



At the TU Bergakademie Freiberg, Faculty of Materials Science and Technology, Institute of Nonferrous Metallurgy and Purest Materials, is from 1<sup>st</sup> of January 2023 an open position of a



### Research Associate (m/f/d) – reference number 200-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 P11 “Investigation of the oxidation resistance and of the behaviour of carbon-lean anodes during molten salt electrolysis of aluminium”

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 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 CO<sub>2</sub>-reduction shall be achieved via refractory material recycling.

The aim of the PhD project P11 is the evaluation of carbon-lean anodes on the basis of metaloceramic composite materials with max-phases and residual carbon from MgO recyclates. Carbon has a positive influence on the electrical conductivity of anodes and is present in refractory materials in need of recycling. To reduce the CO<sub>2</sub>- and environmental footprint it is imperative that the generation of CO, CO<sub>2</sub>, CF<sub>4</sub> that on the novel carbon-lean anodes is minimized or even avoided. The oxidation rate of the anodes during molten salt electrolysis will be measured with use of continuous CO/CO<sub>2</sub> measurements. The occurring oxidation and corrosion mechanism will be studied through RFA, XRD und REM-EDX. The electrical conductivity on the anode-electrolyte interface will be a focus point of the investigations. Comparative studies between the novel carbon-lean anodes and conventional graphite anodes will be carried out in a high-temperature electrolysis cell. In addition, the protection of the carbon-lean composite materials of the anode through a flame-oxidation induced passivation layer will be central to the investigations considering attaining sufficient conductivity and thermomechanical/ chemical stability.

#### Job description:

- working on an interdisciplinary scientific topic that combines the investigation of the electrochemical behaviour of environmental friendly carbon-lean anodes and their material properties with upcycling processes of refractory recyclates.
- planning and execution of 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”
- induction by long-standing employees, opportunities for further training
- 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 and/or thermochemistry as well as materials characterization of metallic/ceramic samples
- 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/en/forschung/grk2802/job-offers>

**For further information please contact 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 **August 29<sup>th</sup>, 2022** stating **reference number (200-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>