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| **WPPWIE Deliverables Status Report** | | | | | **Date:** | | | 01-Sep-2022 | | |
| **Subproject:** | SP C / Retention and Release | | | | **Deliverable ID** | | | PWIE-SP C.4.T-T002-D002 | | |
| **Deliverable owner:** | L. Gao (FZJ) | | | | **Deliverable due date** | | | 31-12-2022 | | |
| **WP Leader:**  **SP Coordinator:** | S. Brezinsek (FZJ)  K. Schmid (MPG) | | | |  | | |  | | |
| **Task title:** | SP C.4 Influence of n-damage on Hydrogen retention and transport | | | | | | | | | |
| **Deliverable title:** | Plasma-loading and post characterization by NRA, TDS, and LIA-QMS and DP-LIBS (FZJ) | | | | | | | | | |
| **Status:** |  | **Completed** |  | **Partially completed** | |  | **Delayed** | |  | **Cancelled** |
| Please write a short status report (max. ½ pages) here.  Please check the status of the deliverable(s) with a “x” in the row above.  If the deliverable(s) are delayed, please also indicate an estimated completion date in the report text.  If the deliverable(s) include machine time, please indicate the number of days that have been used for the deliverable(s) in the report text.  For reference, the specification of this task from the PMP is given below. | | | | | | | | | | |
| **Reference from PMP:** | | | | | | | | | | |
| The transport of hydrogen isotopes HIs through the first wall of fusion devices is the driving process for HIs retention but also for permeation to the coolant. Both of these processes have fundamental implications for the safety and the tritium self-sufficiency of a fusion reactor. This requires experiments on HIs retention in the different materials (W, steels and Cu-alloys) by trapping at intrinsic defects and at defects generated by the bombardment with MeV neutrons from the fusion reaction. Since MeV fusion neutrons are not available at high fluxes, their effect in the materials will have to be mimicked either by high-energy ion implantation or by exposure to fission neutrons. In the past experiments with self-damaged W have shown that the simultaneous presence of HIs increase the damage produces by self-implantation Comparison of proton-induced and high-energy ion implantation and associated loading by plasma will compared. W with different degree of damage and D content will be analysed post-mortem by NRA, TDS and double pulse LIBS and LIA-QMS. | | | | | | | | | | |
| **Inputs required:**   * Ion beam facilities for damage simulation (MPG)   Plasma facilities to expose damaged W samples (FZJ) | | | | | | | | | | |
| **Tasks to be performed:**   * Simulation of neutron-damaged W by W self-damage at different dpa (6 W samples) (FZJ) * Exposition of W samples in PSI-2 D plasmas to load with D at low surface temperature (FZJ) * Quantification of fuel content for 3 samples by NRA and TDS (MPG, FZJ)   Quantification of fuel content for 3 samples by LIA-QMS and DP-LIBS (FZJ) | | | | | | | | | | |
| **Deliverables:**   |  |  |  | | --- | --- | --- | | Deliverable ID: | Deliverable Title: | | | D001 | | Pre-damaging of W samples by heavy ion implantation in W to 0.005 -0.5 dpa (MPG) | | D002 | Plasma-loading and post characterization by NRA, TDS, and LIA-QMS and DP-LIBS (FZJ) | | | | | | | | | | | | |
| **Management Information**  **Human Resources 2022**:   |  |  |  |  | | --- | --- | --- | --- | | **Deliverable Owner** | **Beneficiary** | **PM** | **Deliverable (Team)** | | T. Schwarz-Selinger | MPG | 2 | D001 | | L. Gao | FZJ | 3 | D002 (E. Wüst, R. Yi) | | **Total** |  | 5 |  |   **Hardware/ Machine Resources:**   |  |  |  |  | | --- | --- | --- | --- | | **Device** | **Beneficiary** | **Days** | **Related Deliverable** | | PSI-2 | FZJ | 5 | D2 | | Ion beam | MPG | 5 | D1 |   **Other resources:**  **Collaborations:**   * FTD and WP MAT   **Other information:** | | | | | | | | | | |