

In-Pile Tritium release behaviour of Lithium Metatitanate produced by Sol Gel process in the irradiation experiment EXOTIC-9/1 (P4-H-454)

Marjan Peeters, A.J. Magielsen, M.P. Stijkel

NRG P.O. Box 25 1755 ZG Petten The Netherlands

The irradiation programme EXOTIC (EXtraction Of Tritium In Ceramics) is carried out within the European framework for the development of the Helium Cooled Pebble Bed concept. The EXOTIC-9/1 is the latest experiment in the series of EXOTICS, that are irradiated in the High Flux Reactor, Petten. Tritium release and inventory in lithium containing ceramic pebbles are key properties in the design of a TBM. New production routes of pebbles are developed, leading to different thermomechanical and tritium release properties.

The objective of the EXOTIC-9/1 is to study in-pile tritium release behaviour of the latest developed lithium titanate pebbles (Li_2TiO_3). The pebbles are produced by a sol gel process at CEA. The new pebbles differ with respect to porosity from the Lithium titanate materials tested in the previous EXOTIC 8 programme. The pebbles have diameter in the range from 0.6 to 0.8 mm. Irradiation of EXOTIC-9/1 started at 24 March 2005, and will continue until the end of 2006, in total about 400 irradiation days. The temperature is varied between 340 and 580 °C. Begin of Life (BOL) tritium production rate is 0.56 mCi/min.

In this paper the in-pile tritium behaviour will be reported during normal operation and during transients in temperature, purge gas chemistry and gasflow. The collected data is compared to tritium release data from ceramics irradiated in previous EXOTIC experiments with respect to tritium inventory, residence time and porosity.