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Nano-Enabled Microwave Pretreatment of Wastewater Sludge to Enhance Subsequent Anaerobic Digestion

Nanomaterial and Microwave Augmented Biogas Production from Wastewater Residual Sludge

Background

The disposal of wastewater residual sludge costs an annual $2 Billion and is expected to increase over the coming years. Anaerobic digestion, the use of microbial metabolism to transform waste into usable or benign products, offers a potential solution. Anaerobic bacteria can consume the wastewater sludge to produce a mixture of gasses primarily composed of methane (biogas). Currently costly and dangerous methods are utilized to improve the biogas yield. Therefore, a safe and cost-effective method is needed to improve biogas yield in anaerobic digestion.

Invention Description

Researchers at ASU have developed a methodology to improve the biogas yield by approximately 300%. The technology utilizes nanoparticle enhanced microwave technology to simultaneously heat and disperse the wastewater sludge. The method is safe, efficient, and does not required the harsh chemical additives typically employed in anaerobic digestion. Additionally, this method provides an approximately 250% increase in efficiency compared to traditional methods This technology will decrease the cost of transportation and disposal and increase income from the produced biogas.

Potential Applications

- Wastewater Sludge Digestion
- Sugar Processing

Benefits and Advantages

- Energy Efficient- The technology developed by researchers at ASU requires less energy to operate.
- Mass Efficient- Reduces the residual wastewater sludge in the reactor.
- Effective- Increases biogas production by 300%.

Professor Westerhoff's Website

Original Document