

## Evaluation of Corrosion Behaviour of Austenitic Steel 08Cr18Ni10Ti Exposed to Supercritical Water

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**Abstract :** New sources and ways of producing energy are still seeking, and one of the sustainable ways is Generation IV nuclear reactors. The supercritical water-cooled reactor is one of the six nuclear reactors of Generation IV, and as a consequence of the development of light water, reactors seem to be the most perspective. Thus, materials usually used in light water reactors are also tested under the expected operating conditions of the supercritical water-cooled reactor. Austenitic stainless steel 08Cr18Ni10Ti is widely used in the eastern types of light water nuclear power plants. Therefore, specimens of 08Cr18Ni10Ti were exposed to conditions close to the pseudo-critical point of water and high-temperature supercritical water. The description and evaluation of the corrosion behaviour of austenitic stainless steel have been done based on the results of X-ray diffraction in combination with energy dispersive spectroscopy and electron backscatter diffraction. Thus, significant differences have been found in the structure and composition of oxides formed depending on the temperature of exposure. The high temperature of supercritical water resulted in localised form of corrosion in contrast to the thin oxide layer of 1  $\mu\text{m}$  present on the surface of specimens exposed close to the pseudo-critical point of water. The obtained results are important for further research as the supercritical water can be successfully used as a coolant for small modular reactors, which are currently of interest.

**Keywords :** localised corrosion, supercritical water, stainless steel, electron backscatter diffraction

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