

Chair of Bioprocess Engineering

Early detection of parasite infection in microalgal cultures by a noninvasive electro-sensoric method

Dr. Ing. Carolin Schott

Contact:

Carolin.schott@tu-dresden.de

+49 351 463-33386

Motivation

Utilization of microalgae for the production of active and valuable substances

Astaxanthin is one of the most potent antioxidants with anti-inflammatory properties and antitumor effects

Green alga ***Haematococcus pluvialis*** (*H. pluvialis*) is the most important producer of natural Astaxanthin

Infections with **algae-associated parasites** have economic consequences

Paraphysoderma sedebokerense (*P. sedebokerense*) infection with epidemic effects is specific to *H. pluvialis* and is one of the most common causes of algal culture collapse

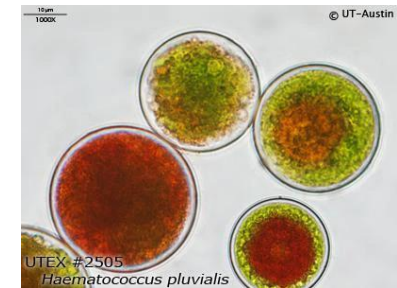
Early detection of the parasite is essential for culture survival, treatment efficacy, and production

Major limiting factor is the need for simple, rapid, and automated early detection of parasitic contamination

The aim of the research project is to establish a non-invasive and direct method, based on ion mobility spectrometry, which allows the unrestricted monitoring of processes.



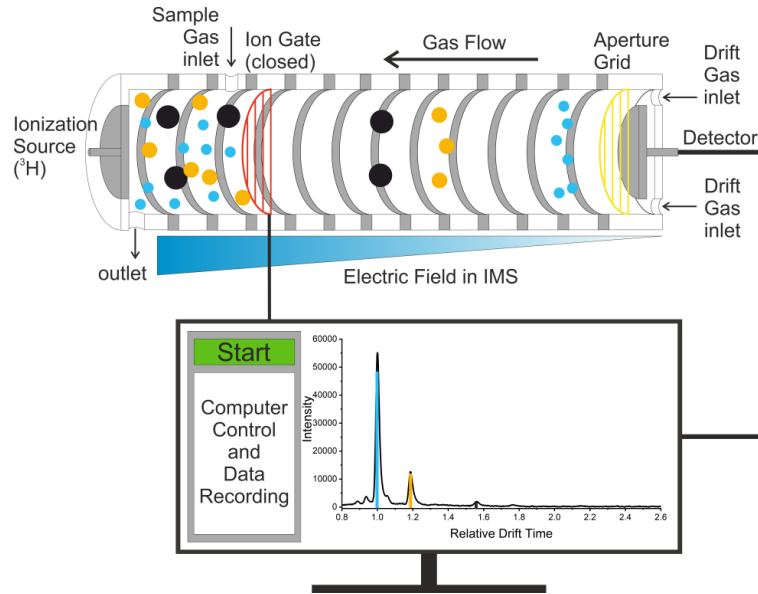
<https://dr-peterhartig.de/astaxanthin/>



