



2023 Helmholtz – OCPC – Programme for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project:

Photo- and electrocatalytic membranes for micropollutant degradation

Helmholtz Centre and/or institute:

Karlsruhe Institute of Technology (KIT)

Project leader:

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Description of the project (max. 1 page):

Several postdoc opportunities are available that build on ongoing research projects in the area of Photo- and electrocatalytic Membrane Reactors (PMR, EMR) for the removal of micropollutants during water treatment and reuse. Projects span from materials characterization through to process upscale depending on the individual skills and interests of the applicant. On the materials side, the main aim is to fabricate a photo- and electrocatalytic membranes and investigate these systematically using common operational and water quality parameters for the removal of micropollutants such as steroid hormones in the nanogram per litre concentration range. On the process side the design and construction of a pilot system with an innovative photocatalytic membrane module is a key challenge – followed by field testing.

The research is carried out at IAMT where the membranes will be characterized with state-of-the-art filtration and analytical devices. Extensive opportunity for international collaboration and up-scale exists.

The project is developed with the following objectives, i) identify a photo- or electro catalytic material of interest that targets the degradation of challenging micropollutants, ii) identify most suited analytical method for micropollutant of interest (analytical tools for ng/L quantification exist), iii) evaluate the effectiveness of membrane for the removal of micropollutants initially in synthetic and later in real waters.



This research will investigate the following research questions;

- ◆ What are the limiting parameters to the degradation of the most stable micropollutant bonds?
- ◆ What is the degradation efficiency in a flow through reactor operated with various light sources or applied potentials?
- ◆ What are the mechanisms involved in micropollutant removal in PMR or EMRs?

Further, the postdoc will be responsible for process development and up-scale, setup and control of this membrane filtration system in the laboratory working with workshops and suppliers on such engineering tasks. At postdoctoral level the preparation of research proposals and publications, participation in team responsibilities and activities as well as the supervision of students is a key requirement. Throughout the project, there will be additional opportunities for cooperation with internal and external partners, team events, as well as contributing to (a minimal amount of) teaching.

Description of existing or sought Chinese collaboration partner institute (max. half page):

IAMT is open to new collaborations from within China with a focus on membrane technology.

Required qualification of the postdoc:

The ideal candidate will hold a PhD in Chemical, Process, Environmental, Materials Engineering, or equivalent and is a naturally curious 'can do' person, eager to learn more and has a strong interest in research. Experience with membrane filtration is a requirement and photo and electrocatalytic membrane systems (of any scale) a definite advantage. Further requirements are experience in specifying system components, sound experimental problem-solving skills, micropollutant/water analysis and a solid publication track record – as well a good common sense. Excellent English language proficiency is essential (IAMT is English speaking), basic German language skills of advantage. A valid driver's licence is required.

Please send applications with cover letter addressing position requirements, CV, publication list and your contribution to the publication (if relevant), academic transcripts, degree certificates, contact details for three references and a preliminary research proposal on the topic to the above contact(s). It is strongly advised to visit the IAMT website as well as read the numerous publications on the topic.