Contribution ID: **777** Type: **not specified**

P2.206 Precipitation phenomena during corrosion testing in the forced-convection Pb-15.7Li loop PICOLO

Tuesday, 18 September 2018 11:00 (2 hours)

Several blanket concepts (e.g., HCLL, WCLL, DCLL) are based on the application of the liquid breeder Pb-15.7Li, which is in direct contact with the structural components. Compatibility testing has shown that the structural materials (e.g., Eurofer) always suffer from corrosion attack which mainly depends on the operation temperature and flow velocity of the liquid breeder. The governing mechanism can be attributed to dissolution of the steel by the liquid breeder. At high flow velocities (v = 0.1 m/s), high dissolution rates of ca. 200 µm/year were evaluated at 823 K. This corresponds to an amount of ca. 1.6 kg/m² of removed steel constituents. A fusion device with blanket modules or also a corrosion testing loop, e.g., the PICOLO loop of KIT, are non-isothermal systems. The components dissolved at higher temperatures are transported with the breeder flow. At sections with a lower temperature oversaturation of the breeder will occur. Effects such as deposition, precipitate formation and transport of corrosion products will take place. Corrosion testing in PICOLO showed that such particles are formed and that they can seriously affect the safe and reliable operation of Pb-15.7Li systems up to blocking of components. Thus, during maintenance work tubing sections and components beyond the magnetic trap, which is installed and designated in PICOLO to collect formed particles, were removed for analyzing the issue of occurring precipitates. Particles were analyzed by SEM/EDX and metallographic techniques concerning composition, the areas of deposition, shape and size. The comparison of corrosion/deposition modelling with areas of detected deposition indicated that a transport of particles is present. The observed effects will also be discussed with respect to the development of new purification components and further testing needs towards a reliable operation of blanket systems.

Presenter: KRAUSS, Wolfgang (Institute for Applied Materials Karlsruhe Institute of Technology)

Session Classification: P2