

Master thesis project:

‘The phenotyping of single microalgae for industry applications’

Background

Photosynthetic microalgae have strong potential as bioproducers of food, chemicals and fuels. Yet, despite their importance for industry applications, the systematic selection of single microalgae for improved productivity or stress resilience (‘phenotyping’) has remained largely inaccessible. To enable the phenotyping of microalgae the Behrendt Lab recently developed ‘[PhenoChip](#)’, a microfluidic platform for the characterization and selection of unicellular phenotypes under defined environmental conditions. In this project the student will use PhenoChip to select single microalgae with improved abilities to assimilate CO₂ from industrial flue gases and grow these optimized cells within to-be-constructed small scale photobioreactors (‘[Phenobottles](#)’). The data, equipment and selected microalgae from this effort will directly contribute to society by advancing the capturing of flue gas and by reducing carbon emissions.

Master-thesis project description and aims

In this master thesis, you will (i) construct small-scale photobioreactors (‘[Phenobottles](#)’) and (ii) use PhenoChip to expose single microalgae of industrial relevance to varying levels of flue gas and categorize their response using advanced microscopic fluorometry imaging. Following single-cell selection, and if time permits, you will categorize the photophysiology of the resulting microalgae cultures in Phenobottles.

Methods

In this project, you will use the following methods/equipment:

- Microbiological cultivation
- Hardware engineering using Arduino, 3D printing and software scripting
- Microfluidic devices for the creation of flue-gas environments
- Advanced chlorophyll fluorometry imaging

You should be a master-level student with an engineering- or physics- background and (ideally) already possess basic knowledge in the 3D printing, arduino, microfluidics, finite-element modeling, and/or numerical modeling.

Students from all walks of life and backgrounds are welcome to apply!

Have a look at what else we are up to: <https://behrendtlab.com/>

Interested? Please contact Lars Behrendt, lars.behrendt@scilifelab.uu.se. The scope of the project is a 45-60 hp master thesis