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Organization of neutron irradiation campaign for RR and other retention-related experimental studies at SCK CEN

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According to what has been agreed at the 2nd RCM meeting, SCK CEN has prepared and start the execution of the neutron irradiation campaign to enable: (i) generation of the sample set for future RR campaigns; (ii) assess retention in tungsten (and other materials comprising the campaign) in different labs using deuterium and tritium experiments; (iii) make assessment of the retention in Eurofer97 steel and innovative W-Cr-Y alloys.

The launched campaign includes three irradiation temperatures 50, 300 and 800 ℃ and the target irradiation dose is 0.2 dpa which corresponds to the twice the end-of-life dose of the first ITER divertor. Besides mentioned above W and Eurofer97 steel, the experiments involve Molybdenum, Iron and CuCrZr. All together, this set of samples will comprise the research material for future CRPs dedicated to the reduction of the uncertainty on neutron irradiation damage, correspondingly induced defect structure, annealing of defects and interaction of hydrogen isotopes with those defects.

The irradiation experiment is currently ongoing and the irradiation should be completed by end of March 2023. The capsules should be opened in April and visual inspection is to be done in April – May.

In addition, several tungsten samples irradiated in the previous campaigns (as discussed at the 1st and 2nd CRP) are now available for the advanced post irradiation characterization and can be shipped with A-type container. The samples are irradiated up to 0.05 - 0.2 dpa exhibit the activity of less than 2 mSv/hour on contact and can be handled in fume hood with ALARA. These samples could be used for this CRPs to perform dedicated experiments to investigate permeation and retention of hydrogen isotopes. The freshly irradiated samples could be shipped together with “old” samples to reduce the cost. However, the agreement on the shipment must be made to ensure timely action.

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