Karlsruhe Institute of Technology

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Experimental investigation of the corrosion behavior of Eurofer97 steel in contact with Lithium ceramic breeder pebbles under specific Helium Cooled Pebble Bed breeding zone atmosphere

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- Study the evolution of the corrosion layer of E97 when in contact with Li_4SiO_4 under blanket relevant atmosphere
- E97 Samples kept for 8, 16, 32, and 64 days at 550 °C in flowing helium with 0.1% hydrogen
- The water content was monitored and kept as low as possible

Design of the Sample Holders

Filling procedure

- To avoid contact between air moisture and hygroscopic pebbles, the filling is done in a glove box under Ar gas
- Compaction of the pebble bed on a shaker plate

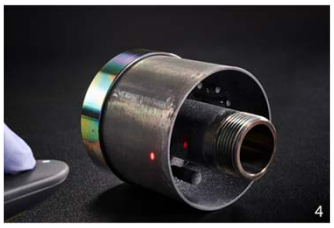
Experimental facility: HELOKA HEMAT

Helium cooled, low pressure loop (max. 4 bar), max. temp. 650 °C, max. flow 20 g/s, gas composition monitoring by a mass spectrometer, moisture sensors

Results

8 days exposure time: contact spots

64 days exposure time: black oxide layer formed on the samples

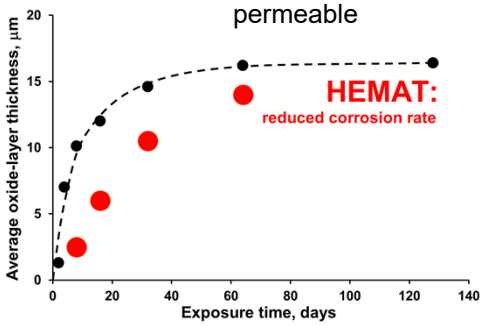


64 days exposure time: walls still permeable

As-received

Simple exposure device (open loop)

HEMAT



EUROfusion

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