Insights in Analytical Electrochemistry

Abstract

Polyhydroxyalkanoates from marine bacteria for the development of MRI-visible biomaterials

Evgenii Krasikov

Kurchatov Institute”, Russia

Statement of the Problem: Influence of neutron irradiation on Reactor Pressure Vessel (RPV) steel degradation are examined with reference to the possible reasons of the substantial experimental data scatter and furthermore – nonstandard (non-monotonous) and oscillatory embrittlement behavior. In our glance this phenomenon may be explained by presence of the wavelike component in the embrittlement kinetics. We suppose that the main factor affecting steel anomalous embrittlement is fast neutron intensity (dose rate or flux), flux effect manifestation depends on state-of-the-art fluence level. At low fluencies radiation degradation has to exceed normative value, then approaches to normative meaning and finally became sub normative. Data on radiation damage change including through the ex-service RPVs taking into account chemical factor, fast neutron fluence and neutron flux were obtained and analyzed. In our opinion controversy in the estimation on neutron flux on radiation degradation impact may be explained by presence of the wavelike component in the embrittlement kinetics. Therefore flux effect manifestation depends on fluence level. At low fluencies radiation degradation has to exceed normative value, then approaches to normative meaning and finally became sub normative. As a result oscillation arise that in tern lead to enhanced data scatter.

Moreover as a hypothesis we suppose that at some stages of irradiation damaged metal have to be partially restored by irradiation i.e. neutron bombardment serve as radiation annealing of radiation embrittlement of the steel. Nascent during irradiation structure undergo occurring once or periodically transformation in a direction both degradation and recovery of the initial properties. According to our opinion at some stage(s) of metal structure degradation neutron bombardment became recovering factor that result in increase the resilience and frontier of the steel.

Recent Publications (minimum 5)

1. Krasikov E (2013) RPV steel embrittlement under the combined action of neutron field and hydrogen. EFC19. 19-th European Conference on fracture.

2. Krasikov E et al. (2015) Steel embrittlement under the action of neutrons and hydrogen. Engineering Fracture Mechanics, v. 130, (Nov.2014)

3. Krasikov E et al. (2015) Nonmonotony embrittlement of the RPV steel. Atomic energy, v.119 July, 41-45.

4. Krasikov E (2015) Radiation intensification of the reactor pressure vessels recovery by low temperature heat treatment. RTEP2014. IOP Publishing IOP Conf. Series: Materials Science and Engineering 81 (2015) 012002 doi:10.1088/1757-899X/81/1/012002

5. Krasikov E et al. (2016) Radiation annealing of radiation embrittlement of the reactor pressure vessel steel. RTEP2015. IOP Publishing IOP Conf. Series: Materials Science and Engineering 110 (2016) 012001 doi:10.1088/1757-899X/110/1/012001

Webinar on Materials Chemistry & Science; June 22, 2020; Tokyo, Japan

Citation: Evenginii, Polyhydroxyalkanoates from marine bacteria for the development of MRI-visible biomaterials, June 22, 2020; Tokyo, Japan