IFERC Newsletter

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Meeting

6th Joint Technical Coordination Meeting (JTCM-6)

The 6th Joint Technical Coordination Meeting (JTCM-6) between Demo design and R&D was held on 3 February 2016 at Nagoya University, hosted by Prof. N. Ohno. JTCM is intended to enhance exchange of information between the Demo Design and R&D teams. Recent results of Material R&D have been presented. On-site participants were 4 from EU, 26 from JA (JAEA, NIFS and universities). Remote participants were 2 from JA (JAEA and university). Following are highlights of DEMO R&D:

SiC$_f$/SiC composites (T1)

Key findings in 2015 were as follows:

- Key corrosion driving sources were identified by various characterization techniques such as SXES, rf-GD-OES, TPD-MS, etc.:
  - Li-O compounds in the liquid Pb-Li alloy (external source)
  - Oxidation protective layer (SiO_2) on the surface of CVD SiC and sintering additives (SiO_2, Y_2O_3, Al_2O_3) of NITE-SiC/SiC composite (internal source)
- Corrosion was observed only with flowing Pb-Li, not with still Pb-Li.

These observations indicate that establishing the quality control scheme of the starting Pb-Li alloy becomes essential to suppress serious damage in SiC materials.
A compatibility test of CVD SiC lasting for 1800 h was completed.

Tritium Technology (T2)

The R&D of tritium technology (T2) is underway successfully in FY 2015. Especially, many kinds of analysis for JET tiles and dust started. First results of tritium distribution, microstructure of decomposition layer and contents of both tiles and dust were obtained. Counter measures to accelerate this study in FY 2016 were proposed by JA. Continuation of 13 collaborative studies with JA universities will be approved.

Database & issues of qualification of data & irradiation effects in JA (T3)

The current preparation status of database (MPH) of F82H was summarized, and the importance of the qualification of Small Specimen Test Technique (SSTT) is suggested. Preliminary analysis on the impact of ductility loss on a blanket structure was introduced. Possible collaboration with EU on several topics related to database, design criteria, and fusion neutron irradiation effect estimation was proposed.

Advanced neutron multiplier (T4)

$Be_{12}V$ beryllide pebbles fabricated directly by the rotating electrode method without homogenization treatment were much more resistant to water vapor than pure Be pebbles. Moreover, BeO layer on the surface of $Be_{12}V$ pebbles acts as a protective barrier against H_2 generation reaction with water vapor.

Advanced tritium breeder (T5)

Solid-solution pebbles of $Li_{2+x}TiO_{3+y}$ with Li_2ZrO_3 (LTZO) as a super advanced tritium breeder were easily fabricated by emulsion method under air sintering. Then, LTZO pebbles exhibited good tritium release behavior from viewpoints of not only chemical form of released tritium but also tritium recovery rate.

Activities of database in EU

The EUROfusion Materials Programme progressed in its second year on development of new in-vessel materials, such as advanced steels, where more than 15 new heats, each of them a EUROFER variant for increased temperature window either at the low or high end of the temperature, were produced on an industrial scale. The activities in the EDDI subprogramme (Engineering Data and Design Integration) include gap analysis of EUROFER-97, assessment of more than 30 material grades with an MTRL (material technology readiness level) scheme developed under EUROfusion, and development of design rules for in-vessel materials under DEMO environment.

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