



The TU Bergakademie Freiberg was founded in 1765 and is one of the technical universities with the longest traditions in Germany

The Institute for Inorganic Chemistry is offering a PhD position for a DFG*-funded research project:

*(i.e. German Research Foundation)

"The System Si–Al–O–N at Extreme Pressures: A Synthetic and Computational Route to Novel Materials?"

Salary: pay grade ½ [TV-L 13](#)
Term-limitation: 36 months

Required qualification:

University degree (Diploma, M.Sc.) in science or engineering

The project is dedicated to the elucidation of the high-pressure-high temperature behaviour of nitrides and oxide nitrides in the element system Si-Al-O-N which is not well known to a large extent. Already at ambient pressure this system inherits several of the most important high-performance ceramics, such as Si_3N_4 and SiAlON (cutting tools, bearing balls...), AlN (electronic heat sinks...), AlON (transparent armor). Dense and superhard high pressure forms of Si_3N_4 and AlN have been found and will be further investigated with respect to their mechanical (hardness, elastic constants) and electrical (electronic band gap...) and thermal properties. The experimental work within the project can, for example, include high-pressure high-temperature single crystal growth of these novel phases, but also synthesis of starting materials with specific composition $\text{SiAl}_x\text{O}_y\text{N}_z$ using solid-state or chemical precursor routes and investigation of their conversion products after static or dynamic high pressure treatment.

Although being based at the Institute for Inorganic Chemistry, this project is clearly interdisciplinary and will include close interaction with other researchers at the institutes for materials science, theoretical physics, mineralogy and engineering, who are joint together in the Freiberg High Pressure Research Centre (FHP).

Experiences or preliminary knowledge in one or several of the following research fields would be appreciated, but are not compulsory:

- Ceramics / solid state and/or inorganic chemistry / crystallography
- Synthesis of materials via precursor routes
- Manipulation of air- or moisture sensitive substances**
** (Schlenck- and glovebox technique)
- High temperature techniques
- Extreme pressure techniques (multi-anvil, diamond anvil, shock waves)
- Chemical and structural analytics and materials characterization:
 - o Liquid and solid state spectroscopic methods
 - o Electron- and optical microscopy
 - o XRD
 - o Mechanical characterization, especially indentation & hardness testing

We particularly encourage female applicants to apply for this position. Disabled persons will be preferred in case of equal qualification.

For further information please contact [Prof. E. Kroke](#) or [Dr. Marcus Schwarz](#).

Please send your written application including the usual documents (CV, scientific career records, certificates) to:

TU Bergakademie Freiberg, Dezernat für Personalwesen, Akademiestr. 6, 09596 Freiberg

Application reference number: (159/2009)

Application deadline: 28. Aug. 2009