



The Faculty of Materials Science and Materials Technology, Institute of Nonferrous Metallurgy and Purest Materials, is seeking to fill the following position as soon as possible



**Research Associate (m/f/d) – reference number 138-E/2022**

within the DFG Research Training Group “Refractory Recycling: A contribution for raw material-, energy- and climate-efficiency in high temperature processes” (GRK 2802), PhD project P10 "Investigation of new carbon-free materials as inert anodes in aluminium molten-salt electrolysis"

is available.

**Pay grade:** according to German pay grade E13 TV-L  
**Hours:** 1,0 FTE (part-time possible)  
**Contract type:** fixed-term for 48 months

The focus of the Research Training Group GRK 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 thermos-mechanical, chemical and functional properties in high-temperature metallurgical processes, to generate new research ideas and thus to open up new research fields. The aim is to achieve a material-related CO<sub>2</sub> reduction through recycling and through the innovative use of such materials in processes.

The aim of the PhD project P10 is to characterise the behaviour of inert anodes (based on MgO recyclates and Cr-Ni steel incl. further additives such as Ni/NiO/TiO<sub>2</sub>) with regard to their use in fused-salt electrolysis for the production of aluminium (Al) from alumina (Al<sub>2</sub>O<sub>3</sub>). The replacement of state-of-the-art graphite anodes in fused-salt electrolysis in combination with recycling concepts in the production of the anode have the potential to avoid more than 400-460 kg CO<sub>2</sub> per tonne of aluminium. The characterisation of the behaviour of inert anodes will take place in a high-temperature laboratory electrolysis cell, while particular focus will be given to quantifying the emissions of perfluorocarbons (CF<sub>x</sub>). Corrosion taking place at the anode-gas-phase and anode-electrolyte (here cryolite) interfaces will be investigated. The relationship between current density, temperature and electrochemical corrosion rate will be determined during long-term experiments. The electrical conductivity of the interface (anode-electrolyte) is investigated. Furthermore, the wettability of the cryolite melt with the anode is investigated in a sessile drop system. Another focus is the investigation of other electrolyte systems, such as KF-AlF<sub>3</sub>, with the aim of increasing the corrosion resistance of inert electrodes through lower operating temperatures.

**Job description:**

- working on an interdisciplinary scientific topic that combines the investigation of the electrochemical behaviour of environmental friendly inert anodes and their material properties with upcycling processes of refractory recyclates
- readiness and ability to complete a PhD thesis
- planning and performing experiments to characterise the behaviour of inert anodes during high-temperature molten-salt electrolysis for the production of aluminium
- evaluation of measurement data, interpretation of measurement results
- interdisciplinary cooperation with other PhD projects
- preparation of reports
- writing and submission of scientific publications to peer-reviewed journals
- presentation of results at national and international conferences

**What you can expect from us:**

- working at a family-friendly university with flexible working hours
- 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:**

- university diploma or master's degree in Materials Science, Materials Engineering, Metallurgy or related disciplines
- outstanding theoretical knowledge and practical skills in the areas of pyrometallurgy and/or electrochemistry
- an aptitude for experimental research work
- good team-working and communication skills
- advanced German and English skills
- readiness and ability to complete a PhD thesis

A three-stage, weighted process is used to select the best suited and highly motivated PhD candidates.

For more information, see:

**GRK 2802 website:** <https://tu-freiberg.de/forschung/grk2802/stellenangebote>

**For further information please contact Univ.-Prof. Dr.-Ing. Alexandros Charitos (phone: +49-3731 39-2303, e-mail: [Alexandros.Charitos@inemet.tu-freiberg.de](mailto:Alexandros.Charitos@inemet.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) and a summary of the thesis, should be submitted by **June 26<sup>th</sup>, 2022** stating **reference number (138-E/ 2022)** to the following address:

**TU Bergakademie Freiberg, Dezernat für Personalangelegenheiten, 09596 Freiberg or e-mail: [bewerbungen@tu-freiberg.de](mailto: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/wirtschaft/karriere/stellenausschreibungen>