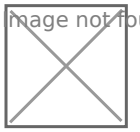
Docket #: S21-202

High flux anaerobic membrane bioreactor

Stanford researchers in the Criddle lab have developed a novel anaerobic membrane bioreactor that enables high flux treatment of wastewater with greatly reduced energy costs. The most common current approaches to wastewater treatment utilize aerobic processes, including aerobic membrane bioreactors. These types of bioreactors require energy-intensive aeration to supply oxygen for the aerobic bacteria they utilize and produce high amounts of biosolids, requiring further processing or disposal, that imposes additional costs. Wastewater aeration requirements account for ~1-2% of US electricity consumption, and biosolids provoke ~13% of the operational expenditure of aerobic domestic water treatment plants. Anaerobic membrane bioreactors, which utilize methane-producing anaerobic microorganisms, promise a potential solution to these quandaries. Unfortunately, conventional anaerobic membrane bioreactors are not able to treat some particles in wastewater, provoking rapid membrane fouling, subsequently limiting high flux operation, and resulting in poor effluent quality. The new anaerobic membrane bioreactor design, incorporating optimized membranes, can improve energy efficiency by enabling high flux operation and increased methane production while producing better effluent quality.

Figure:



(Image Credit: Inventors)

Applications

- Municipal wastewater treatment
- Industrial wastewater treatment

- Food and Beverage water treatment

Advantages

- High flux
- High energy savings
    - Net-energy positive operation in pilot-scale bioreactor

- Low biosolids production
- High quality effluent
- Requires less frequent membrane chemical cleaning
- Low Costs for less membranes and chemical requirements

Publications

- Temperate climate energy-positive anaerobic secondary treatment of domestic wastewater at pilot-scale

Innovators

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