# IFERC Newsletter

IFERC-N-2014-5, 1 December 2014
International Fusion Energy Research Centre, Rokkasho, Aomori 039-3212, Japan

**Meetings**

## 13th DEMO R&D Workshop

The 13th Workshop of DEMO R&D was held at Fusion for Energy (F4E) in Barcelona, Spain, on 25th September 2014 with 37 participants (including 11 remote participants); 4 from IFERC-PT, 19 from EU home team, and 14 from JA home team. The objective of this meeting was to exchange information on the progress of the DEMO R&D activities and to enhance mutual cooperation between EU and JA.

Tritium Technology

In the area of tritium studies, the dust from JET was delivered to Rokkasho in order to be examined with the excellent analytical equipment available there. The study should start later this year: end of October – early December. The study should be done in close cooperation between the EU and JA staff, i.e. with the participation of EU scientists at the Research Centre in Rokkasho. In JA, research on advanced plastic scintillator for tritiated water, started. A new cation-exchanged mordenite-type zeolite (MOR) has been developed in order to find a column material which can be used at temperatures higher than 77 K. Ag-MOR showed a fairly large adsorption capacity of hydrogen isotopes at 77 K in comparison with other MORs. The mechanism of passivation inhibitory effect for SUS304 stainless steel in tritiated solution was studied by using steel containing lower amounts of chromium. The results showed that the passivation inhibitory effect would depend on the self-passivation of chromium.

$SiC_f$/SiC composites

The erosion/corrosion equipment, designed, fabricated and checked by ENEA, has been successfully transferred and installed at Rokkasho site. Tests performed as part of the EU tasks show that ionizing radiation enhances the interaction between hydrogen isotopes and oxides stabilizing the absorbed hydrogen within the material. The role played by both irradiation temperature and displacement damage on the absorption of hydrogen isotopes during irradiation will be addressed. During 2015, the study with Scanning Electron Microscope (SEM) and Secondary Ion Mass Spectrometry (SIMS) will be continued on the effect of irradiation temperature, irradiation dose and irradiation dose rate on the quantity of deuterium absorbed, deuterium penetration range and possible effects on the microstructure.

In JA, preparatory compatibility tests are ongoing in parallel. The fabrication method of the Pb-Li alloy was optimized for small batch and mass production. Characterization of Pb-Li alloy has progressed equally. Specifically, the first ever mapping of Li-O bond on the Pb-Li alloy was carried out. The conceptual design to study the synergetic effects of magnetic field and absorbed gas in Pb-Li corrosion process was completed. Preliminary irradiation experiments using a Tandem accelerator suggest in-situ electrical degradation of CVD-SiC after high energy and low fluence ion irradiation. The improvement of experimental apparatus made it possible to measure deuterium permeability of SiC more precisely. Preliminary gamma-ray irradiation data suggest no notable deterioration of D permeability occurs. Detailed fatigue life evaluation of $SiC_f$/SiC was initiated. The detailed mechanism for off-axial failure was identified by various techniques. Specifically, the edge effect was identified for plates and is being investigated for tubes. These data have been added to the fundamental irradiation microstructure database. Specifically, the effect of He on irradiation creep was identified.

Advanced tritium breeders

In EU, the facility for the advanced tritium breeders has been upgraded and the control program successfully implemented. High purity pebbles were produced for reprocessing experiments. Standard characterization of

the pebbles is performed in parallel to production. The tests have confirmed that pebbles can be reprocessed using the same process as the original pebbles. No significant accumulations of impurities have been observed after each remelting step. Pebbles with a lithium deficit can be re-enriched by remelting.

The present status of DEMO Joint Research Building

The DEMO Joint Research Building is a prefabricated building with steel pillars, with a construction area of ~ 750 $m^2$, floor area of 750 $m^2$ and height ~ 6 m. It houses a material testing room, a Be LOCA experimental room, an experimental room (with a crane of a 3 ton maximum load capacity), a HVAC room and an Electrical room. Its electric system has electric power supply of 1 MW, fire detection/alarm, LAN (JAEA/IFERC), telephone, etc. Its mechanical system includes a HVAC room of approximately 1000 m3/h (ventilation) Special HVAC of Be LOCA experimental room for Be handling and air conditioning.

Joint parallel working sessions

In parallel working sessions, participants jointly prepared the Work Programme 2015 and Work Plan covering the period until the end of Broader Approach.