

# Real time monitoring

## of the production process of valuable microalgae and additives

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### Objective

**Real time monitoring** of the algae production process



Fig. 1: Algae culture in shaking flasks

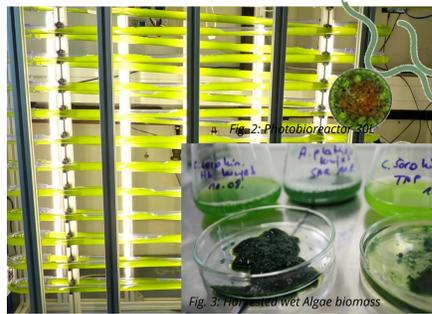


Fig. 2: Photobioreactor

Fig. 3: Harvested Wet Algae biomass

- Ion mobility spectrometry (IMS) used to characterize biotechnological processes
- Rapid **at-line** for GMP<sup>1</sup>-certified monitoring
- **SMELLMASTER®2 (IFU GMBH, Frankenberg)** - a mobile IMS-device which operates under **ambient pressure**

1 Good Manufacturing Practice

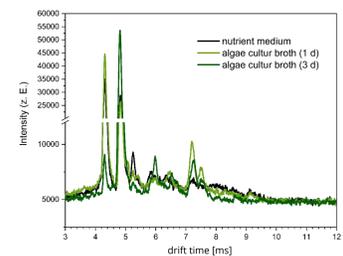
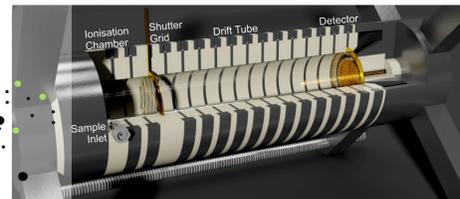


Fig. 4: left, Ion mobility spectrometry (IMS), right, IMS-Spectra

### Strategy

#### Can you smell the algae ?

Measurement of the volatile compounds

#### Challenges

- High water content in headspace
- Water inhibits the ionization of the target molecule

→ Integration of an PDMS-Membrane-Inlet

→ Optimization of the experimental set up

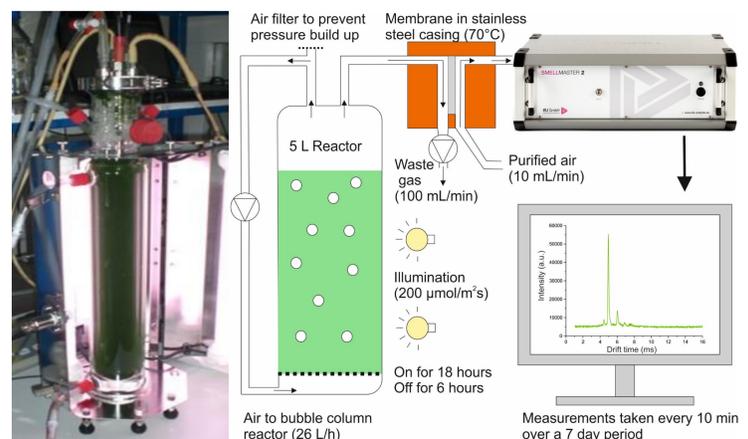


Fig. 5: Experimental set-up of ion mobility spectrometry (SMELLMASTER®) to measure the volatiles of an algae culture

### Results

- Volatile algae-associated substances can be measured directly online and continuously with IMS
- IMS-signal correlates with biomass growth and light-dark cycles (Fig. 6)
- Stable and characteristic IMS-signal
- IMS-signal is influenced by cell death

For information on IMS measurements in combination with electrospray ionization (ESI), please contact the authors...

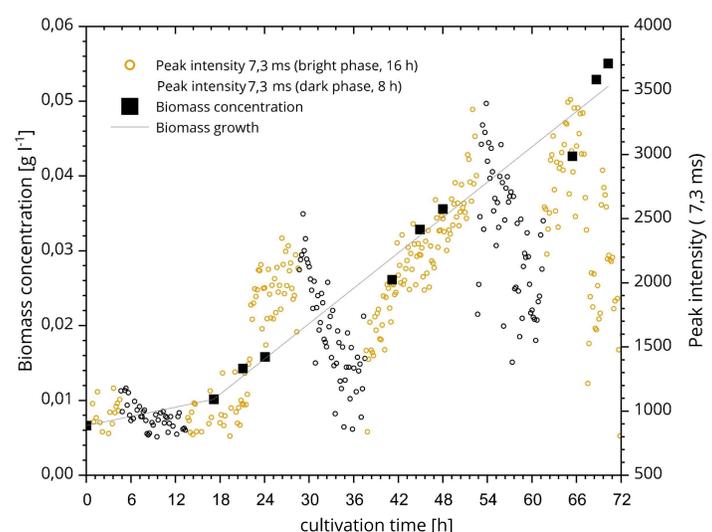


Fig. 6: Biomass concentration (*A. Platensis*) and the Intensity of the IMS-Spectra Peak (drift time 7,3 ms) over the cultivation time