

## Microcosm studies for evaluating the microbial influence on metal corrosion

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A deep geological disposal by using multiple barriers is favored for the long-term storage of high-level radioactive waste. A safe long-term storage means to analyze the applied materials according to their structural properties and stability in order to identify potential risks that could evolve during the operational phase and on the long run. So far, several concepts in Europe prefer cast iron and copper as canister materials (technical barrier) and bentonite as backfill- and buffering-/sealing material in between the canister and the host rock formation. In order to analyze the influence of naturally occurring microorganisms in bentonite on the respective barrier materials, different microcosm experiments were set up. These slurry experiments contain the Bavarian B25 bentonite, synthetic Opalinus Clay pore water or cap rock solution as well as copper- or cast iron plates in various combinations. During an incubation time of 400 days under anaerobic conditions at 37 °C, several bio-geochemical parameters (e.g. pH, redox potential and the concentration of minerals, sulfate, iron(II/III) and organic acids) were analyzed as well as the development of microbial diversity and incubated metal plates in the respective experiments. The obtained results provide insights into the complex interplay between bentonite, pore water, metals and microorganisms and can help to get a deeper understanding of the corrosion process of canister materials under the applied conditions.

Vlad Sushko



- Received his master`s degree in chemistry with specialization in analytical chemistry at the National Taras Shevchenko University of Kyiv (Ukraine)
- His thesis focused on the development and characterization of a cheap and sensitive fluorometric method for routine measurement of oxalic acid in human plasma and urine
- Afterwards he worked at the Enamine Ltd. in Kyiv as a specialist in chromatography and mass spectrometry
- In September 2019 he joined the Biogeochemistry department of the Institute of Resource Ecology at the HZDR as PhD student with special focus on the microbial influence on barrier materials in repositories of high-level radioactive waste
- Currently, his research focuses on the corrosion behavior of metals in the presence of different bentonites

Dr. Nicole Matschiavelli



- Received her Dr. rer. nat. in Microbiology under the supervision of Prof. Dr. Michael Rother at the TU Dresden (Germany)
- Her dissertation focused on the characterization of microbial communities in extreme environments, i.e. shale reservoir
- She joined the Biogeochemistry department of the Institute of Resource Ecology at the HZDR as a post-doctoral researcher with special focus on the microbial influence on barrier materials in repositories of high-level radioactive waste
- Currently, her research focuses on investigating the diversity of naturally occurring microorganisms in bentonites and their influence on the geochemical parameters of bentonite-pore water-slurries including metal plates that mimic the respective container materials