Karlsruhe Institute of Technology

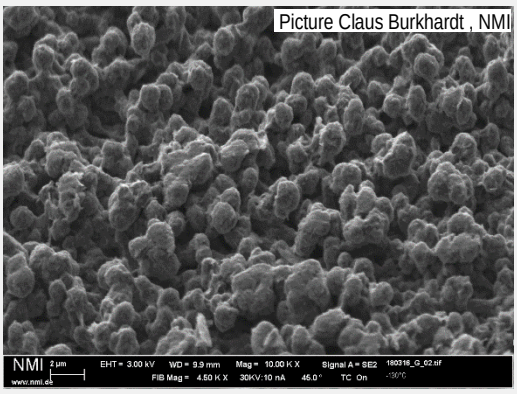
Diplomarbeit / Masters Project

Project Summary:

Graphene Membrane Composites for Water Treatment Applications

Steroid hormones are excreted by humans and are subsequently found in many waterways as micropollutants. Removal of such micropollutants is a major engineering challenge because the separation of steroid from water requires membranes with very small pores and hence a significant amount of energy. Nanomaterials such as graphene are able to adsorb certain micropollutants and hence reduce the energy requirements for water treatment if sufficient removal was attainable. Graphene membranes prepared by the University of Bologna, Italy for non-aqueous applications, will be investigated for possible application in water treatment.

The aim of this project is to characterize these membranes i) for water permeability, ii) micropollutant adsorption, iii) breakthrough behaviour. Based on the variation of a number of water quality parameters interaction mechanisms can be understood and the potential micropollutant uptake capacity estimated. The specific tasks will be;



- Literature review on the topic (graphene like materials; ultrafiltration (UF); micropollutants removal; endocrine disrupting chemicals (EDCs); advanced membrane materials)
- Perform graphene-UF permeability, adsorption and breakthrough experiments
- Analyse water samples from experiments with relevant analytical instruments following calibration and validation
- Analyse experimental data and write/co-author a research publication (in English)

The topic builds on previous projects from which some publications are available.

Required Skills:

Studies in Chemical/Process Engineering or equivalent (Uni, TH)

Basic knowledge in water quality, water treatment technologies, membrane technology, nanomaterials. 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.

Institute/ Department: Institute for Functional Interfaces / Membrane Technology Department (IFG-MT) in collaboration with the University of Bologna, Italy

Start Date: Flexible/negotiable (projects are typically scoped for a duration of 6 months)

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

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