

Structural behavior of high entropy alloys and bimodal harmonic structure materials under neutron irradiation

Project partners

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A brief description of the project proposal

The project aims to assess the impact of neutron irradiation to the structure of high entropy alloy (HEA) and bimodal harmonic structure (bHS) materials. Those promising materials for industrial applications in extreme environments such as nuclear power plants, space and health applications possess advanced properties, especially under irradiation. However, the underpinning mechanism of such irradiation resistance at the atomic scale is still an open question. Therefore, the aim is to answer such scientific questions by means of dedicated experiments using a wide range of experimental techniques from small-scale mechanical and X-ray facilities to large-scale neutron and X-ray facilities.

The project is expected to foster a strong and working collaboration between partners, opening the door to future research projects. The project is expected to assess the role played by the chemical and structural fluctuations and the associated lattice distortions in the irradiation resistance properties of advanced materials. By their unique composition and properties, the proposed materials to study will represent unique opportunities to fundamental understanding of irradiation resistance. This understanding is essential to develop new materials with improved properties, providing innovative engineering solutions for better efficiency in e.g. nuclear power plants and space industry, where high demand for improved performance of materials and equipment exists.

The project will involve international cooperation (Finland, Sweden and France) and connects small facilities at University of Helsinki and Lund University to large-scale facilities ILL, ESRF and PETRA III, and potentially SOLEIL. In addition, the cooperation with industrial partners (France) and KTH's startups called Fertitico (Sweden) is expected.