Contribution ID: **146** Type: **Oral Presentations**

High Entropy Alloys in Nuclear Applications: Radiation Shielding and Structural Integrity

Thursday 10 July 2025 17:50 (20 minutes)

Melisa Ozkan1, Baki Akkus 1, H.O. Tekin 2,3
1 Department of Physics, Faculty of Science, Istanbul University, 34134, Istanbul, Türkiye
2 Department of Medical Diagnostic Imaging, College of Health Sciences, University of Sharjah, 27272, Sharjah, United Arab Emirates
3Istinye University, Faculty of Engineering and Natural Sciences, Computer Engineering Department, Istanbul 34396, Türkiye

Abstract
Materials used in nuclear reactors must withstand harsh operating conditions such as high temperature, extreme radiation and mechanical stress. Conventional engineering materials tend to degrade under prolonged radiation exposure, directly affecting reactor safety and lifetime. In recent years, high entropy alloys (HEAs) have emerged as a revolutionary alternative in nuclear technologies due to their unique atomic structure and outstanding physical properties.
In this study, the radiation shielding capabilities and structural integrity of high-entropy alloys are investigated. In particular, the interactions, radiation-induced damage mechanisms and long-term stability of HEAs against neutron and gamma radiation are discussed. According to experimental and computational studies reported in the literature, high-entropy alloys (HEAs) demonstrate lower radiation-induced damage, higher mechanical strength, and superior thermal stability compared to conventional alloy systems.
A better understanding of the advantages of this new generation of materials in terms of radiation resistance is an important step for advanced reactor designs and safety standards.
Keywords: High Entropy Alloys; Nuclear applications; Radiation shielding

Primary author: ÖZKAN, Melisa (Istanbul University)

Co-authors: AKKUŞ, Baki (Istanbul University); Mr TEKIN, Hüseyin Ozan (University of Sharjah)

Presenter: ÖZKAN, Melisa (Istanbul University)

Session Classification: Nuclear Physics, Energy Science and Technology, Accelerators and beams

Track Classification: S07 –Nuclear Physics, Energy Science and Technology, Accelerators and beams