

# PAS Assessment of Radiation Embrittlement of RPV Welds

Sofia Gašparová<sup>a)</sup>, Vladimír Kršjak, Matúš Húska, Vladimír Slugeň, Stanislav Sojak, Martin Petriska, Yamin Song, and Jarmila Degmová

*Slovak University of Technology, Institute of Nuclear and Physical Engineering, Ilkovičova 3, Bratislava 841 04, Slovak Republic*

<sup>a)</sup> Corresponding author: sofia.gasparova@stuba.sk

**Abstract.** A positron annihilation spectroscopy (PAS) investigation of radiation-induced damage in RPV welds was conducted. Eight different materials with composition variation of Mn, Ni, Si and Cr were manufactured based on typical WWER-1000 materials. This variation was chosen to observe the potential of synergistic role of these elements on the reactor pressure vessel (RPV) degradation. Materials were irradiated at the High Flux Reactor (HFR) in Petten as a part of LYRA-10 experiment, to displacement damage of ~ 0.1 dpa. Subsequently, the as-received and irradiated materials were studied by the means of positron annihilation spectroscopy in the laboratory of the Institute of Nuclear and Physical Engineering of the Slovak University of Technology in Bratislava. Positron Annihilation Lifetime Spectroscopy (PALS) and Coincidence Doppler Broadening Spectroscopy (CDBS) were used to analyze the microstructure of samples. The obtained analysis from both techniques showed an increased rate of positron trapping at radiation-induced vacancy clusters with increasing content of Ni, Mn and Si in the materials.

## ACKNOWLEDGEMENTS

This work is a part of project that has received funding from the Euratom research and training programme 2019-2020 under grant agreement No. 945272 (STRUMAT-LTO).