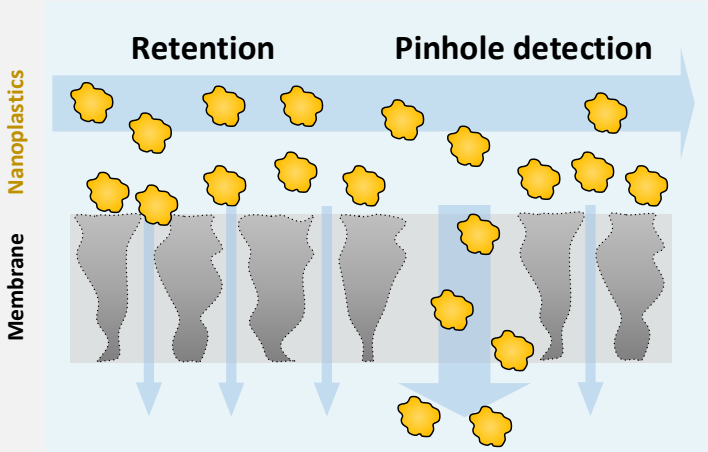
Master Project

Research project opportunity (6 month) for students finishing their master at any university allowing student mobility

Project Summary

Fate of nanoplastics in membrane processes



Micro- and nanoplastics are ubiquitous in aquatic environments and have raised significant concerns due to their toxicity.
Ultra- and nanofiltration are membrane processes that can retain particles such as pathogens or micro- and nanoplastics with sizes larger than the membrane pore sizes. For membranes to be an effective barrier, defects such as pinholes or cracks need to be detected in-situ. Provided suitable analytical tools are available, nanoparticles can be used as probes for the membrane retention studies and membrane integrity monitoring. In this context, this project will to investigate the interactions between nanoplastics and the membrane surface making use of state-of-the-art analytical tools such as laser induced breakdown spectroscopy (LIBD). Key factors affecting the filtration performance (membrane pore size, type and number of defects, nanoplastic concentration, and applied pressure) will be systematically examined.
Nanoplastics are sourced either from commercial suppliers (with particle sizes 20−400 nm) or synthesized by collaborators at Tel Aviv University (with varied shapes and origins). Commercial membranes, both intact and with defects will be used, while membranes with controlled pinholes will be prepared by colleagues at Boston University, USA.

The Master's student will be responsible for carrying out the following tasks;

- Literature review to acquire fundamental and applied knowledge on the topics of micro- and nanoplastics sources, detection and characterization, membrane integrity testing methods, membrane colloid and particle filtration, membrane models, etc.;
- Operation of filtration experiments with in-situ nanoplastic concentration determination;
- Data analysis and, if suitable, contribution to the preparation of a research publication.

Besides, the student will be participating in group activities and writing of reports and take part in collaborative discussions with colleagues from KIT-IAMT and other institutes. Language of all communications and writing will be English.

Required Skills

Current enrolment in a Master in Chemical/Process Engineering or equiv. (Uni., TH)
Good knowledge in chemistry and membrane technology; proactive in learning; evidenced writing skills in English language; ability to use MS Word, Excel; willingness to acquire proficiency in Origin Labs and MS Visio software for data analysis and graphing, and Endnote for citation mgmt; interest in the possibility to contribute scientifically to the writing of a scientific publication.

Institute/ Department

Institute for Advanced Membrane Technology (IAMT), Bldg. 352, Campus North, Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany for information on team, research skills and research environment: https://www.iamt.kit.edu/

Start Date

Flexible/Negotiable. Duration at least 6 months.

Application Procedure

Please email CV, transcripts and motivation letter with available time period for evaluation. For external applicants please provide details of the local supervisor.

Project Advisor(s)

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