PhD Position (Doktorarbeit)

Project

This PhD project builds on ongoing research projects running jointly between IMT and IAMT in the area of coating novel photocatalytic thin-films onto membranes for water treatment. Current research focuses on the deposition of 5-10 nm thick titanium dioxide (TiO_2) layers via atomic layer deposition (ALD) onto ceramic membranes. This will be expanded to focus on: i) methods for enhancing visible light absorption whilst retaining high photocatalytic activity; ii) optimising thin-film deposition parameters to maximise the coverage of the surface-area; an iii) investigate system design from small-scale to potentially pilot scale process design, including the challenge of integrating a light source into the setup.

There are many aspects of this project, that require in-depth research and development, including:

- To what degree can other photocatalytic oxides (including ternary and quaternary) be realised via ALD coatings?
- How can the ALD deposition parameters be optimised such that low deposition temperatures (compatible with polymeric membranes) be realised?
- How can either sunlight or an ultraviolet/ visible LED be integrated into a scaled-up setup (that is beyond the current size of a few-cm^2 area)?
- What are the most suitable photocatalytic material characteristics for the degradation of micropollutants in water and what selection criteria/tools are important?

The PhD project will be largely experimental and will begin with an identification of a set of research questions based on detailed literature survey. A preliminary research proposal is required at the time of application (with a timetable for a 3–4 year research project) and will be further expanded to 4 main experimental chapters. Required equipment will be set up and further developed to achieve the project goals. Execution of the research plan through conducting of experiments, sample and data analysis and write up of results for scientific publication are part of the PhD process – a journey to become an independent researcher!

Throughout the project, there will be multiple opportunities for cooperation with internal and external partners, supervising bachelor and master students, giving oral presentations at conferences, writing high-impact journal articles, as well as sharing your knowledge via teaching.

Qualifications

You will most likely already hold a Masters in Engineering or Physics or equivalent. You are a naturally curious person who is eager to learn more and has a strong interest in research. Experience with the deposition and characterisation of thin films is a definite advantage, as well as being comfortable in specifying system components and sound experimental problem-solving skills – as well a good common sense. Excellent English language proficiency is essential, basic German language skills of advantage.

KIT

KIT is one of the biggest research institutions worldwide and has access to state-of-the art research facilities resulting from the merger of the National Research Centre of the Helmholtz Association and the former Technical University of Karlsruhe. This project is jointly hosted between the Institute of Microstructure Technology (IMT) and the Institute for Advanced Membrane Technology (IAMT), both located on Campus North of the Karlsruhe Institute of Technology.

Contact

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Applications

Please send applications with: i) CV, ii) publication list incl. your contribution to the publication (if relevant), iii) academic transcripts, iv) degree certificates, v) contact details for three references and vi) a preliminary research proposal. A valid driver's licence will be required.