

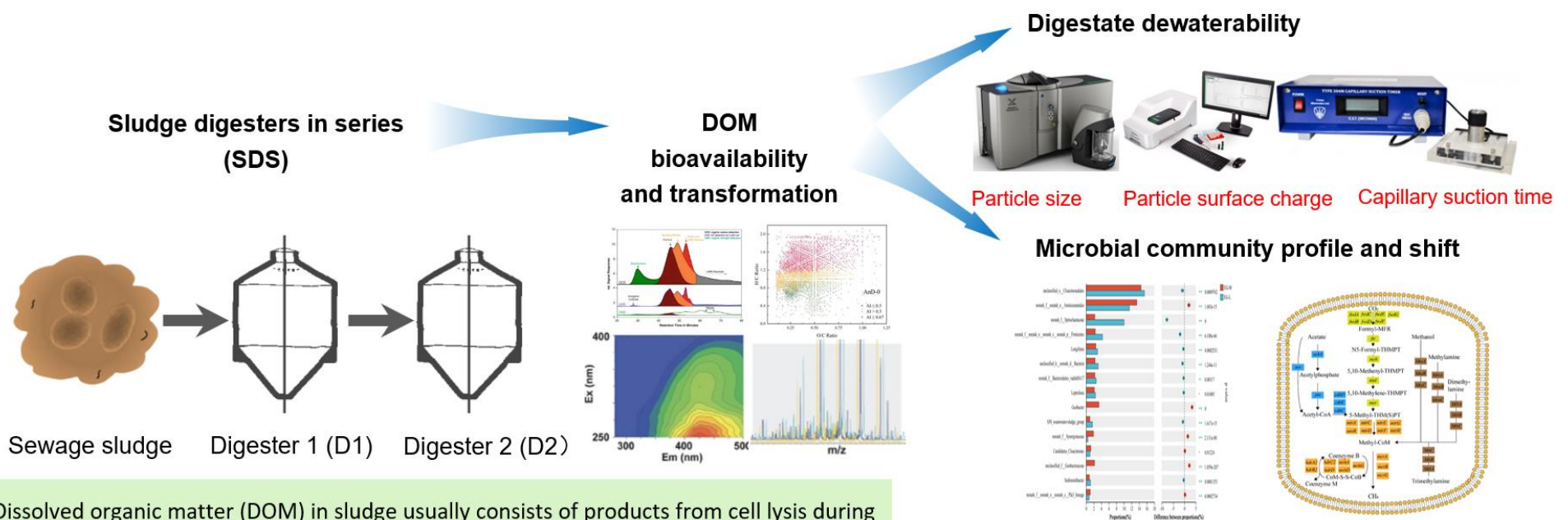
DECIPHER DOM TRANSFORMATION PROPERTIES, DIGESTATE DEWATERABILITY, AND MICROBIOTA SHIFT AT THE VARIOUS SRTS OF AD IN SERIES

Abstract

PUB has been constantly looking for innovative wastewater treatment and state-of-art technologies for the continual improvement of water reclamation plants (WRPs). Sewage sludge, comprising of both primary sludge and waste activated sludge, is generated from the liquid treatment process. Anaerobic digestion is a sequence of processes by which microorganisms break down biodegradable material in the absence of oxygen. The process is used to recover biogas from sewage sludge for energy generation. Sludge digesters in series (thereafter referred to as SDS) mimics a plug flow process which minimises short circuiting, improve mixing and increases the biogas yield. For this project, it is proposed for two demonstration scale digesters to be connected in series and the reactor design, process control and operations shall be optimised to improve its performance and efficiency as compared to conventional systems.

The technology will be demonstrated by retrofitting the existing demo-scale digestors at the current co-digestion demonstration scale plant. If successfully proven, the technology can be retrofitted to both greenfield and brownfield projects. Although three digesters in series may lead to a higher increase in biogas yield, retrofitting 3 digesters in series may not be practical for full-scale implementation due to site and operational constraints. For ease of retrofitting to existing plants and allowing for greater operational flexibility (switching between series and parallel), two instead of three digesters is proposed to be connected in series instead. SDS – 2 digesters in series has not been extensively studied at the demonstration scale. The proposed demonstration aims to validate the design SRT of SDS ranging from 10 to 15 days, that is approximately 47% – 70% of conventional systems with SRT of 21 days. This demonstration will make use of the existing demo-scale digesters at UPWRP with some modifications to suit to the design conditions and operation modes of SDS (2 digesters in series).

ANAEROBIC SLUDGE DIGESTION IN SERIES



Dissolved organic matter (DOM) in sludge usually consists of products from cell lysis during the sewage biological treatment process and refractory residues of some biochemical compounds. Easily degradable organic compounds in DOM are fermented into volatile fatty acids (VFA), which are further converted into biogas by methanogenic bacteria. Therefore, DOM is a key constituent in sludge anaerobic digestion to produce biogas, and identifying DOM characteristics is crucial to optimizing AD performance.

BENEFITS

This will be a promising Sludge Digestion technology to upgrade existing or future water reclamation plants (WRPs), aiming at a more sustainable treatment with reduced footprint, more biogas production, and lower greenhouse gas emissions that echoes the nation pledge and global commitment for a greener earth.



PI Prof Zhou Yan