

Upgrade of the IVEM-Tandem User Facility

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ABSTRACT:

The IVEM-Tandem User Facility at the Argonne National Laboratory is a world-leading research facility for *in situ* transmission electron microscopy (TEM) study of ion irradiation damage and ion implantation. It is supported by the Department of Energy (DOE) Office of Nuclear Energy through the Nuclear Science User Facilities (NSUF). It currently serves more than 30 active user groups from universities, national laboratories, and nuclear industry with about 30% over-subscription. To provide users with expanded capabilities for new science and discoveries, we propose two enhancements to the Facility: (1) to establish a dual-beam irradiation capability to enable the study of synergistic effects of heavy ion induced cascade damage and helium produced in nuclear environments. This will be accomplished by adding an existing low-energy ion gun and to-be-purchased auxiliary components and support structure; (2) to acquire a Gatan Model 652 *in situ* heating stage dedicated to radioactive samples to meet the increased demand in nuclear fuel studies and high-dose irradiation of neutron-irradiated samples, permitting safe specimen handling and experimentation. These enhancements will allow users to better address the scientific challenges of nuclear fuels and reactor materials that underpin the needs of sustainable nuclear energy.