Contribution ID: **47** Type: **ORAL**

Selection, testing and development of qualification procedure for ALLEGRO gas-cooled fast reactor fuel

Thursday 21 April 2022 10:52 (12 minutes)

On the basis of detailed review, the fuel types were proposed for the new design of the ALLEGRO gas-cooled fast reactor. The first core will be built with MOX or UOX fuel in 15-15Ti stainless steel cladding. These fuel types have been widely used in different sodium-cooled fast reactors. The second core of ALLEGRO will use refractory fuel. The primary candidate is carbide fuel –(UPu)C or UC –in SiC cladding.
15-15Ti and SiCf/SiC type claddings were tested in high temperature helium atmosphere with different impurities in order to investigate the effect of high temperature treatment and impurities on the mechanical load bearing capabilities of these cladding materials. Ballooning tests were performed with 15-15Ti cladding tubes and it was shown that they can keep their integrity at high temperature. The failure pressure of samples tested at 960-1000 ℃ was above 18 MPa.
Qualification procedures have been proposed for the start-up and refractory ALLEGRO fuel. The technology readiness level approach was applied and the basic step of qualification procedure were identified. Using the currently available information the further needs were specified, which include experimental activities, design work, development of numerical models, technology developments, establishment of fuel fabrication capabilities, irradiation in research reactors and post-irradiation examination of fuel.

Country/Int. organization

Hungary

Authors: Mr HÓZER, Zoltán (Centre for Energy Research); Mr ILLÉS, Levente (Centre for Energy Research); KIM, Daejong (Korea Atomic Energy Research Institute); Mr KIM, Weon-Ju (Korea Atomic Energy Research Institute); Mr KIRÁLY, Márton (Centre for Energy Research); Mr NOVOTNY, Tamás (Centre for Energy Research); Mrs PEREZ-FERÓ, Erzsébet; Mrs PINTÉR-CSORDÁS, Anna (Centre for Energy Research); Mr SCHYNS, Marc (SCK·CEN Belgian Nuclear Research Centre); Mrs SLONSZKI, Emese (Centre for Energy Research); Mr SZABÓ, Péter (Centre for Energy Research); Mr DELVILLE, Rémi (SCK·CEN Belgian Nuclear Research Centre)

Presenter: Mr HÓZER, Zoltán (Centre for Energy Research)

Session Classification: 3.2 Development of innovative fuels: design and properties irradiation

Track Classification: Track 3. Fuels, Fuel Cycles and Waste Management