Part of DOTS
a platform by sbi

sbi SCIENTIFIC BIOPROCESSING

Multiparameter Sensor (MPS)

OPTICAL MONITORING OF MULTIPLE PARAMETERS IN SHAKE FLASKS

The Multiparameter Sensor is installed underneath the shake flask and measures non-invasively through the vessel wall.

The Multiparameter Sensor (MPS)

The MPS is the central piece of the DOTS Platform. It is placed in the MPS Adapter and is controlled by the DOTS Software.

Hardware & Software Components

Multiparameter Sensor (MPS)

The MPS is an optical sensor, capable of reading out various signals from one shake flask culture.

MPS Adapter & USB Hub

It is positioned in the adapter, underneath the shake flask. The setup allows for increased stability, withstanding very fast shaking speeds. The USB Hub bundles data from multiple MPS and forwards it to the DOTS Software.

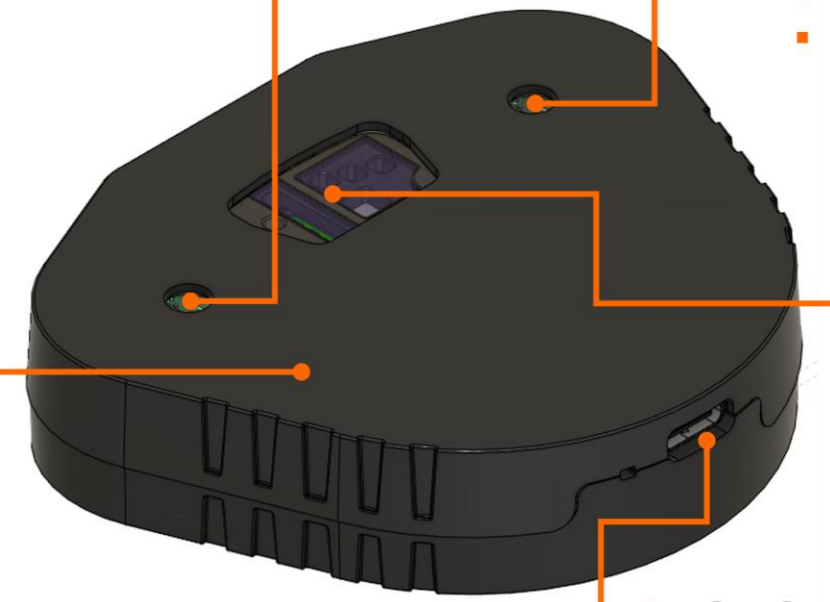
DOTS Software

DOTS Software enables a simplified control of sensors and visualizes the received data from all monitored shake flasks in real-time.

The MPS contains three read out windows for different parameters and communicates with the DOTS Software via wired connections.

The Multiparameter Sensor (MPS)

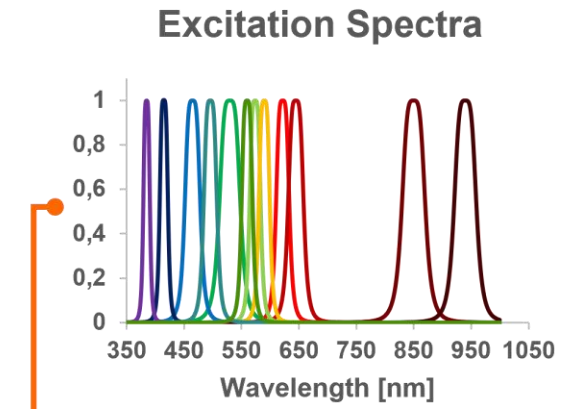
Ambient Sensors
- Temperature
- Shaking speed
- Humidity
- Pressure

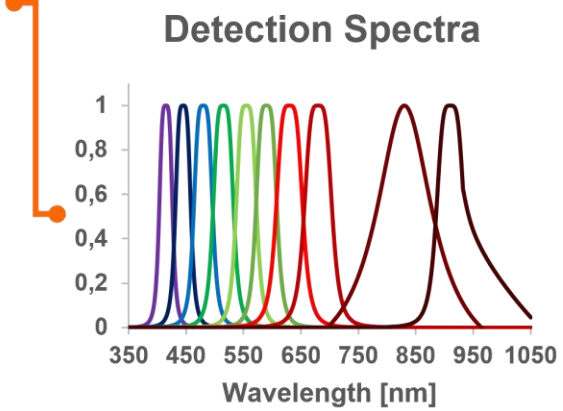


Sensor Pill Read Out
- DO
- pH (*future edition*)

Optical Read Out
- Backscatter
- Fluorescence
- Marker detection

USB-C Port
- USB Connection
- Charging
- External Interfaces





The MPS Adapter keeps the sensor in place and secures the shake flask, for increased stability.