<https://utex.org/products/utex-2505?variant=30991180791898>



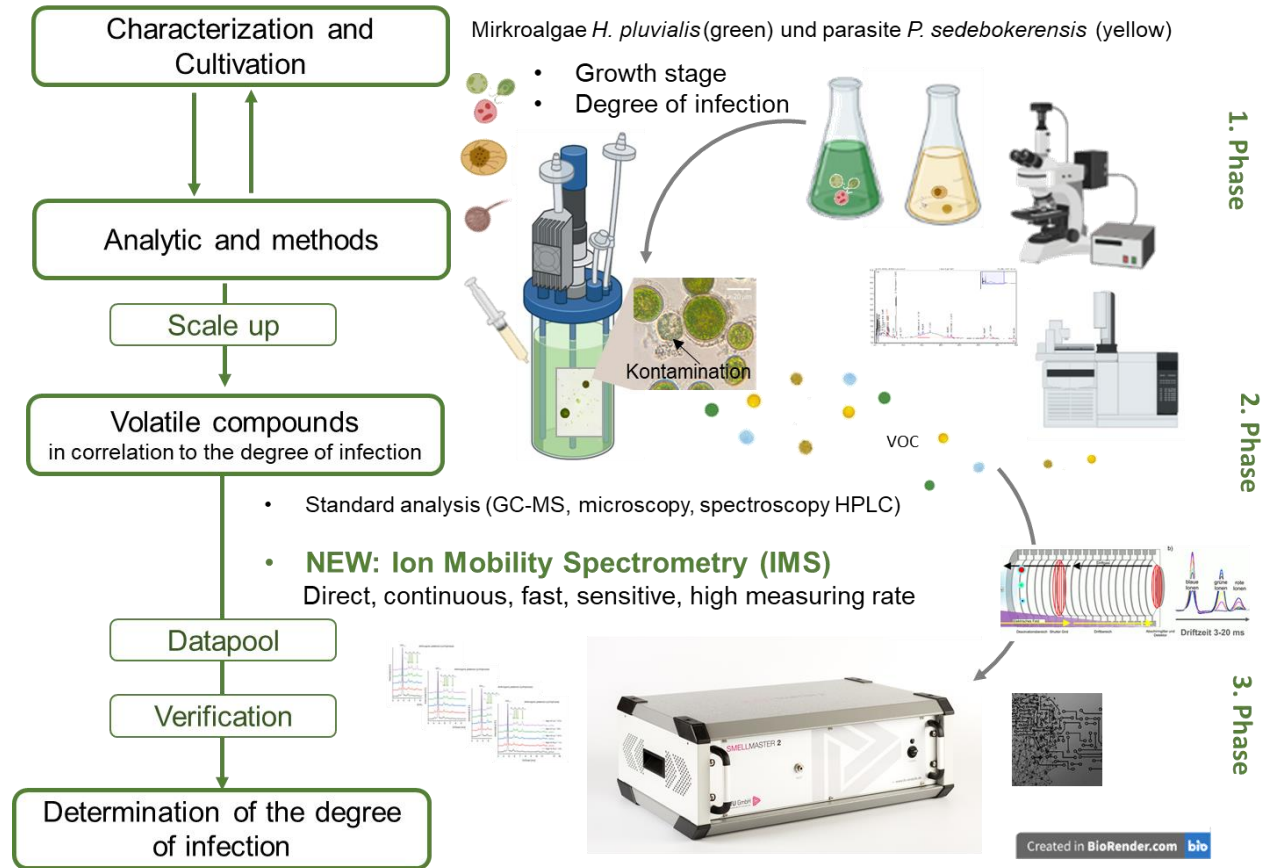
Ion Mobility Spectrometry (IMS)



Function

- Compounds in Sample Gas and Drift Gas ionized
- Ion Gate opened → Small Ion Packet moves towards Detector due to Electric Field
- Ions separated by Mass, Structure and Charge through Collisions with Neutral Drift Gas

Rapid and direct detection of Volatile organic compounds (VOCs) from fresh cultures without long sample Preparation



Specify possibility for students to work on the project

student assistant, research internship up to diploma thesis possible....

Student assistant: Preparation of culture medium, care of strain culture, help in performing sampling and standard analysis, etc.

Topics:

- Cultivation of *Paraphysoderma sedebokerense* : Determination of growth rates, determination of morphological appearance and establishment of a stable stock culture
- Establishment of an experimental protocol for the multiple determination of reference data of axenic cultures and infected culture.
- Characterization of the infection behavior of *Paraphysoderma sedebokerense* in relation to the growth and astaxanthin formation of *Haematococcus pluvialis*.
- Identification of the spectrum of volatile components with GC-MS analytic (UFZ Leipzig)
- Various tasks for Ion Mobility Spectrometry (IMS) measurements on the model organisms as a function of growth and degree of infection.

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