

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) in Ion Irradiation and Materials Characterization of Novel Refractory High-Entropy Alloys for Nuclear Applications.

Recruitment is subject to final approval by the project sponsor. A safe and sustainable use of nuclear energy in Europe and worldwide is not possible without suitable structural materials. The operating conditions foreseen for future reactor designs (Generation IV) – particularly high temperatures and high neutron fluences – impose extreme demands on structural materials. Within the framework of an interdisciplinary collaborative project, we are working on the development and investigation of novel refractory high-entropy alloys (HEAs) as potential candidate materials for highly loaded, neutron-exposed components in nuclear reactors. High-entropy alloys have shown promising mechanical, thermo-mechanical, and corrosion-resistant properties. Their complex chemical composition offers a unique potential for exceptional radiation tolerance, making them attractive for high-temperature nuclear applications. The project aims to provide fundamental insights into the radiation tolerance of these novel materials and to enable a knowledge-based assessment of their suitability for future nuclear systems. At the same time, the successful candidate will contribute to maintaining national expertise in nuclear materials research beyond the phase-out of nuclear energy in Germany.

City: Dresden; Starting date (earliest): 01/12/25; Duration: 3 years; Remuneration: TVöD Bund; Reference number: 2025/131; Closing date: 30/10/25

Working field

- Planning, conducting, and evaluating ion irradiation experiments
- Performing thermal ageing experiments
- Characterization of materials in the initial state and after irradiation/ageing using (scanning) transmission electron microscopy (TEM/STEM), nanoindentation, and complementary microstructural and mechanical analysis techniques
- Conducting literature reviews and evaluating the current state of research
- Independent development and validation of experimental concepts
- Preparation and dissemination of research results through: Peer-reviewed publications, Conference contributions (national and international), PhD thesis

Requirements

- Completed university studies (Master/Diploma) in the field of Materials Science, Physics, Materials Engineering, Nuclear Engineering, or a related field
- Solid knowledge of microstructural and mechanical characterization of materials, ideally with experience in TEM/STEM and nanoindentation
- Interest in or initial experience with ion irradiation
- Good understanding of crystal defects and their impact on material properties
- Basic knowledge of radiation-induced damage mechanisms in metals is an advantage
- Strong team spirit and willingness to collaborate within an interdisciplinary research consortium
- Independent, structured, and solution-oriented working style
- High level of scientific curiosity, openness to new topics, and willingness to develop professionally
- Willingness to actively communicate and collaborate with project partners
- Motivation to engage with challenging and complex scientific questions
- Proficient use of scientific software (e.g., Gatan DigitalMicrograph, Python, Origin, Matlab)
- Basic knowledge of scientific data analysis and statistical evaluation
- Good knowledge of MS Office and reference management tools (e.g., Zotero, EndNote)
- Excellent written and spoken German or English skills
- Willingness to present research results at national and international conferences

What we offer

- Participation in a highly relevant and internationally visible research field
- Access to state-of-the-art research infrastructure (ion beam center, electron microscopy, mechanical testing, hot-cell labs)
- Intensive scientific supervision and interdisciplinary collaboration within the project consortium
- Opportunity to pursue a PhD in cooperation with a German university
- 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=75808>

More information at <https://stellenticket.de/198753/TUBS/>
Offer visible until 30/10/25