The Multiparameter Sensor (MPS) Adapter Key Facts

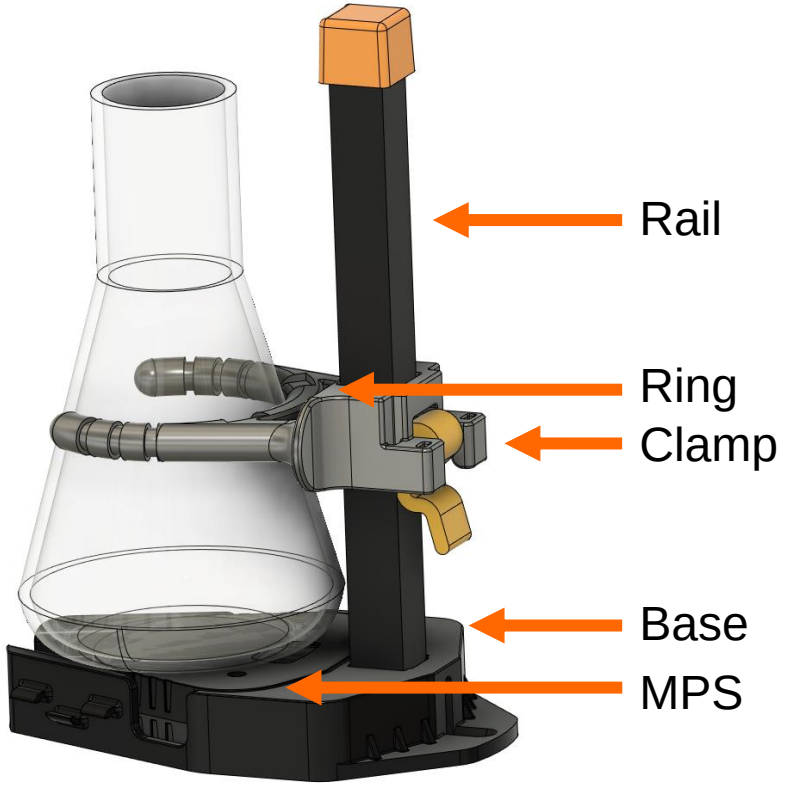
- Available for **all common shake flask sizes**
  - 100 mL, 250 mL, 500 mL, 1000 mL, 2000 mL
- Compatible with **every shaking incubator**
  - Screws and Sticky Mats
- **Ideal positioning** of sensor underneath the shake flask – no flask rotation for more reproducible measurements
- **Increased stability** for top-heavy flasks (e.g., with LIS) at high shaking speeds

The MPS Adapter follows the locking ring design and easily adjusts MPS and shake flask.

The MPS Adapter With Locking Ring Design

How To Secure MPS and shake flask:

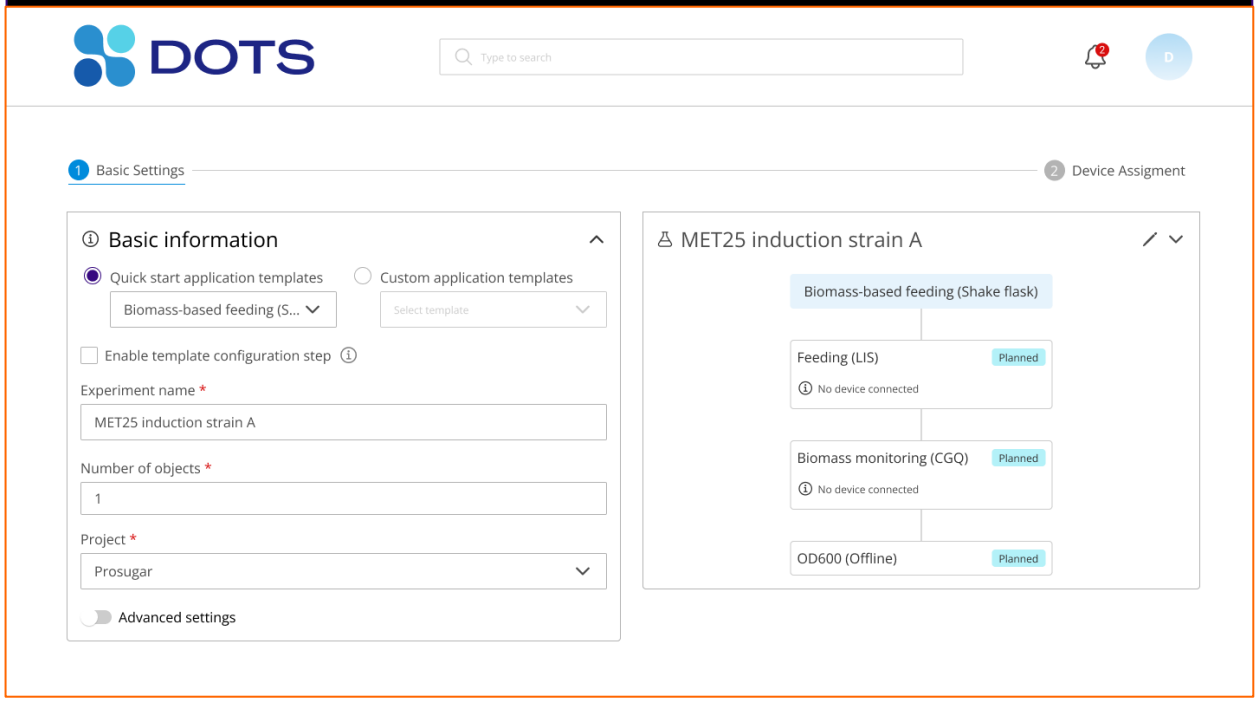
- Secure Adapter **base** on the shaker table
- Open **clamp** and slide the **ring** up
- Insert MPS into **base** with the sensing window located close to the rail
- Place shake flask on top of MPS and slide **ring** down until it rests on top of the shake flask
- Secure **clamp**



