General Scientific Infrastructure Support for the University of Wisconsin

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Program: General Scientific Infrastructure

ABSTRACT:

The University of Wisconsin Nuclear Engineering program has unique strength in experimental programs to develop nuclear technology, currently performing advanced nuclear research in support of multiple advanced concepts including high-temperature gas-cooled reactors, fluoride salt-cooled reactors, and sodium-cooled fast reactors. Currently, our students are involved in fourteen DOE (including NEUP and IRP) and three non-DOE projects which includes research on ion implantation-induced swelling and amorphization of silicon carbide, ion-induced microstructure change in uranium dioxide, radiation response of advanced nuclear fuels, radiation-induced segregation of iron-alloys, thermal-hydraulics, safety and materials science studies in water, sodium, helium, supercritical carbon dioxide, and molten salts.

To support these projects as well as to attract and teach new students interested in nuclear engineering, the department requests funds to purchase an implantation chamber with a sample stage equipped with the heating and cooling system and a few smaller items to make this chamber versatile and for the upkeep of the ion beam lab. The proposed purchases will allow for faster sample implantation and exchange, expansion of experimental parameters such as implantation temperature, flux, and area, as well as for better temperature stability during ion implantation. The new chamber is designed in a way which allows future expansion into a multipurpose experiment. The new infrastructure will increase the ion implantation productivity and will enable more efficient use of the available resources. The above proposed equipment upgrades will enhance our capabilities to train students in the important areas of heat transfer and materials science in nuclear systems and to couple our research with the national laboratory programs. Time saved on experiments and repairs will allow us to offer a one semester course on "Accelerators and Ion Beam Analysis", which will help us teach high quality undergraduates interested in nuclear engineering and materials science. It will also allow us to admit more students into our nuclear engineering Ph.D. program.