizations, the W. M. Keck Foundation supports outstanding science, engineering and medical research. The Foundation also supports undergraduate education and maintains a program within Southern California to support arts and culture, education, health and community service projects.

###

Writer: Libbie Anderson, [435-797-8361](tel:435-797-8361), libbie.anderson@usu.edu

Contact: Erika Espinosa-Ortiz, [435-797-2793](tel:435-797-2793), erika.espinosa-ortiz@usu.edu