

Research Development Fund – FALL 2019 Application Template
SUBMISSION DEADLINE: **Monday – March 30, 2020 at 12 noon CDT** to rdf@tamu.edu

****Applications that exceed page limits for any section or do not follow template will not be reviewed****

Application Title: *Acquisition of an EIKOS-UV Atom Probe*

Lead contact for RDF Application:

Name: Lin Shao and Kelvin Xie

Department: Nuclear Engineering and Materials Science and Engineering

Email address: lshao@tamu.edu and kelvin_xie@tamu.edu

Phone number: 979-845-4107 (LS) and 979-458-3184 (KX)

Key Participating Units: Materials Characterization Facility (MCF), Texas Engineering Experiment Station (TEES)

Anticipated Request Amount (\$): \$1,273,525

Executive summary of this application to utilize Research Development Funds:

The **objective** of this proposal is to acquire a UV-EIKOS atom probe to enable new research activities and to advance the characterization capability at TAMU. Atom probe tomography (APT) is a characterization technique that provides chemical and 3D spatial information of individual atoms in a material with sub-nanometer resolution. The acquisition of an atom probe will benefit the research of a large number of faculties on existing projects and enable new directions to generate additional funding. The new atom probe will be housed and managed by Materials Characterization Facility, and will be also be integrated in the DOE user facility, which is already serving the nuclear research community. The scientific advancement as well as the new service generated by the new atom probe will have a significant and positive impact on the ranking of TAMU in the areas of nuclear engineering, material science and engineering, mechanical engineering, electrical engineering, chemistry, and geoscience. The acquisition of an atom probe will also **enhance the research infrastructure** at TAMU. More specifically, the university has invested \$15M to the Nuclear Science Research Complex for the building and moving but with no advanced characterization capability. The atom probe will bridge this gap allowing both implantation and atomic-level characterization could be performed in-house at TAMU. Moreover, the new atom probe will complement the current characterization strength at TAMU, especially the Titan Themis-Z transmission electron microscope at MCF and Helios focused ion beam at AggieFab, which are generously donated by Hewlett Packard.

The acquisition of an atom probe is expected to greatly **improve the research at Texas A&M** by supporting the current research projects and enabling new research projects. The research areas include but not limited to nuclear, defense, automobile, energy storage, aerospace, tribology, and corrosion mitigation. At least 10 research teams from TEES and TAMU will be directly **benefited at the Brazos County locations**. In fact, the PI and co-PI of the proposal have been sending students to other institutes to perform atom probe experiments. The acquisition of an atom probe will help retaining research resources within TAMU. The results generated from the atom probe are expected to lead to high impact publications and to help create new proposals to generate **external funding** from NSF, DOD, and DOE. In addition, more and more atom probes have been purchase by high-tech companies, such as *Intel* and *Apple*. There is a strong need for material scientist to have expertise in APT. The co-PI (Kelvin Xie) is willing to develop a graduate-level course on atom probe tomography. The atom probe instrument and the expertise at TAMU will allow the training of future experts in materials characterization, making our graduate students more competitive for the leading research-intensive companies in the US. Since no atom probe is available in nearby institutions, researchers from Rice University, University of Houston, and UT-Austin are willing to travel to TAMU to use the atom probe for their research projects if this proposal is successful. Combined with the current characterization strength, the acquisition of the atom probe will elevate the TAMU to the highest level in the various areas of research, such as nuclear engineering and materials science. The requested atom probe will be located at MCF and available not only to the TAMU research community but also to researchers from other academic institutions and industry through the well-developed user programs at MCF and the DOE user facility program led by the PI (Lin Shao) of the proposal.