

At the TU Bergakademie Freiberg, Faculty of Mechanical, Process and Energy Engineering,
Institute of Mechanics and Fluid Dynamics an open position of a

Research Associate (m/f/d) – reference number 295-E/2023



within the DFG Research Training Group GRK 2802 “Refractory Recycling: A contribution for raw material-, energy- and climate-efficiency in high temperature processes”, Cohort II, PhD project P6 „Modeling and assessment of the thermomechanical behavior of MgO-C and Al₂O₃-C materials based on recyclates and usage of environmentally friendly binders“

is available from July 1st, 2024.

Pay grade: according to German pay grade E13 TV-L
Hours: 1,0 FTE (40 hours/week; part-time possible)
Contract type: fixed-term for 48 months (until June 30th, 2028)

The focus of the Research Training Group 2802 is an interdisciplinary education of PhD students in order to be able to acquire the abilities to explore the material property spectrum as well as the limitations of a new generation of high temperature materials on the basis of refractory recyclates with specific thermo-mechanical, chemical and functional properties in high temperature processing in the metallurgy, and to develop new ideas accompanied by new scientific fields. Thereby a material oriented CO₂-reduction shall be achieved via refractory material recycling.

The aim of PhD project P6 is to establish an extended simulation tool that directly supports the research on a new generation of carbon bonded refractory materials, so-called “Green Refractories”, based on MgO-C recyclates and environmentally friendly binders. The primary focus lies on enabling a solid mechanics-based assessment of the materials that are holistically investigated with the Research Training Group. In addition to the assessment of already produced refractory materials, it shall be possible to predict thermomechanical properties in the sense of a virtual laboratory. Quantities of central influence on the creep and thermal shock resistance of the refractory materials will then be identified via numerical experiments based on experimentally calibrated and validated models. In terms of methods, the focus of the project for Cohort II is placed on phase-field modeling, also in combination with the cohesive zone approaches of the first phase. The goal is to be able to simultaneously capture fracture and damage phenomena on interfaces and in the interior of recycle grains and thereby enhance the applicability of the approach and also simulation accuracy. Modeling in this context therefore serves the purpose of revealing structure property relations to identify important potential pathways towards achieving improved material properties.

Job description:

- working on a multidisciplinary scientific topic in the field of recycling of refractory materials
- readiness and ability to complete a PhD thesis
- conceptualization and formulation of novel modeling approaches, implementation of such models into finite element environments as well as verification and validation of model predictions
- analysis, interpretation and assessment of simulation results
- discussion of results within an interdisciplinary research team
- writing of reports
- writing and submitting of scientific publications in peer-reviewed journals
- presentation of research results at national and international conferences

What you can expect from us:

- working at a family-friendly university with flexible working hours
- remuneration according to the provisions of the collective agreement for the public service of the German federal states in accordance with the personal requirements
- attractive fringe benefits, e.g. Asset-based benefits (VL), company pension schemes (VBL), health management, “Job-Ticket”
- a wide range of networking, mentoring and development opportunities
- a focused research programme and a structured training strategy

What we expect from you:

- a higher-than-average university diploma or master's degree in engineering or natural sciences, applied mathematics or related fields
- a strong background and practical experience in continuum mechanics, FE analysis and material modeling
- an aptitude for theoretical and computationally oriented research
- good team-working and communication skills
- excellent English and German skills, both written and spoken

For selecting the best suited and highly motivated PhD candidates a three-stage weighted procedure will be applied:

Stage I. Submitted written application documents (weighting: letter of motivation 10%, final grade 50%, relevance of the master's or diploma thesis 40%)

Stage II. Online interview via the conferencing system BigBlueButton (weighting: motivation 30%, professional skills 50%, language skills 20%)

Stage III. Oral presentation at the TU Bergakademie Freiberg (weighting: 10-minute oral presentation on the given topic: 50%, discussion 50%).

**For further information please contact Prof. Björn Kiefer, Ph.D
(phone: +49-3731 39-2465, e-mail: Bjoern.Kiefer@imfd.tu-freiberg.de).**

The applicant (m/f/d) must meet the hiring requirements for fixed-term employment contracts according to the WissZeitVG. Applicants with disabilities will receive preferential consideration, provided they possess equal qualifications. For consideration, we ask you to submit proof of your disabled status together with your application documents. TU Bergakademie is committed to increasing the number of women in teaching and research positions, hence qualified female candidates are especially encouraged to apply.

Written applications, including a CV, motivation letter and copies of all relevant qualifications documents (certificates, diplomas) as well as and a summary of the thesis, should be submitted by **March 15, 2024** stating **reference number (295-E/2023)** to the following address:

**TU Bergakademie Freiberg, Dezernat für Personalangelegenheiten, 09596 Freiberg or e-mail:
bewerbungen@tu-freiberg.de**

Your application documents will not be returned, please only submit copies. TU Bergakademie Freiberg is always looking for scientific personnel from various disciplines. Further information can be found at <http://tu-freiberg.de>.