



# Laboratory lands 2018 DOE Energy Frontier Research Center

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A Los Alamos-led proposal to better understand the links between radiation damage and corrosion in nuclear energy systems has received the green light to become a US Department of Energy 2018 Energy Frontier Research Center (EFRC). DOE funds these research centers to accelerate scientific breakthroughs that are needed to strengthen the United States' economic leadership and energy security.

FUTURE (for Fundamental Understanding of Transport Under Reactor Extremes) will explore the coupling of radiation damage and corrosion in order to predict irradiation-assisted corrosion in passivating and non-passivating environments for materials in nuclear energy systems. The knowledge will ultimately improve the performance and predictability of materials used in such systems. FUTURE's research supports the Laboratory's Energy Security mission area and its Materials for the Future science pillar through the creation of design principles, synthesis pathways, and manufacturing processes for materials with predictable performance and controlled functionality.

Blas Uberuaga (Materials Science in Radiation and Dynamics Extremes, MST-8) will be the EFRC director. Uberuaga, who has a PhD in physics from the University of Washington, joined Los Alamos as a postdoctoral researcher in Theoretical Division and became a staff member in Materials Science and Technology Division in 2004.

Peter Hosemann (University of California, Berkeley) is Uberuaga's codirector for FUTURE. The team is made of Los Alamos researchers Laurent Capolungo and Yongqiang Wang (MST-8), Edward Holby (Finishing Manufacturing Science, SIGMA-2), and Nan Li (Center for Integrated Nanotechnologies, MPA-CINT). The team's other researchers hail from Bowling Green State University; North Carolina State University; Pacific Northwest National Laboratory; University of California, Berkeley; University of Virginia; and University of Wisconsin, Madison.

Los Alamos has a distinguished history in EFRC discoveries, having led or been a partner in several since EFRCs were established in 2009. The Lab is partnered in four other EFRCs that were either named in 2018 or given extensions:

- **Center for Alkaline-Based Energy Solutions (CABES)** will research the nature, structure, and dynamics of electrocatalysis in alkaline media to enable advanced fuel cell technologies. The center is headed by Cornell University. Piotr Zelenay (Materials Synthesis and Integrated Devices, MPA-11) is the Lab's contact.
- **Center for the Advancement of Topological Semimetals (CATS)** will work to harness new functionalities of topological semimetals for transformative changes

in areas such as mid-infrared photodetection, light harvesting, and spintronics. Ames Laboratory is leading the project and Toni Taylor (Associate Directorate for Chemistry, Life, and Earth Sciences, ADCLES) is the Lab's contact.

- **Center for Molecular Magnetic Quantum Materials (M2QM)** intends to exploit the complexities of molecular magnetic systems as foundational ingredients for quantum computing, quantum electronics/spintronics, and revolutionary sensors at yoctowatt sensitivity. M2QM is headed by University of Florida, and Vivien Zapf (MPA-NHMFL) is the Lab's contact.
- **Precision Ion-electron Control in Solid State Storage (PICS3)** aims to develop the underlying science, from atomic scale interfaces to mesoscale architectures, that underpins 3D solid-state energy storage. The center is led by University of Maryland, College Park, and the Lab's contact is Jinkyong Yoo (Center for Integrated Nanotechnologies, MPA-CINT).

This year, DOE awarded \$100 million for 42 energy research centers. The current cohort of EFRCs, selected by competitive peer review, includes 22 new centers and the renewal or extension of 20 existing centers. The centers will help to accelerate scientific understanding in diverse energy-relevant fields including catalysts, electro- and photo-chemistry, geoscience, quantum materials, nuclear energy, and synthesis science.

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