Single-cell protein production by using *Methylococcus Capsulatus*

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Problem

1. **Lack of food** due to continuous exponential **growth of** world **population**

2. **Amount of GHG** released into atmosphere **from** unnecessary **burning** of biogas and natural **gas**

Work relevance

- Relevant to **biogas cogeneration stations** and **natural gas cogeneration stations**

- Possible relevance to natural gas and biogas **storage facilities**

Purpose of the work

- **Reduce CO2 and CH4 emissions from** biogas and natural **gas burning** in biogas torch, when cogeneration unit malfunctions or produced biogas is not fit for energy/heat production

- **Create single-cell protein** during biogas/natural gas processing
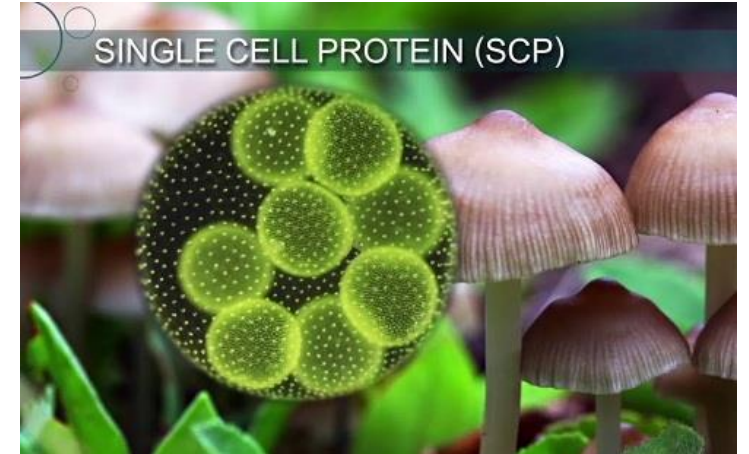
Research methodology

1. **Try various systems for bacteria growth** in natural gas (desiccator, sealed plastic bags, bioreactor system)

2. **Find automatic recirculative methane system** for microorganism growth, which could be integrated in biogas cogeneration plant (bioreactor system)

3. **Find out how to theoretically integrate chosen system** in biogas plant

4. **Messure and register protein content** in microbial biomass

Research results

- **Created automatic recirculated methane system**, which helps avoid wasteful biogas burning and creates SCP in the process

- Biomass **protein content** is yet **to be determined**…
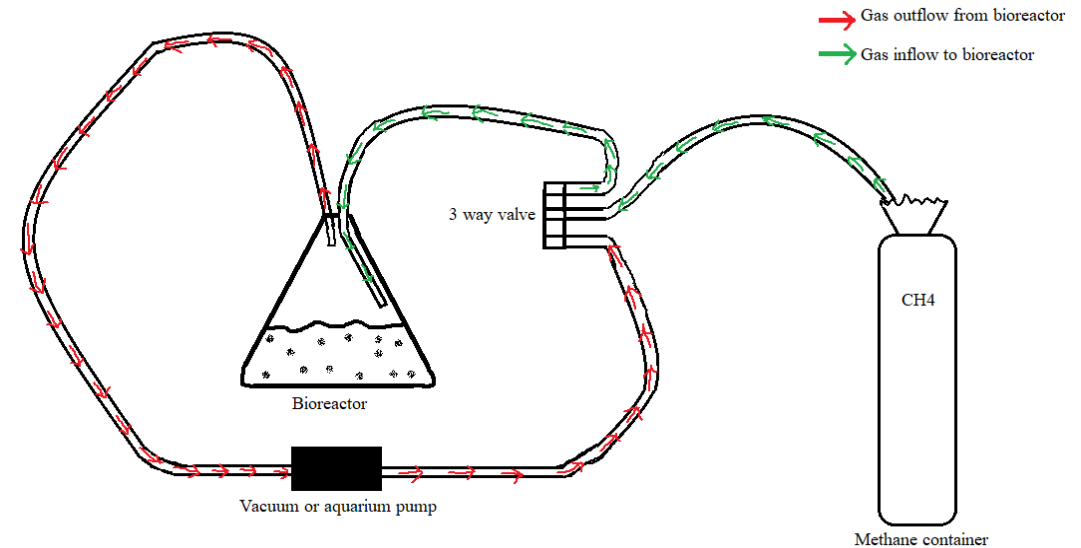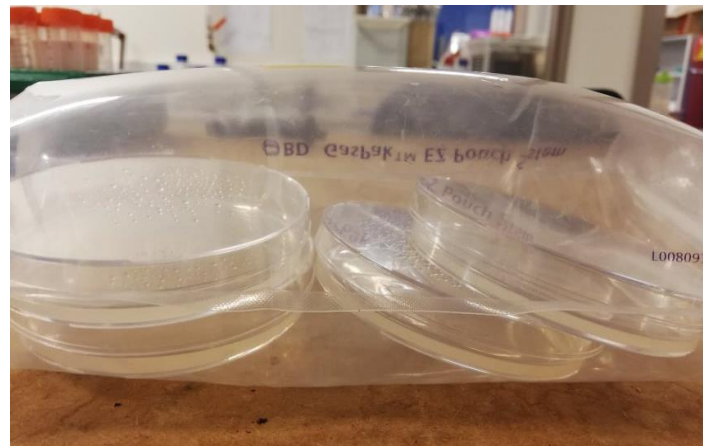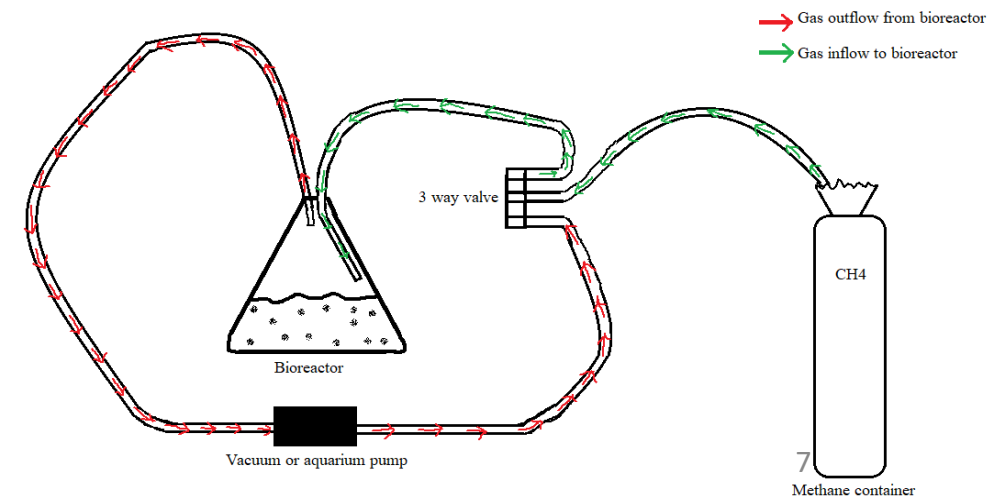

