

## STUDENT THESIS PROJECT

### Effect of solids retention time on the chain length and biodegradability of extracellular polymeric substances (EPS)

Field: Environmental technology/engineering, water technology, biotechnology, or related fields

Duration: minimum 6 months (start date: October/November 2018)

Location: Wetsus, Leeuwarden, the Netherlands

Allowance: 350 € / month

#### Background

Microorganisms responsible for biological wastewater treatment excrete biopolymers, commonly referred to as extracellular polymeric substances (EPS). These EPS mainly comprise polysaccharides, proteins, lipids or their combinations such as glycoproteins and lipoproteins. The presence of high molecular weight biopolymer fraction in EPS, coupled with the negative surface charge make them promising flocculants. Our recent work demonstrated the possibility to simultaneously combine industrial wastewater treatment with the production of EPS as natural flocculants.<sup>1</sup>

With the aim of producing EPS with high molecular weight to enhance (waste) water particle flocculation, we at the *Natural Flocculant* theme of Wetsus want to investigate the effect of solids retention time (SRT) on the EPS chain length. Besides, we also want to understand how the different SRTs affect the (bio)degradability of produced EPS.

#### Your tasks

- Literature review on the above topic. Formulate research questions.
- Operate in parallel two membrane bioreactors (3.5 L capacity each) at different SRTs.
- Monitor the reactors' performances.
- Extract and purify EPS from sludge.
- Analyse and characterise the extracted EPS (molecular weight, charge density, carbohydrate and protein quantification, etc).
- Aerobic and anaerobic biodegradability tests.
- Write a master thesis.

#### Your profile

- Background (MSc in view) in environmental/biological engineering, water technology, biotechnology, or related fields. Relevant lab experience is an advantage.
- Highly motivated, enthusiastic, and can work independently.
- Can bring new ideas and initiatives into the project.
- Good experimental and analytical skills.
- Fluent in English language (speaking and writing) and able to work in an international environment.

#### Application

You feel excited about this project or still have questions? Just contact me! Interested students are invited to hand in a motivation letter (max. 1 page) and a CV (max. 2 pages) to Victor Ajao ([victor.ajao@wetsus.nl](mailto:victor.ajao@wetsus.nl)).

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1. Ajao, V., Bruning, H., Rijnaarts, H. & Temmink, H. Natural flocculants from fresh and saline wastewater: Comparative properties and flocculation performances. *Chem. Eng. J.* **349**, 622–632 (2018).