Contribution ID: **245** Type: **Invited Oral**

Recent developments on the TRITON experiment

Thursday 8 June 2017 13:20 (20 minutes)

The Permeation Against Vacuum (PAV) is the prevailing technology with regard to the tritium extraction from PbLi in the liquid metal-based breeder blankets. With the aim of achieving tritium self-sufficiency of the DEMO power plant, this technology allows the continuous operation mode in a relatively compact system by providing high extraction efficiency. A small scale prototype of PAV, TRITON, has been designed to experimentally test the capability of this technique. It will be installed in a PbLi loop in CIEMAT in order to demonstrate and validate its potential as tritium extraction system at DCLL-DEMO relevant conditions. TRITON is composed of hydrogen-permeable vanadium membranes and a stainless steel supporting structure, conforming rectangular channels for the flowing PbLi alternated with vacuum channels to extract the hydrogen.
In this work, the assembly strategy of TRITON is presented. Due to the involvement of materials with different properties the welding between all the parts is a critic point in the manufacturing process, requiring special attention. It is mandatory to reach a perfect sealing of the channels, therefore, separating the PbLi and vacuum sides. Hence, and prior to the experiments with PbLi, an exhaust analysis of leakages has been made in order to examine each join.
Once the structure is closed and installed in a dedicated experimental set-up, a series of experiments in gas phase have been carried out in order to check the extraction efficiency. This procedure is made at different temperatures thanks to a heating system located inside the prototype. Main results are presented for hydrogen and mixes with argon at various hydrogen partial pressures.

Eligible for student paper award?

Yes

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Session Classification: R.OP3: Tritium Extraction and Control

Track Classification: Tritium extraction and control