

## NOMATEN Seminar

### UNDERSTANDING RETENTION AND TRANSPORT OF HYDROGEN IN DISPLACEMENT-DAMAGED TUNGSTEN

Link: <https://gotomeet.me/ncbjmeetings/nomaten-seminar>

**Tuesday, March 23 2021 at 01:00-02:30PM (GMT+1)**

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#### **Abstract:**

In order to achieve tritium self-sufficiency in a future fusion reactor, the limitations in terms of tritium retention and loss to the coolant need to be very stringent. Among many other favorable properties, intrinsically low fuel retention makes tungsten, therefore, one material of choice as plasma-facing material. However, during plasma operation defects in the tungsten lattice will evolve that will trap hydrogen isotopes. While for present day experiments this increased retention is only limited to the near surface as a cause of the interaction with eV to keV energy ions and neutrals the material will be modified throughout the whole bulk in future nuclear devices because of the neutron irradiation.

In this presentation, I will first motivate the need for well-defined laboratory experiments to study transport and retention of hydrogen isotopes in plasma-facing materials. The two possible experimental strategies to study the influence of displacement damage will be presented: fission neutron irradiation and MeV ion irradiation. Recent experiments showing sub-threshold and super-threshold creation of defects will be presented to show the different approaches found in literature. Finally, hydrogen isotope exchange experiments will be presented that underline the present understanding of hydrogen retention by trapping in defects and transport by thermal de-trapping.

**Bio Note:**

Thomas is an experimental physicist who graduated at the Technical University Munich in 1996 with a physics diploma and wrote his PhD in 2001 at the University Bayreuth, Germany about the sticking coefficient of methyl radicals on hydrocarbon surfaces. He is a senior scientist at the Max-Planck-Institut für Plasmaphysik (IPP) working on plasma-wall-interaction related questions since more than 25 years. While he started his career on studying growth and erosion processes of hydrocarbon thin films, he switched later to hydrogen retention and erosion of beryllium. Since 2012, he is coordinating the tandem accelerator laboratory at IPP focusing on transport, retention and release of hydrogen isotopes from tungsten. His latest interest is the influence of displacement damage on hydrogen retention as well as the opposite: the influence of hydrogen on the displacement damage!