Methylococcus Capsulatus
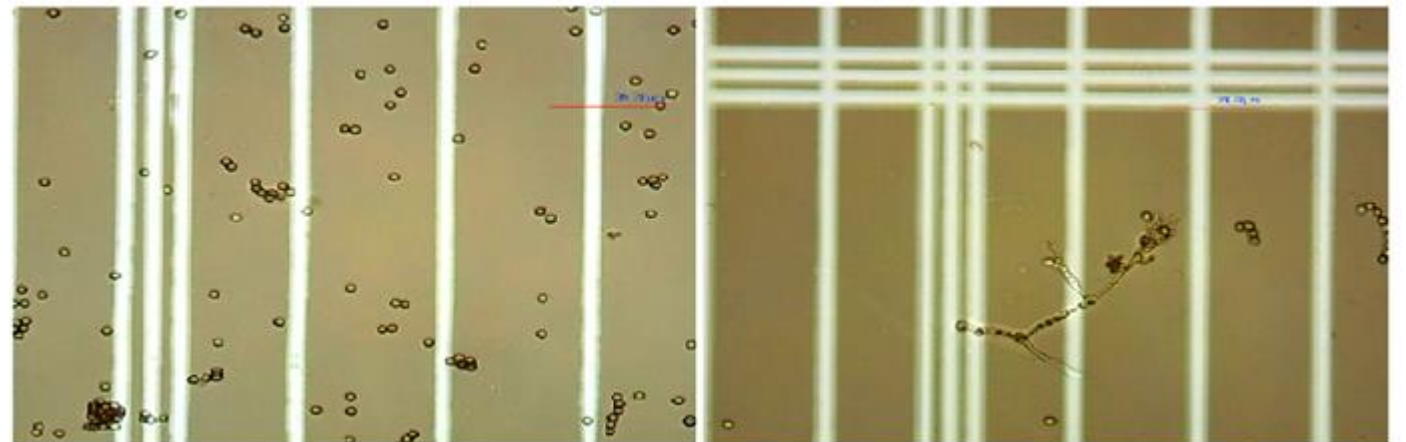
Research results (II)

1) Growth in desiccator

2) Growth in sealed plastic

3) Growth in bioreactor

Gas outflow from bioreactor
Gas inflow to bioreactor
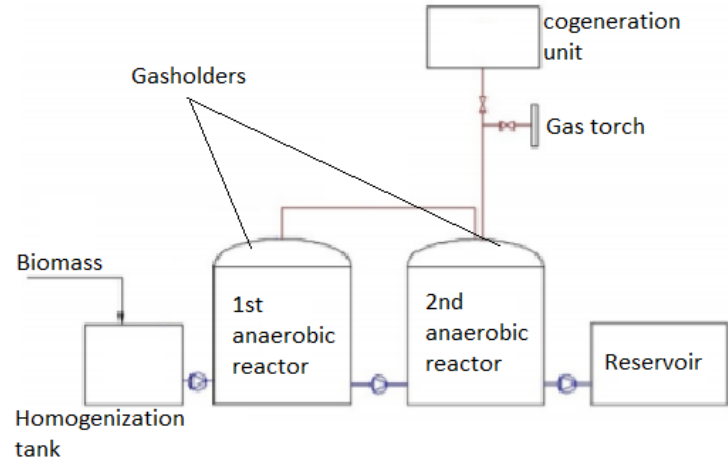
3 way valve

