

## Overview of Recent Tritium Experiments in TPE

Masashi Shimada\*<sup>a</sup>, T. Otsuka<sup>b</sup>, R. J. Pawelko<sup>a</sup>, P. Calderoni<sup>a</sup>, and J. P. Sharpe<sup>a</sup>

<sup>a</sup>*Fusion Safety Program, Idaho National Laboratory, Idaho Falls, ID, 83415, USA*

<sup>b</sup>*Kyushu University, Interdisciplinary Graduate School of Engineering Science,  
Higashi-ku, Fukuoka, 812-8581, Japan*

Tritium retention in plasma-facing components influences the design, operation, and lifetime of fusion devices such as ITER. Most of the retention studies were carried out with the use of either hydrogen or deuterium. Tritium Plasma Experiment (TPE) is a unique linear column plasma device using both fusion fuels of deuterium and tritium, and is suitable for materials exposures in plasma conditions approaching those of plasma facing components (PFCs) in ITER. As the fusion research focuses more on nuclear aspects (tritium retention and neutron irradiation effects), the capability of TPE that allow us to handle tritium, beryllium, and neutron irradiated materials will help solving challenging questions that the fusion community faces.

TPE has been relocated from the tritium system test assembly (TSTA) at Los Alamos National Laboratory (LANL) to the safety tritium applied research (STAR) at Idaho National Laboratory (INL) due to the shutdown of TSTA facility in LANL. Using thermal desorption system, ion chamber, liquid scintillation system, diamond wire saw and imaging plate technique, we can investigate a variety of tritium behaviors: tritium surface profiling, tritium depth profiling in bulk, tritium surface contamination, and total tritium retention. For the first time since its relocation, a series of tritium experiments (0.2-0.5% T<sub>2</sub>/D<sub>2</sub>) was performed to investigate tritium depth profiling in bulk, and tritium retention in steels and pure high Z metals. The results are analyzed by Tritium Migration Analysis Program (TMAP) simulation.

This paper will discuss the tritium handling and storage in uranium beds, and the key results from the tritium experiment campaigns in TPE.