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THE ADVANCED TEST REACTOR NATIONAL SCIENTIFIC USER FACILITY: ADVANCING NUCLEAR TECHNOLOGY EDUCATION

J. Benson[1], T. Allen[1], J. Cole[1], and F. Marshall[1]
[1] Idaho National Laboratory, Idaho Falls, Idaho, USA
(PO Box 1625, Idaho Falls, ID, USA, 208-526-3841, jeff.benson@inl.gov)

ABSTRACT – To help ensure the long-term viability of nuclear energy through a robust and sustained research and development effort, the U.S. Department of Energy designated the Idaho National Laboratory (INL) Advanced Test Reactor and associated post-irradiation examination facilities a National Scientific User Facility (ATR NSUF), allowing broader access to nuclear energy researchers.

The ATR NSUF provides education programs including a Users Week, internships, faculty student team projects and faculty/staff exchanges. In addition, the ATR NSUF seeks to form strategic partnerships with university facilities that add significant nuclear research capability to the ATR NSUF and are accessible to all ATR NSUF users.

1. Introduction

The ATR NSUF Education Program seeks to create an engaged academic, industry, and national laboratory user community that is equipped to conduct nuclear energy research. The User Facility strategy involves increasing the number of individuals from universities/industry across the United States that use and support ATR NSUF, increase the depth and breadth of knowledge of irradiation materials science, and provides an increase in opportunities for cooperative scientific work conducted through the user facility.

ATR NSUF has implemented a number of programs to carry out this strategy. These programs include ATR NSUF Users Week, graduate and undergraduate internships, faculty and student research teams, University Partners Program, and the development of specialized short courses in fuels and materials, instrumentation, modeling, and irradiation experimentation.

2. Education Programs

The first component of the educational program is an annual ATR NSUF Users Week. For example, in June 2012, a week-long Users Week was offered to over 50 students, faculty, small business, and industry representatives. The Users Week featured an ATR NSUF capabilities overview, research forum, beginning and advanced fuels and materials course, reactor instrumentation workshop, and irradiation experimenter's course. Travel scholarships covering travel and expenses were awarded on a competitive basis for faculty and students.

In addition, ATR NSUF annually offers undergraduate and graduate students sponsored internships in materials, fuels, nuclear engineering, and nuclear operations. In the summer of 2012 ATR NSUF sponsored 9 student undergraduate and graduate internships.

The ATR NSUF has also instituted a Faculty Student Research Team program. The purpose of these teams is to engage students and faculty in a collaborative research effort with INL researchers. These teams are led by a faculty member from an accredited U.S. university and must include at least two students. Students and faculty from these teams spend up to 12 weeks at the user facility.

2.1 University Partnership Program

Recognizing that ATR irradiation space may become limited and that certain desired post-irradiation examination equipment may not be available at the INL or that equipment at the INL may become oversubscribed, the ATR NSUF initiated the Partnerships Program [1-4]. The Partnerships Program allows universities to self-nominate capability. If the ATR NSUF determines the nominated capability adds value toward meeting customer needs, the capability is added to the NSUF. Currently the ATR NSUF has ten partners/facilities that include: Illinois Institute of Technology-Advanced Photon Source, Massachusetts Institute of Technology- MITR research reactor, North Carolina State University- PULSTAR Reactor, University of Michigan-Ion Beam and Irradiated Materials Complex, University of Wisconsin- Ion Beam and Characterization Laboratory, University of Nevada Las Vegas- Radiochemistry Laboratory, University of California Berkeley- post-irradiation examination facilities, Oakridge National Laboratory- High Flux Isotope Reactor, Purdue-Interaction of Materials with Particles and Components Testing (IMPACT) facility, and Pacific Northwest National Laboratory-materials, fabrication and PIE labs.

2.2 University Research Experiments

University experiments are selected via a proposal submission and review process. The ATR NSUF publishes broad guidelines, generally corresponding to goals of DOE NE programs (Generation IV, Advanced Fuel Cycle Initiative, Light Water Reactor Sustainability), receives proposals submitted by universities throughout the year, and reviews and selects proposals twice a year. All proposal review is done via peer review to ensure the best science is selected. For those universities selected, the cost of the experiment is entirely borne by the NSUF. These university-led projects are expected to publish their results in the open literature. Since its inception in 2007 ATR NSUF has awarded 51 experiments.

4. Conclusions

ATR was designated as a National Scientific User Facility to allow for broader access to world-class facilities for nuclear energy research. The ATR NSUF also offers a wide range of educational programs. These programs include internships, annual user week, faculty student research teams, and faculty/staff exchanges. In addition the ATR NSUF will form strategic partnerships with other university/lab research facilities to increase overall capability and facilitate the advancement of nuclear science and technology.

5. References

[1] For a more complete discussion of ATR and post irradiation capabilities, the ATR National Scientific User Facility User Guide and the Post Irradiation Examination Capabilities Guide are available at: http://atrnsuf.inl.gov/

[2] Reactor Capabilities (http://atrnsuf.inl.gov/Capabilities/Reactors/tabid/65/Default.aspx)

[3] Post Irradiation Examination Capabilities (http://atrnsuf.inl.gov/Capabilities/PostIrradiationExamination/tabid/101/Default.aspx)

[4] Beam Line Capabilities (http://atrnsuf.inl.gov/Capabilities/BeamLines/tabid/131/Default.aspx)

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