Optimal Biogas Generation from Algae

Method for a biotechnological production of biogas via bacterial fermentation of low-protein microalgae biomass

Invention
The production of biogas from algae biomass has been of interest for quite a long time. Microalgae is an interesting biosystem as it is really fast growing and has a high biomass productivity which is about ten times higher than conventional agriculture crops.

But until today, several obstacles like inefficient degradation and low C/N ratio limit the applicability of algae biomass for a large scale biogas production process. The present invention overcomes most of the technical and biological difficulties and establishes now an improved cultivation and fermentation process for microalgae biomass.

The present invention provides a simple and effective microalgae cultivation method (under nitrogen limiting conditions) for subsequent use of this biomass as mono-substrate for a highly efficient and stable anaerobic fermentation in continuous long-term mode (Fig. 1).

The continuous fermentation of algae biomass, generated under replete-N and low-N culture conditions, was performed under constant hydraulic retention time (HRT 20 days) and increasing organic loading rate. In contrast to conventional biomass (replete-N BM), the biogas as well as methane productivity of the low-N biomass (low-N BM) reactor was constantly high (see Fig. 2), with biomass to methane energy conversion efficiency of 84%, which is close to the theoretical maximum without any pretreatment.

Commercial Opportunities
The described technology enables the fast and competitive production of biogas in a continuous biotechnological process in industrial scale. On behalf of the University of Bielefeld, PROvendis offers access to rights for commercial use as well as the opportunity for further co-development.

Current Status
In case of interest we are pleased to inform you about the current patent status.

Relevant Publication

An invention of University of Bielefeld.

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Competitive Advantages
- Effective production process of biogas through continuous fermentation of microalgae
- Efficient energy source
- New optimized cultivation procedure (low-N) for fertilizer cost reduction
- No pretreatment of biomass needed
- Methane content (61%) in biogas, higher than plant material
- Highly efficient fermentation to biogas / methane without inhibition risks