

**Funded project:**

Revolutionizing Nuclear Materials: High Entropy Alloys for Radiation-Damage Resistance

Funding type:

Rapid Research

Main applicant info:

Dr. Fengxian Liu, Assistant Professor, Faculty of Engineering Technology, University of Twente

Co-applicants info:

Prof. Francesco Maresca, Associate professor, Faculty of Science and Engineering, University of Groningen (RUG)

Dr. Diletta Giuntini, Assistant professor, Department of Mechanical Engineering, Eindhoven University of Technology (TU/e)

Project Main Results

The project focused on understanding how structural materials behave under the challenging conditions present in Molten Salt Reactors (MSRs). Through a systematic review of the scientific literature, the researchers examined two key factors affecting material performance: irradiation damage and corrosion.

A major finding of the study was that these two processes are typically investigated separately, while in real reactor environments they occur simultaneously and influence each other. This insight highlighted an important knowledge gap in the field and led the team to develop a new research direction focused on the combined effects of irradiation and corrosion on reactor materials.

The project also identified inconsistencies between existing irradiation and corrosion studies and highlighted the need for new approaches to better understand how materials evolve and degrade under realistic operating conditions. The findings are currently being consolidated into a comprehensive review paper that will serve as a valuable reference for future MSR materials research.

Building New Collaborations

Although modest in scale, the seed funding generated significant strategic impact. It enabled the researchers to broaden their work from a primarily modelling-focused effort into a collaborative research programme closely aligned with emerging industrial and national priorities in nuclear energy. The researchers became actively involved in national initiatives such as the Dutch Nuclear Materials and Fuels Research Alliance (NMFA) and other emerging nuclear energy programmes, helping to strengthen connections between academia, industry and research organisations.

The project created opportunities for engagement with key Dutch stakeholders, including Thorizon, a Dutch company developing molten salt reactor technology, and NRG PALLAS, the national organisation responsible for nuclear research infrastructure and materials testing. These interactions helped shape a more application-oriented research agenda and laid the groundwork for future collaborations.

Looking Ahead

The seed funding has established a strong foundation for future research and community-building activities.

The insights generated by the project are now being used to support larger collaborative research proposals and to further strengthen industrial–academic partnerships in the Netherlands.

By connecting researchers, industry partners and national initiatives, this project demonstrates how targeted seed funding can catalyse new collaborations and help accelerate innovation in support of the energy transition.