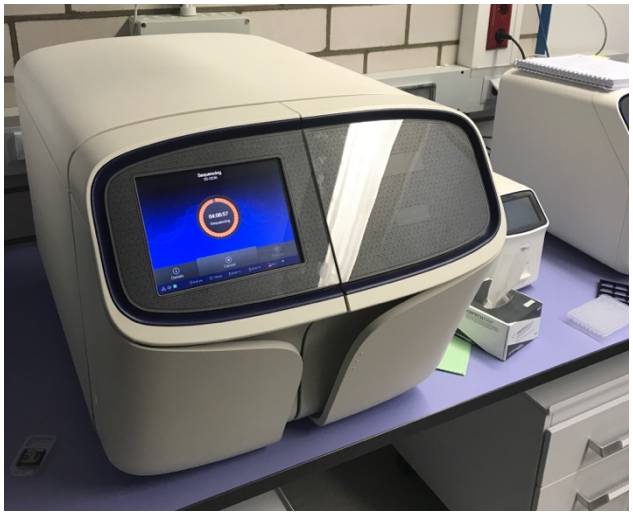
Master/Bachelor Thesis at Technische Universität Darmstadt

Department of Civil and Environmental Engineering Sciences
Chair of Wastewater Engineering

TECHNISCHE UNIVERSITÄT DARMSTADT

Project Title: Quantifying microbes in wastewater using next-generation PCR

Project Description:



The partial Nitritation/Anammox (PNA) process is a relatively new innovative method for nitrogen removal in wastewater treatment plants. These engineered systems strongly depend on the performance of microorganisms working together like cogwheels, e.g. ammonium oxidizing bacteria, anaerobic ammonium oxidizing bacteria and heterotrophic denitrifiers. We use the polymerase chain reaction (PCR) to quantify these organisms and to draw conclusions about their performance in these wastewater treatment systems as well as lab-scale reactors.

Quantitative polymerase chain reaction (qPCR) is a frequently used and well-established method for quantification of bacterial groups. However, the results are dependent on the reference used in the qPCR analysis. The development of next-generation PCR offers a new straightforward method, especially for absolute quantification of these microorganisms. In next-generation PCR a nanofluidic chip provides the possibility to run thousands of PCR reactions in parallel without any need for relying on reference samples or standards. This method is a TaqMan based assay, and therefore highly specific and offers the ability to detect and quantify small copy number differences with high precision.

Task and Requirements:

The student will develop a TaqMan Probe for Ammonium Oxidizing Bacteria by using *insilico* analysis. We are using Next Generation Sequencing data to search for the most relevant species in PN/A systems. This TaqMan Probe will be verified in several wet lab experiments with different wastewater treatment plant samples. Finally, the results will be compared with conventional qPCR.

If you are interested please contact the project supervisor Laura Orschler (l.orschler@iwar.tu-darmstadt.de).

Prof. Dr. Susanne Lackner

Technische Universität Darmstadt

Tel.: 06151/1620301

E-Mail: s.lackner@iwar.tu-darmstadt.de

www.iwar.tu-darmstadt.de/abwasserwirtschaft