



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

### PART A

**Title of the project:**

Nanofiltration in a circular economy: from water for hydrogen to resource recovery

**Helmholtz Centre and/or institute:**

Karlsruhe Institute of Technology (KIT)

**Project leader:**

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**Description of the project** (max. 1 page):

Nanofiltration is a well established technology for a myriad of applications from drinking water production to acid mine drainage treatment. Nanofiltration membranes are highly selective and permeable and thus suited for organic matter as well as ion separation. The applications of producing clean water for hydrogen production as well as resource recovery are integral to a circular economy. The applicant is invited to define a project that investigates both fundamental processes as well as an application of nanofiltration with a purpose of making a contribution to a circular economy approach – in a chosen field of study. This can include any application water reuse, acid mine runoff treatment, water for hydrogen production, resource recovery from various waters, etc..

The research will include i) review of novel applications of nanofiltration, including recent developments in nanofiltration materials, ii) scoping of a suitable project where nanofiltration has a unique advantage in terms of selectivity and permeability (and thus energy requirements) for solving global challenges, iii) experimental investigations at laboratory scale (synthetic water) as well as field scale (real waters) for the chosen application, iv) resource mass balance, and v) techno-economic

analysis of water provision for the given application in a context of circular economy that consider waste minimization, resource efficiency and resilience.

Many aspects of this project require in-depth research and development, including;

- ◆ Feasibility studies on nanofiltration application potential and associated performance gains compared to conventional processes
- ◆ Set-up of suitable experimental protocols that enable extrapolation of data to large scale nanofiltration applications
- ◆ Establish collaboration with companies that can enable access to real water and performance data in terms of resources, energy requirements and water quality for techno-economic analysis



There will be several projects available. Throughout the chosen 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 a mobile Landrover - Trailer nanofiltration unit 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, as well as applications. 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 nanofiltration (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.