CH4

Bioreactor

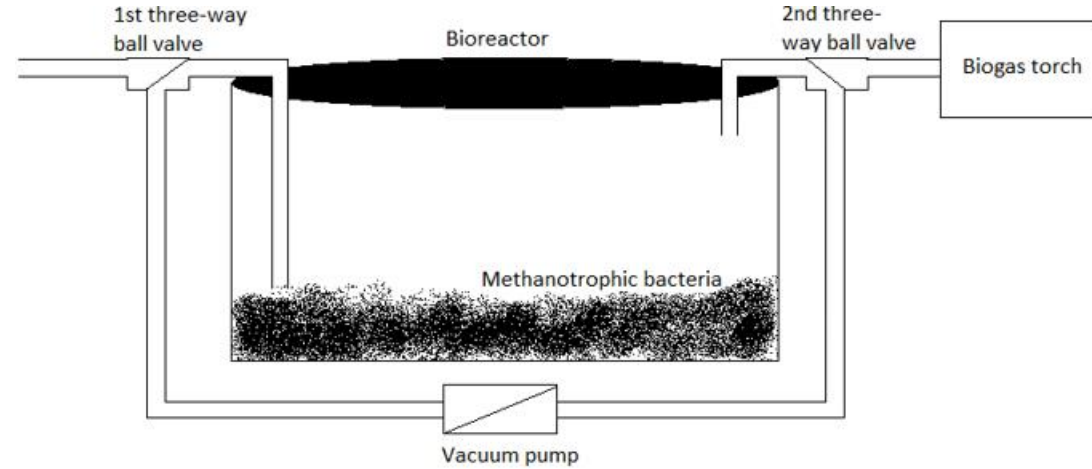Vacuum or aquarium pump

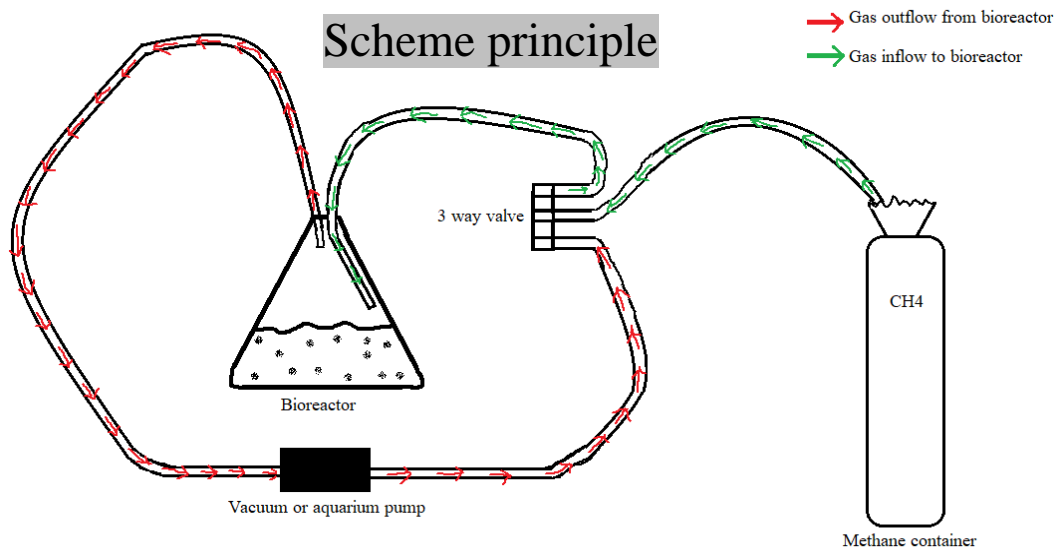Methane container

Research results (III)

Current system in biogas plant

Offered alternative in biogas plant

Scheme principle

System model in laboratory

Conclusions

- To evaluate **if produced protein quality** requirements **fits EU regulation** for animal protein foods

- This might be a potentially **good way to cut emissions** from wastefuly burned biogas in biogas plants and biogas cogeneration stations

- To evaluate amount of protein biomass potentially created in biogas plant, it is **necessary to analize data of wastefully burned biogas** in biogas torch from one of biogas companies

Conclusions (II)

- To evaluate the efficiency and potential integration of created recirculative methane absorbtion system, it is **necessary to test** it in real life **at biogas prduction and cogeneration station**