Enhanced Micro-analytical Capabilities of Irradiated Materials

Applicant Name: Oak Ridge National Laboratory

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ABSTRACT:

The Low Activation Materials Development and Analysis (LAMDA) Laboratory in the Materials Science and Technology Division of the Oak Ridge National Laboratory is a world-leading facility in the characterization of irradiated materials including metals, ceramics, graphite and novel composites. Several programs within ORNL's Materials Science and Technology Division utilize the LAMDA facility, with primary emphasis on the evaluation of irradiation materials. Current fission programs include the US Department of Energy, the Naval Reactor Advanced Structural Materials Program, the NE-Generation IV program, as well as international nuclear companies and research laboratories.

A core capability of the LAMDA Laboratory is the electron optic suite. This is comprised of several of microscopes that includes a three dual-beam focused ion beam (FIB) millers, two scanning/transmission analytical electron microscopes, and access to a local electrode atom probe – all capable of handling materials with no or low activity (up to 100 mR/hr at 30 cm).

The Materials Science and Technology Division requests funds to enhance these capabilities in support of current and future DOE projects, through the acquisition of systems to be added onto the state-of-the-art FEI Talos scanning/transmission electron microscope. These systems are a MEMS-based high-temperature, high-mechanical stability *in situ* experimental system for TEM and an on-axis tomography TEM holder for atom probe specimens. The implementation of an advanced laboratory information management system will also increase efficiency of the LAMDA Laboratory through better sample inventory tracking, and data sharing/management. The addition of these capabilities will enhance ORNL's capabilities for microstructural characterization of irradiated materials in support of DOE Fission programs. Through the LAMDA Laboratory's status as an ATR NSUF partner facility, these capabilities will also be available to University and National Laboratory researchers around the US, ensuring Nation-wide access and an enhanced teaching experience of graduate students.