Master Project (6 months)

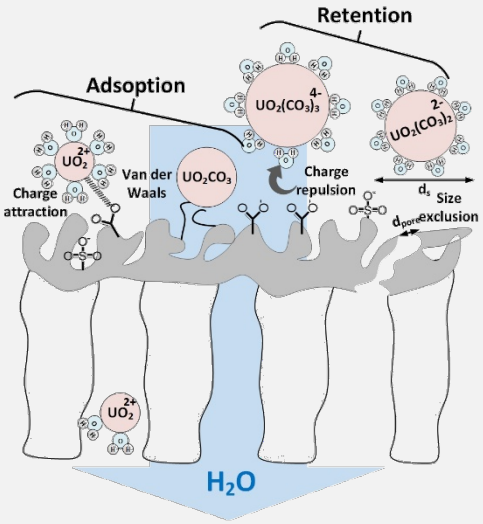
Uranium removal using photovoltaic-powered nanofiltration

Project

Uranium occurrence in natural water sources represents a threat to human health due to its chemitoxicity, leading public health agencies to set maximum acceptable concentration guidelines as low as 30 µg/L for drinking water. Uranium contamination of groundwater results from the natural dissolution of mineral formations and anthropogenic activities, such as mining. This is the case of the old Krunkelbach pit near the municipality Menzenschwand in the Black Forest, where a spring water conduit has uranium concentration above the guideline.

Photovoltaic-powered nanofiltration system

Mechanisms of uranium species separation in nanofiltration



Photovoltaic-powered nanofiltration (PV-NF) is a promising technology for the provision of drinking water in, for example, off-grid rural areas in developing countries. Removal of uranium from contaminated groundwater using PV-NF could increase access to safe drinking water by enabling consumption of currently unutilized water sources, thereby contributing to the realization of United Nations Sustainable Development Goal (SDG) 6: *ensure availability and sustainable management of water and sanitation for all*.

This project aims to evaluate the removal of uranium from real water sources during field experiments using a mobile pilot-scale PV-NF system. Specific project tasks will include:

- Conduct field-based experiments for the removal of uranium from water using a pilot-scale photovoltaic-powered nanofiltration system.
- Collect water samples for water analysis using IAMT facilities, including uranium analysis using inductively coupled plasma mass spectrometry (ICP-MS).
- Analyse experimental data and contribute to writing a joint research publication (in English).

Qualifications

The project is the final research project in a Master's degree. The candidate will be studying for a Master's in Chemical, Process, Environmental Engineering, or equivalent, and is naturally curious, eager to learn, and has a strong interest in research. Basic knowledge of water chemistry, water treatment processes, and membrane technology is essential. Evidence of writing skills in English language, ability to learn/use OriginLab for data analysis/graphing as well as EndNote for literature management, and the willingness to lead or contribute to writing a scientific publication are a must.

KIT

KIT is one of the biggest research institutions worldwide and has access to state-of-the-art research facilities. This project is hosted by the relatively new Institute for Advanced Membrane Technology (IAMT) in new laboratories and state-of-the-art equipment. IAMT is part of the Division Earth and Environment at KIT and the Faculty of Chemical and Process Engineering. The research team is international and the language is English (oral and written communication)

Contact

Dr. Tyler Malkoske, Institute for Advanced Membrane Technology (IAMT),
+49 (0)721 608 24364, Tyler.Malkoske@kit.edu, https://www.iamt.kit.edu

Dr. Youssef-Amine Boussouga, Institute for Advanced Membrane Technology (IAMT),
+49 (0)721 608 2436, Youssef-Amine.Boussouga@kit.edu, https://www.iamt.kit.edu

Prof. Dr.-Ing. Andrea I. Schäfer, Institute for Advanced Membrane Technology (IAMT),
+49 (0)721 608 26906, Andrea.Iris.Schaefer@kit.edu, https://www.iamt.kit.edu

Applications

Please send applications with CV, motivation letter that specifies interests and preferred start date, academic transcripts, and degree certificates.

Start Date

Flexible/negotiable.