

Diplomarbeit / Masters Project

Project Summary **Dynamic functionalization of microporous membrane with β -cyclodextrin for hormone removal from wastewater**

Recently, β -cyclodextrin functionalized membranes have shown great potentials for micropollutants removal from wastewater because of their unique host-guest interactions. However, membranes prepared by physical blending of β -cyclodextrin with polymer matrix suffer from long-term stability issue as β -cyclodextrin gradually dissolves in water. While covalent bonding of β -cyclodextrin on membrane surface possesses better durability, this permanent irreversible bonding of β -cyclodextrin may result in a decrease of adsorption capacity after regeneration process.

Research at ITG-Levkin research group uses the dynamic disulfide bonding chemistry for attaching the β -cyclodextrin groups onto microporous membrane surface. This dynamic bonding could enable the β -cyclodextrin groups to be refreshed or exchanged when the adsorption of micropollutants is saturated.

This master project will check the adsorption capacity of β -cyclodextrin functionalized microporous membranes prepared using a dynamic disulfide crosslinker. The methods for membrane preparation, functionalization, characterization, as well as hormone static adsorption and breakthrough test have already been developed.

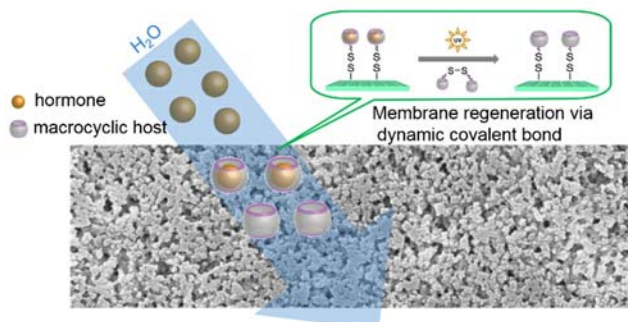


Figure 1: A schematic showing the dynamic functionalization of membrane with β -cyclodextrin via disulfide bonds.

Specifically, the following tasks will be performed as part of the masters project;

- Literature review on the topic (hormone adsorption, endocrine disrupting chemicals (EDCs), adsorption processes, membrane fouling)
- Material characterization (contact angle, ATR-FTIR, simultaneous thermal analysis, etc) of β -cyclodextrin functionalized microporous membrane prepared under variable conditions.
- Hormone breakthrough experiments with β -cyclodextrin functionalized microporous membrane of different characteristics (thickness, pore size, etc).
- Analyse experimental data and write/co-author a research publication (in English)

Required Skills **Studies in Chemistry/Chemical/Process Engineering or equivalent (Uni, TH, FH)**

Basic knowledge in polymer chemistry, water treatment technologies, membrane technology. Evidenced writing skills in English language, proficiency with Origin Labs software for data analysis and graphing, willingness to lead or contribute to the writing of a scientific publication.

Host Dept. Levkin Research Group of Functional Materials, Institute of Toxicology and Genetics & Membrane Technology Department, Institute for Functional Interfaces (IFG-MT)

Start Date Flexible/negotiable

Application Procedure Please email CV, transcripts and motivation letter with available time period for evaluation.

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