

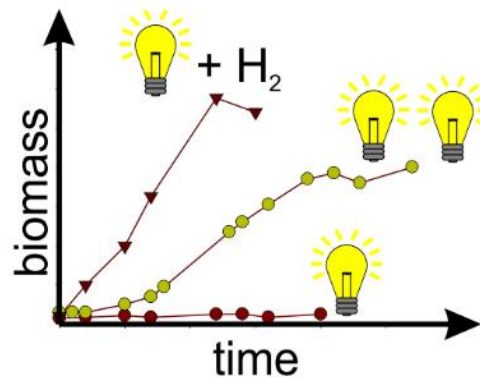
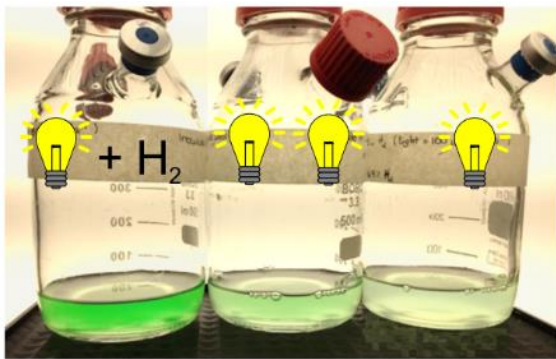
## ***Phototrophic biomass production on gaseous substrates***

Wetsus – Leeuwarden (NL) - European centre of excellence for sustainable water technology

### **Motivation:**

In the past decades, cultivation of microalgae has received considerable attention for the production of fuels, (fine)chemicals and food supplements. Although economic applicability is within reach productivity must still be increased and process operation simplified. More specifically, productivity is limited by light availability in mass cultures, and the complexity of simultaneously supplying carbon dioxide and removing oxygen, which requires substantial energy.

Biological hydrogen production from sunlight and water catalysed by phototrophs has been studied in great detail. Recently, a proof of concept was provided for the increased productivity of cyanobacteria by using the opposite mechanism, feeding with hydrogen gas.



Through the use of gaseous substrates, the production systems (photobioreactors) can be simplified since only gaseous substrates are consumed and no gaseous products are produced. Current photobioreactor design and operation is limited by the conflict between adequate of supply of carbon dioxide and removal of photosynthetically produced oxygen. In our approach this oxygen will be used within the process to catalyse the growth of the phototrophs.

Now we want to further explore these findings and mechanism, by using higher light intensities and seeing how much of the photosynthetically produced oxygen, which is toxic for the cyanobacteria, can be used for hydrogen oxidation and biomass formation.

### **Research challenge**

We propose to enhance the production of cyanobacterial biomass and products through the addition of gaseous substrate streams i.e. hydrogen. It should be possible to consume all the photosynthetically produced oxygen through the addition hydrogen and reduce or remove oxygen toxicity.

### **Requirements**

We are looking for an enthusiastic (environmental) biotechnology student with a background in microbial physiology and bioprocess engineering. Experience with bioreactors, and more specifically algae cultivation in photobioreactors, is considered as an advantage.

*Interested?* please contact Tom Sleutels (tom.sleutels@wetsus.nl)