

## HEAFNA - High Entropy alloys for nuclear applications

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### Abstract

High entropy alloys (HEA) have attracted the attention and interest of the scientists worldwide, due to their unique and even intriguing compositions, microstructures and engineering properties. Containing five or more main elements (concentrations of each main element ranging from 5 to 35 at. %), they form disordered solid solutions with either face-centered cubic, body-centered cubic or hexagonal closed-pack structures. Thus, HEA concept with a vast number of elemental combinations offers the possibility to design technologically relevant alloys, thermodynamically stable at high temperatures, with high strength and fracture toughness, improved fatigue resistance and high temperature corrosion resistance. Recent studies on high-entropy alloys, reporting good phase stability following ion irradiation up to 50 dpa, have underlined HEA potential as candidates for the structural materials in fusion and fission reactors.

At KIT the focus was on HEA that are able to form alumina scales in HLM (Pb, PbBi) as potential material solutions for Pb alloy cooled nuclear systems. This presentation will show the materials produced and the first compatibility tests in liquid Pb. Starting from this KIT organized an EERA-JPNM pilot project HEAFNA to explore the production and use of HEA for nuclear application. A brief overview on the structure of this PP will also be given.