

EVOLUTION OF BERYLLIUM AND TITANIUM BERYLLIDES (HIDOBE) IN LONG TERM, HIGH FLUX IRRADIATION IN THE HIGH FLUX REACTOR

S. van Til, J.B.J.W Hegeman

Nuclear Research and consultancy Group, 1755ZG, Petten, the Netherlands

Corresponding author: vantil@nrg.eu

In the HIDOBE (*High DOse irradiation of BEryllium*) experiment, various grades of constrained and unconstrained beryllium pebbles, beryllium pellets and titanium-beryllide samples are irradiated in the High Flux Reactor (HFR) in Petten at high temperatures. The irradiation is performed in a high flux position in order to obtain a DEMO relevant dpa-helium ratio. High dose irradiation testing is important because the beryllium irradiation behaviour, in particular its swelling and creep, has impact on e.g. structural integrity of the breeder blanket and the tritium inventory and it is considered a critical issue for the HCPB concept for performance, safety and waste management.

The HIDOBE experiment consists of two separate rigs (HIDOBE-01 and HIDOBE-02) and have target fluences that are aimed to produce about 15% and 30% of the DEMO end-of life conditions (3000 and 6000 appm helium in beryllium, respectively).

HIDOBE-01 has reached its irradiation target after two years of irradiation and has been dismantled. The sample specimens have been retrieved and Post Irradiation Examination (PIE) has started on a selection of materials. This work presents the found material evolution (e.g., swelling, porosity tritium formation and retention, etc.) due to irradiation effects on different beryllium grades. Among the performed PIE experiments are He-pycnometry, dimensional measurements, density measurements and TPD (tritium release as function of temperature)