Helmholtz-Zentrum Dresden-Rossendorf e.V.

With cutting-edge research in the fields of ENERGY, HEALTH and MATTER, around 1,500 employees from more than 70 nations at Helmholtz-Zentrum Dresden-Rossendorf (HZDR) are committed to mastering the great challenges facing society today. The Institute of Resource Ecology performs research to protect humans and the environment from hazards caused by pollutants resulting from technical processes that produce energy and raw materials. The Department of Structural Materials is looking for a

PhD Student (f/m/d) Mechanical characterization of ion-irradiated layers as part of a materials acceleration platform for the use of high-entropy-alloys as nuclear structural materials

High-Entropy Alloys (HEA) have great potential to fulfil the demanding requirements regarding tolerance against irradiation, high temperatures and corrosion posed by next generation nuclear power plants. While this resulted in rising interest in such alloys as nuclear structural materials, conventional methods of alloy development with a focus on the iterative refinement of specific compositions have proven too time prohibitive when faced with the vast number of possible HEA compositions and resulting material properties. A recently started European joint research project aims to address this challenge by developing a materials acceleration platform (MAP) for nuclear structural materials. It will combine numerical simulations, ion irradiations and fast screening tests to facilitate the targeted search for HEAs with high resistance to irradiation and corrosion to be used as structural materials in a lead cooled fast reactor (LFR). Special emphasis will be on acceleration of the alloy development process and researching methods to investigate the transferability of ion induced irradiation damage towards neutron induced damage. The offered phd position will focus on the irradiation induced damage of the HEA candidates withing the scope of the nuclear MAP. This includes the development and implementation of screening tests for irradiation induced embrittlement and swelling as well as cooperation with colleagues at HZDR and European partner institutions working on other aspects of the MAP. Recruitment is subject to final approval by the project sponsor.

City: Dresden; Starting date (earliest): 01/07/26; Remuneration: TVöD-Bund; Reference number: 2026/67; Closing date: 15/06/26

Tasks

- Planning and conduction of screening-tests to evaluate irradiation tolerance of high-entropy alloys
- Hardness measurement of thin ion-irradiated layers by nanoindentation, including numerical evaluation of the results
- Characterization of irradiation induced swelling using profilometry
- Independent concept development and experimental validation
- Documentation, analysis and scientific publication of results (publications, conferences, dissertation)

Requirements

- Completed university studies (Master/ Diploma) in the field of Materials Science, Physics, Materials Engineering, Nuclear Engineering or a related field
- Solid knowledge of materials characterization, particularly regarding microstructure and mechanical properties
- Initial experience or strong interest in ion irradiation and irradiation induced effects (embrittlement, hardening, swelling)
- Basic knowledge of micro- or nanohardness measurement is an advantage
- Experience with microstructure-based modelling of mechanical properties is desirable
- Scientific curiosity, openness to new topics and willingness for further development
- Willingness to communicate and collaborate with scientific partner institutions
- Enthusiasm for tackling challenging and complex scientific questions
- Willingness to present research results at national and international conferences
- Ability to work in a team, independent, structured and solution-oriented working style
- Proficiency in scientific software (Origin, Matlab, Python) and good command of MS Office
- Basic knowledge of scientific data analysis and statistical evaluation
- Excellent written and spoken English skills, German skills desired

What we offer

- A vibrant research community in an open, diverse and international work environment
- Scientific excellence and extensive professional networking opportunities
- A structured PhD program with a comprehensive range of continuing education and networking opportunities - more information about the PhD program at the HZDR can be found here
- Salary and social benefits in accordance with the collective agreement for the public sector (TVöD-Bund) including 30 days of paid holiday leave, company pension scheme (VBL)
- We support a good work-life balance with the possibility of part-time employment, mobile working and flexible working hours
- Numerous company health management offerings
- Employee discounts with well-known providers via the platform Corporate Benefits
- An employer subsidy for the "Deutschland-Ticket Jobticket"

Application

We look forward to receiving your application documents (including cover letter, CV, diplomas/transcripts, etc.), which you can submit via our online-application-system: https://www.hzdr.de/db/Cms?pNid=490&pLang=en&pOid=77721