Open postdoctoral position at KIT-INE, Karlsruhe, Germany

With more than 100 employees, the Institute for Nuclear Waste Disposal (http://www.ine.kit.edu/) at the Karlsruhe Institute of Technology (http://www.kit.edu) is the largest institute in the field of nuclear safety research within the Helmholtz Association of German Research Centers. Within the scope of provident research, KIT-INE conducts both basic and applied R&D in the field of safe disposal of nuclear waste. KIT-INE has a number of available facilities including:

- a radioactive controlled area for working with radionuclides of all types, where appropriate laboratories are equipped with state-of-the-art equipment, including hot cells, alpha and inert gas glove boxes,
- the most modern facilities and instrumentation for analysis of radioactive materials,
- state-of-the-art laser spectroscopy for speciation of radionuclides,
- the INE-Beamline for actinide research at the local synchrotron light source ANKA.

KIT-INE has currently an open postdoctoral position (2 years) on:

**Steel corrosion and uptake of actinides by iron corrosion products**

Geological disposal is considered a prime solution to the safe management of high-level nuclear waste. However, during the geological evolution of the repository system, ground water may come in contact with the canister containing the nuclear waste and steel will start corroding. Information on steel corrosion under low saline conditions has been reported. However, a detailed mechanistic understanding of steel corrosion under saline conditions, such as may be expected for a salt-based waste repository, is still lacking. The formation of secondary phases upon steel corrosion also constitutes an additional barrier to the radionuclide migration. However, only scarce information on radionuclide retention under saline conditions has been reported. The goal of this project is to obtain information on steel corrosion and on the retention of actinides by coprecipitation with selected corrosion products.

The first goal of this project is to investigate the steel corrosion by using an electrochemical setup. Experiments will be performed under defined chemical conditions, and at the end of the experiment, various microscopic and spectroscopic techniques will be used to characterize the neoformed secondary phases and identify the corrosion mechanism. Results will also be compared to data obtained by characterizing samples from corrosion experiments performed by project partner. The second goal is to investigate the retention of actinides by structural incorporation within the secondary phases identified in corrosion experiments. Information on the molecular scale environment of the actinide will be provided by X-ray absorption spectroscopy and shed light on the possible incorporation within the host lattice. Quantum chemical calculations at the Density Functional Theory level will be performed to complement experimental data. Data generated within this project will be made available to improve safety performance assessment of a nuclear waste repository.

This study is related to the KORSO project funded by the German Federal Ministry for Economic Affair and Energy (BMWi), dedicated to investigations on corrosion and sorption processes at steel surfaces at higher temperatures and pressures under saline conditions.


**Contact at KIT-INE**

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*Note that this is no official job-offer from KIT, which will be posted later at the official KIT webpage.*