

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

Postdoc (f/m/d) in Irradiation Tolerance of Additive Manufactured Ferritic/Martensitic Steels for Fusion Applications.

Recruitment is subject to final approval by the project sponsor. Structural materials used in future fusion power plants must withstand extreme conditions, particularly high neutron fluxes. Ferritic/martensitic steels, especially the Eurofer alloy specifically developed for fusion applications, are among the most promising material candidates. To enable the fabrication of complex geometries and functionally integrated components, innovative manufacturing methods such as additive manufacturing are gaining increasing attention. As part of an interdisciplinary research project, we aim to assess whether additively manufactured variants of ferritic/martensitic steels meet the demanding requirements for use in fusion applications. The focus is on evaluating the irradiation tolerance. Ion irradiations using iron (Fe) and helium (He) ions are employed to simulate fusion-relevant damage mechanisms. The objective is to experimentally replicate effects such as hardening, embrittlement, and swelling, and to clarify their dependence on the microstructure induced by the manufacturing process.

City: Dresden; Starting date (earliest): 01/12/25; Duration: 3 years; Remuneration: TVöD Bund; Reference number: 2025/130; Closing date: 29/10/25

Working field

- Design, execution, and evaluation of ion irradiation experiments to simulate damage phenomena typical of fusion environments
- Post-irradiation investigations using transmission electron microscopy (TEM/STEM) and nanoindentation
- Analysis of the interaction between additive manufacturing-induced microstructure, irradiation damage, and mechanical properties
- Literature research, data analysis, and development of scientific concepts
- Coordination of supplementary mechanical testing (e.g. fracture mechanics, small punch tests) and subcontracted experiments (e.g. creep testing)
- Supervision of a PhD student within the project team
- Documentation and publication of results in peer-reviewed journals and presentations at scientific conferences

Requirements

- Completed university studies (PhD) in the field of Materials Science, Materials Engineering, Physics, Nuclear Engineering or a comparable field
- Sound knowledge in materials characterization (microstructure, mechanical properties), ideally with experience in TEM/STEM and nanoindentation
- Practical experience or strong interest in ion irradiation and in studying irradiation-induced effects such as hardening, swelling, and embrittlement
- Familiarity with additively manufactured materials
- Knowledge in fracture mechanics and creep experiments is desirable
- Experience in coordinating scientific work and project management is a plus
- Willingness to provide academic supervision to doctoral students
- Strong team spirit in interdisciplinary research collaborations
- Independent, structured, and solution-oriented way of working
- Scientific curiosity and openness to new challenges
- Strong communication skills and willingness to collaborate with internal and external partners
- Enjoyment in working on complex scientific questions and implementing them experimentally
- Confident use of scientific software (e.g. Gatan DigitalMicrograph, Python, Origin, Matlab, SRIM/TRIM)
- Solid skills in scientific data analysis and statistical evaluation
- Good command of MS Office and reference management tools (e.g. Zotero, EndNote)
- Excellent written and spoken English, German skills desirable
- Willingness to present research results at national and international conferences

What we offer

- Participation in a forward-looking and socially highly relevant research field
- Access to state-of-the-art infrastructure: ion irradiation facilities, electron microscopy, mechanical testing, hot cells
- Independent work with substantial creative freedom in a well-connected and interdisciplinary project environment
- Opportunity to build leadership experience by supervising a PhD candidate
- Active integration into a national and international research network, with numerous opportunities for professional and strategic networking (e.g. conferences, workshops, consortium meetings)
- Support for developing your academic profile and preparing for a career in or outside academia
- 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=75806>

More information at <https://stellenticket.de/198751/TUBS/>
Offer visible until 29/10/25

