Bioreactor Utilizing Digester Outputs

Inventors:

Qinghua (Peter) He
Associate Professor

Jin Wang
Professor

Matt Hilliard
PhD Graduate

Department of Chemical Engineering

Contact:

Brian Wright
Auburn University
Innovation Advancement & Commercialization
334-844-4977
dircomm@auburn.edu
iac.auburn.edu
Reference: Bioreactor Utilizing Digester Outputs

View More Available Technologies

Auburn University is seeking a licensee or development partner for a bioreactor that converts output from an anaerobic digester into a value added product.

Overview: Animal manure from food production facilities must be managed by the farms, primarily to meet environmental regulations. Cost estimates for such management are $300 per cow per year for dairy operations. Some farms have utilized systems known as anaerobic digesters that process the manure into biogas and a liquid digestate. The biogas can be burned for electricity, and the liquid can be used as a fertilizer. While providing a return to the farmer, these end products are relatively low value. Auburn has developed a bioreactor system that takes the outputs from an anaerobic digester and converts them into a high value microbial biomass, which can be sold for over $1,000 per ton. While currently demonstrated with manure, the process could be applied to numerous other inputs, e.g., wastewater treatment. A manufacturer of anaerobic digesters could leverage this technology to engage current customers for additional sales, and to engage potential customers with an additional value proposition.

Advantages:

- **VALUE ADDED END PRODUCT -** Final output of the bioreactor is a high value commodity that can be used as a feedstock for such products as bioplastic and animal feed.
- **QUICK FINANCIAL PAYOFF -** Payback period estimated to be a few months
- **ENVIRONMENTALLY SOUND** - Small footprint, low energy & water use, superior nutrient management

Description: Unlike microalgae-based bioreactors, this systems utilizes a co-culture of microalgae and methane-consuming bacteria. This enables the system to utilize, methane, carbon dioxide and the liquid digestate, which significantly improves biomass production and provides a system nearing zero emission or waste. A looped conveyer belt containing the biomass runs through both the gas and liquid phases. This allows for the capture of carbon from the gas phase and nutrients from the liquid phase, converting both into biomass. Harvesting of resulting biomass is performed by simply scraping the biofilm from the belt.

Biofilm growing in pilot unit.

This high efficiency system has a small footprint and low water and energy inputs. The biomass end product is estimated to be 10 times more valuable than electricity generated from the same amount of digester output. This, combined with the relatively low capital investment, results in a rapid payback period for the farmer. If desired, a bioreactor manufacturer could offer services in parallel, such as to maintain the system and manage sale of the biomass for the customer. This would minimize the customer's efforts while still allowing them to retain an attractive revenue stream.

Status:

- US (20210024861) and PCT applications have been filed
- This technology is available for exclusive or non-exclusive licensing
- Technology has been demonstrated at a pilot scale (see photo above)

Early Stage ***Prototype*** ***Pilot*** ***Market Ready***