Contribution ID: **48** Type: **POSTER**

Thermal Annealing Effect on Recovery of Corrosion Properties of EP-450 Steel Irradiated IN BN-600 Reactor to High Damage Doses

Tuesday, June 27, 2017 5:30 PM (1h 30m)

High radiation-resistant ferritic-martensitic steels are prospect materials for fast reactor cores. Chromium ferritic-martensitic steel 12Cr-13Mo-2Nb-B-V (EP-450) was successfully used as a shroud tube material for BN-350 reactor fuel assemblies and is still used for BN-600 and BN-800 reactors. It is expected to use ferritic-martensitic steel EP-450 for BN-1200 reactor shroud tubes and ferritic-martensitic oxide dispersion strengthened steel for claddings. Wet storage of BN-1200 reactor spent fuel assemblies in a cooling pool is supposed. However during the storage of BN-600 spent fuel assemblies in the cooling pool high rates of corrosion and corrosion product (CP) release into the cooling pool water for spent fuel assembly structural elements made of 12%-chromium ferritic-martensitic steels were observed. Along with higher corrosion and corrosion product release rates radionuclide concentration increases, thereby increasing radiation hazard level. Localized (pitting) corrosion may occur and lead to cladding depressurization with high active fission product (cesium, strontium, iodine) release into the environment. Cladding depressurization risk diminishes environmental safety of spent fuel assembly storage in the cooling pool.
The research results of water corrosion resistance of 12Cr-13Mo-2Nb-B-V steel after irradiation in BN-600 reactor in the range of temperatures between 360 and 520 oC to different damage doses and isothermal annealing in the range of temperatures between
650 and 750 oC during 1-10 hours are given. It is shown that annealing at a temperature above 700 oC and during more than 3 hours reduces corrosion and corrosion product release rate of 12%-chromium ferritic-martensitic steels in the cooling pool water by more than an order of magnitude. Also it inhibits localized pitting corrosion occurrence. A new technique of the storage of fast reactor spent fuel assemblies with structural elements made of 12%-chromium ferritic-martensitic steels in the cooling pool has been developed. A patent for the technique No. 2555856 (RU) dated 10.06.2015, IPC G21C19/06, was granted.

Country/Int. Organization

Russian Federation

Primary author: Mr GOLOSOV, Oleg (Joint Stock Company "Institute of Nuclear Materials")

Co-author: Mr SEMERIKOV, Vasilii (Joint Stock Company "Institute of Nuclear Materials")

Presenter: Mr GOLOSOV, Oleg (Joint Stock Company "Institute of Nuclear Materials")

Session Classification: Poster Session 1

Track Classification: Track 5. Fast Reactor Materials (Fuels and Structures) and Technology