

Water and Sanitation Engineering

Protecting our natural water cycle is necessary to protect our natural drinking water resources. In Bavaria, drinking water originates about 90 % from groundwater. Low concentrations in the effluent have to be achieved in wastewater treatment to preserve excellent water quality. The elimination of nitrogen is – compared to the elimination of carbon (COD) or phosphorous – more complex. Nitrogen elimination can, therefore, be challenging for large wastewater treatment plants in growing urban areas.

The research group is working with a novel technology using moving bed biofilm reactors (MBBR) to treat the effluent of large wastewater treatment plants to further reduce the nitrogen from 10 to <5 mg/l. The process will be implemented in full scale at a cooperating treatment plant. Since no technical guidelines exist for this novel process, a pilot plant was operated for four years. In addition, several lab-scale reactors are used to investigate distinguished aspects such as required hydraulic retention time, external carbon source, and temperature influence. Based on the results gained from pilot plant and lab-scale reactors, technical guidelines will be developed to be used in the design of the full-scale application.

While wastewater treatment is necessary to protect the natural water cycle, wastewater treatment plants consume considerable energy resources. Large wastewater treatment plants usually also produce energy by producing methane. But other forms of energy production are also possible. Major limitations are the significant changes over the day as well as seasonal changes. Therefore, a simulation model is developed in SIMBA# to implement energy flows into the simulation of the biochemical processes. This opens the possibility to identify what forms of energy production are feasible for the respective simulated wastewater treatment plant.

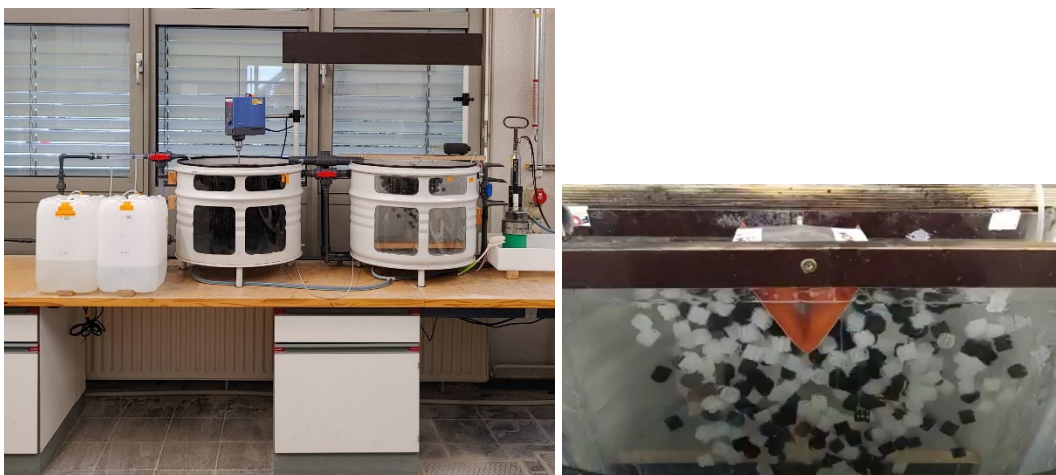


Figure 1: Moving bed biofilm reactors in the lab and moving biofilm carriers

Scope of the internships, applied study semester, or thesis.

The main task during the internship will be conducting laboratory experiments with our lab-scale biofilm reactors to eliminate low nitrogen in low concentrations. This includes lab work and interpreting the results (i.e., assembling results and data, generation of diagrams).

Furthermore, data analysis and data preparation are necessary for simulation processes. The involvement in the simulation process with SIMBA# is not mandatory but could be arranged.

Requirements

Basic knowledge of wastewater treatment processes and basic experience in lab work and analysis are required. The intern will work in our laboratory and offices at the university. Good knowledge of Microsoft Office applications (Excel, Word) is expected.

Qualification level

Advanced Bachelor's degree or Master's degree, Ph.D. students

Programs lines

SRI, A2S, BA/MA

More information

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