

# **An Effect of Manganese and Nickel in VVER-440 Reactor Pressure Vessel Steels During the Process of Annealing**

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**Abstract.** In this paper, an effect of thermal stress on VVER-440 reactor pressure vessel steel (15KhMFAA) was observed by non-destructive Positron Annihilation Lifetime Spectroscopy and Coincidence Doppler Broadening Spectroscopy. This steel was investigated previously in a couple of publications, but the influence of the thermal treatment was studied mostly up to 500 °C. Our recent positron results from the optimization of the recovery annealing temperature published in [1] indicated that the structure is significantly changed at temperatures over 500°C, although the reason was not in charge of structural defects on which positrons are sensitive. This paper studies closer the chemical aspects of the annealing and the formation of precipitates at temperature of 550°C. The results indicated an effect of manganese and nickel on the structure surrounding structural defects which is changing during the process of the annealing.