



2025 Helmholtz – OCPC – Program for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project:

Membrane concentrate treatment membrane distillation

Helmholtz Centre and/or institute:

Karlsruhe Institute of Technology (KIT)

Project leader:

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Description of the project (max. 1 page):

Concentrates from nanofiltration and reverse osmosis require further concentration for resource recovery and disposal. The treatment will be investigated on a laboratory scale to investigate i) novel membrane distillation materials, ii) a novel stack configurations and iii) a range of real concentrates with varying quality for economic-technical evaluation. On the process side the design and construction of a pilot system with an innovative membrane distillation module is a key challenge – followed by field testing as a mobile unit powered by renewable energy.

This research expands from ongoing projects in the area of renewable energy powered membrane processes, in particular solar powered hybrid ultra- and nanofiltration as well as electrodialysis at IAMT. The removal of inorganic contaminants such as nitrate, arsenic, selenium, uranium and fluoride is a key priority in water provision, while other elements can be recovered depending on economic value. The projects explore aspects that range from system adaptation to fluctuations in solar energy that results in a non-steady state operation and variation in contaminant retention to dealing with concentrates by coupling with membrane distillation.

The research will include i) examination of novel membrane distillation membranes (ideally prepared also by collaborators in China), ii) operation of novel membrane distillation system with renewable energy, iii) investigate membrane distillation for concentrate recovery, iv) resource mass balance, and v) organise and conduct national and international field work. Many aspects of this project require in-depth research and development, including;

- ◆ Feasibility studies on removal of contaminants in a solar powered membrane distillation process
- ◆ Establishment of the most suitable energy management scenario in collaboration with the renewable energy colleagues at KIT-IMT
- ◆ Elucidate the dominant separation mechanisms such that both fundamental understanding and optimized process performance can be achieved in electrodialysis and membrane distillation



Throughout the project, there will be multiple opportunities for cooperation with internal and external partners. The choice of collaboration partners and field trip destinations is open. Significant experience in working with different African countries exists in the team, while mobile Landrover - Trailer units will enable working in geographically closer destinations.

Co-supervising PhD and supervising master students, giving oral presentations at conferences, writing high-impact journal articles, as well as sharing your knowledge via (a minimal amount of) teaching. Career development through many team activities is an opportunity to attain leadership skills and prepare for exciting professional opportunities in industry or academia.

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 materials and processes. Many IAMT collaborations have resulted in joint publications in high impact journals.

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 experience with electrodialysis of membrane distillation systems (of any scale) a definite advantage. Further requirements are experience in specifying system components, sound experimental problem solving skills, trace ion/water analysis and a solid publication track record – as well as 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** (10 pages) on the topic to the above contact(s). It is strongly advised to visit the IAMT website as well as read the numerous publications relevant to the research area.