



Accomplishments and Look-Ahead

November/December

- November 15 – 19, 2009, ATR NSUF exhibit at Winter ANS Meeting
- November 24, 2009 – Awarded four proposals for experiments to be performed using the Advanced Photon Source at Argonne National Laboratory. Projects were awarded to Meimei Li of Argonne National Laboratory; Maria Okuniewski of Idaho National Laboratory; Jeff Terry of Illinois Institute of Technology; and Donald Reed of Los Alamos National Laboratory. Experiments for Li and Terry were performed the first week of December. Publications on the research are planned by Lin in FY 2010.
- A subset of samples from the University of Florida and the University of California, Santa Barbara were removed and shipped to the Materials and Fuels Complex (MFC) for post irradiation examination. The remaining samples from these two experiments will be removed in July.

January

- Award of 3 new proposals received in the Fall 2010 Solicitation. Projects were awarded to Donald Olander of the University of California, Santa Barbara; George Imel of Idaho State University; and Denis Beller of the University of Nevada, Las Vegas.
- Professor Bilge Yildiz of MIT and Professor Carlos Levi from the University of California, Santa Barbara presented colloquia at the INL.
- NSUF principal investigator, Kumar Sridharan (University of Wisconsin) wrote a successful proposal to analyze ATR irradiated samples at the SHaRE User Facility located at Oak Ridge National Laboratory.
- ATR NSUF Users Week registration opened January 7, 2010.
- The final samples from the North Carolina State University experiment will be removed in January and shipped to MFC.
- NSUF staff visits Texas A&M University

February

- ATR NSUF exhibits at the 2010 TMS (The Minerals, Metals and Materials Society) Annual Meeting in Seattle, Washington, February 14 – 16, 2010.
- NSUF staff visits the University of Missouri.



Noteworthy News



Jeff Terry

A research partnership established last year between the Advanced Test Reactor National Scientific User Facility and the Illinois Institute of Technology is already yielding experimental data about the effects of irradiation on materials used in nuclear reactors.

Formed in July 2009, the partnership with IIT Assistant Professor Jeff Terry focuses on studying the structural properties of materials following post-irradiation examination. The synchrotron radiation experiments take place at Argonne National Laboratory's Advanced Photon Source using an x-ray beam-line operated by the Materials Research Collaborative Access Team, a multiple-institution research consortium at Argonne.

In response to a research proposal solicitation last year, ATR NSUF made four awards, and two experiments were completed in December. Meimei Li of Argonne National Laboratory conducted an experiment involving irradiation of chromoly steel to examine the effects on carbon-nitride precipitates and solutes by determining how the atoms were displaced as the dose rate changed. The second experiment was Jeff Terry's own and was a collaborative effort with the University of Wisconsin on irradiation of the ceramic materials used in reactor fuel-element cladding to contain fission products.

Two additional experiments will take place this year: Maria Okuniewski from INL will conduct an experiment in April 2010 to examine stress and strain in a fuel pellet, and Donald Reed of Los Alamos National Laboratory will conduct a study in July to look at the fate of actinides in repositories.

Terry explained that all the data compiled from these experiments either will improve the understanding of the effects of damage mechanisms on the strength of materials or further our knowledge of the complete nuclear fuel cycle. The development of a better understanding of these areas will help insure a robust future for the nuclear power industry.

"We want to better understand the damage mechanisms in materials so we can put that knowledge to use when a nuclear reactor is built," he said. "We can't tear down a reactor and build another one every five years because the metal doesn't hold up. We want to determine a way to prevent material failure from happening so we can build better, stronger reactors that can operate at higher temperatures. This research will help us get there."



Illinois Institute of Technology Physics Professors Jeff Terry (top) and Carlo Segre (bottom) work with graduate student, Dan Olive (middle) to prepare the Materials Research Collaborative Access Team (MRCAT) beamline to study a Zircaloy sample.



Terry noted that the techniques being used in these studies are not necessarily new; in fact, they helped to revolutionize the semiconductor industry. He hopes that a dedicated facility can be built to look at highly activated, irradiated materials in the next four to six years.

“We are now beginning to apply these techniques to energy production, he said. “Clearly, there is a demand for PIE experiments, and the research has to be demonstrated.”

He added that the partnership with ATR NSUF is the key to research success.

“The partnership is great because we couldn’t do it alone, he said. “I would have to go out and find the people interested in doing the research. Everyone knows about the ATR – and they match up the people who want to conduct the research with the appropriate facility. The partnership is the perfect way to make this happen.”

ATR NSUF Scientific Director, Todd Allen agrees “Establishing research partnerships with other National User Facilities like we are doing with Jeff at APS is an excellent way to add value to the irradiation experiments from the ATR.”

Experiment Update

FY 2008 Reactor Experiments			
Institution	ATR Position or Other Facility	Scheduled Insertion Date	Scheduled Removal Date
Colorado School of Mines	MIT Reactor	Various – Spring 2009	Various – Spring/Summer 2009
University of California, Santa Barbara	ATR A-10	August, 2009	August, 2010
North Carolina State University	ATR East Flux Trap	February, 2009	Nov 2009/Jan 2010
University of Illinois	ATR A-9	August 2009	December, 2010
University of Florida	ATR B-1	February, 2009	April, 2010
University of Wisconsin	ATR East Flux Trap	August, 2008	Sept 2009/Oct 2010
FY 2009 Reactor Experiments			
Institution	ATR Position or Other Facility	Scheduled Insertion Date	Scheduled Removal Date
Massachusetts Institute of Technology	MIT Reactor	Various	Various
University of California, Santa Barbara	ATR I-10	October, 2010	October, 2011
Utah State University	ATR B-2	May 2010	February, 2011
Idaho State University	ATR-C	May 2010	August, 2010
Drexel University	ATR A or B	October, 2010	October, 2011



FY 2010 Reactor Experiments			
Institution	ATR Position or Other Facility	Scheduled Insertion Date	Scheduled Removal Date
University of California, Berkeley	MIT	Newly Awarded *	
Idaho State University	ATR B-9 & B-10	Newly Awarded *	
University of Nevada, Las Vegas	ATR-C	Newly Awarded *	

FY 2009 Post Irradiation Examination Experiments		
Institution	ATR Position or Other Facility	Analysis Dates
University of Wisconsin	University of Wisconsin	Various - 2010

FY 2010 Post Irradiation Examination Experiments		
Institution	ATR Position or Other Facility	Analysis Dates
Argonne National Laboratory	Advanced Photon Source	December, 2009
Illinois Institute of Technology	Advanced Photon Source	December, 2009
Idaho National Laboratory	Advanced Photon Source	Spring, 2010
Los Alamos National Laboratory	Advanced Photon Source	Summer, 2010

* Insertion date has not yet been determined.