Contribution ID: **19** Type: **not specified**

Sieverts' constant for H2/D2/T2 in eutectic PbLi

Wednesday, May 24, 2023 6:25 PM (25 minutes)

We have designed and build a new setup at the Tritium Laboratory Karlsruhe (TLK) for the measurement of the Sieverts-constant of lithium-lead (PbLi) with tritium. To reduce the systematic impact of hydrogen solubility in different materials, we used aluminium and glass parts for the majority of the setup choosing stainless steel only where no alternatives are available. Combined with a careful design and layout of all internal volumes and variable buffer vessel sizes combined with a flexible PbLi amount of 100 g or 1000 g, the setup provides high-sensitivity access to a broad range of possible Sieverts-constants. The symmetric layout of the feed and extraction side aims for both, adsorption and desorption measurements with high sensitivity in a wide range of Sieverts-constants mentioned in literature.
A second key feature for a successful determination of the Sieverts-constant is the handling of the lithium lead. Impurities such as oxides can have a great impact on the performance of the facility as well as on the Sieverts-constant itself. Therefore, methods for cleaning, storage and transfer have to be tested and defined.
In this contribution we will present the current status of the experiment including details on the design considerations. In addition, we show the efforts made to obtain best possible sample preparation for the lithium-lead used. This will be accompanied by an extensive series of commissioning measurements with hydrogen which are an absolute necessity to gain a deep understanding of the systematic effects of the facility prior to contamination with tritium.

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Session Classification: Fusion R&D - Fuel Cycle/Materials

Track Classification: Oral presentations