

ECAP: Electrochemical Phosphorus Removal and Recovery from Phosphorus-rich Waste Streams

Background

Use of phosphorus fertilizer is essential for securing food production for the increasing global population. Unfortunately, phosphate rock, which is the source of phosphorus fertilizer, is a non-renewable resource and has limited reserves on our planet. Meanwhile, the discharge of phosphate-containing solutions to water bodies leads to a worldwide problem, namely, eutrophication. Therefore, phosphorus in waste streams needs to be removed and potentially reused.

Despite significant advancements in the last decades, the current state-of-art methods have many problems with dosing chemicals, sludge production, and high-energy consumption. We developed a novel electrochemical-based method for phosphorus removal and recovery. Compared with the state-of-art techniques, our approach showed many advantages: there was no need for dosing a calcium source, adjust the pH of wastewater, or require a solid-liquid separation process.

Description of the work

The main goal of this project is to understand the technical and commercial feasibility of electrochemical removal and recovery of phosphorus from phosphorus-rich wastewater (i.e., cheese wastewater).

1. Perform a continuous flow operation of the ECAP technology with real wastewater to identify the stability of this system in long-term operation, and understand how this relates to operational conditions and the collection of precipitates.
2. Perform a systematic optimization of the process, in terms of phosphorus removal efficiency and energy consumption.
3. Identify the quality of the recovered product: compared it with phosphate rock or commercial phosphorus fertilizer.
4. Compare the technical performance (P removal and recovery efficiency) of the ECAP technology with the state-of-the-art technologies (i.e. chemical precipitation).

Requirements

We are looking for highly motivated master students with interest in wastewater treatment and resource recovery. Experience in a chemical lab with the ability to work safely and securely is essential. Knowledge about precipitation, coagulation, and electrochemistry is a bonus but not required. Having a driving license is an advantage. Students with interest in pursuing an academic career are especially encouraged to apply.

Expected start date: November 1st or later, minimum duration: 4 months

Offer

International working atmosphere; state of the art facilities; 175 euro/month allowance; guided by senior PhD researcher;

Application

Applications or questions should be addressed directly to yang.lei@wetsus (Yang), please include your CV for consideration).