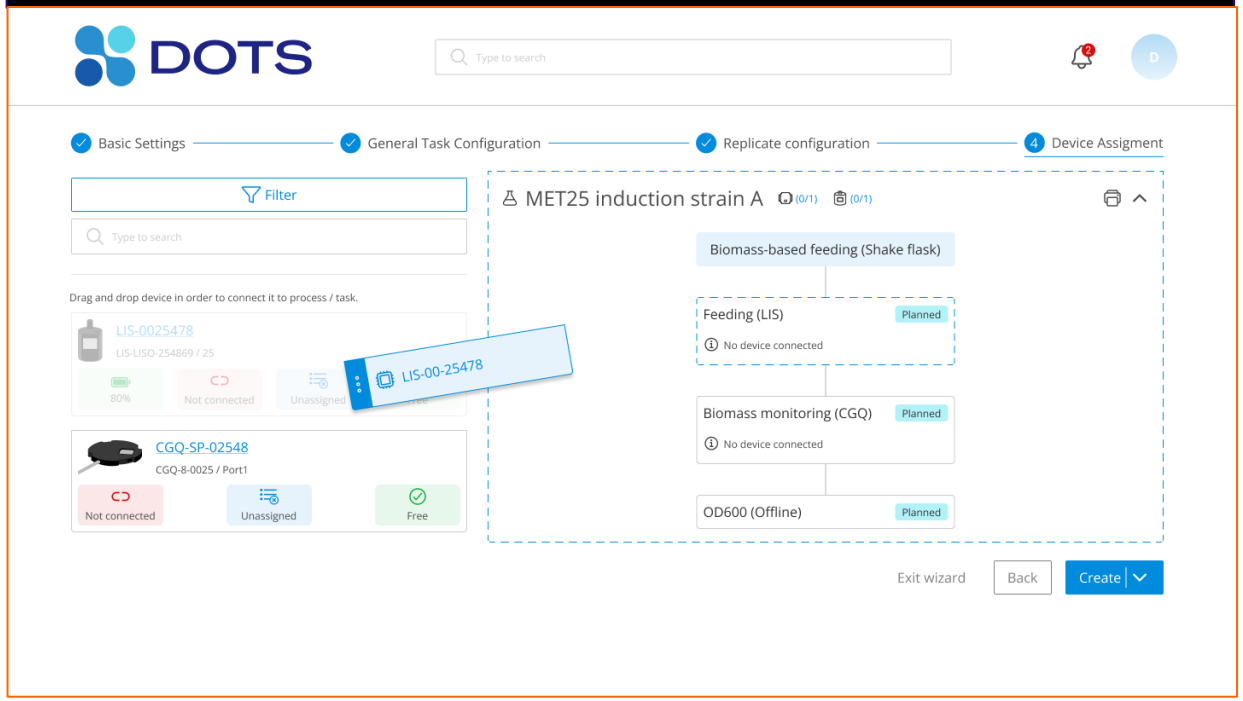
The DOTS Software enables easy sensor handling and experiment set up.

Exemplary Screenshots

Create an experiment with pre-defined application templates



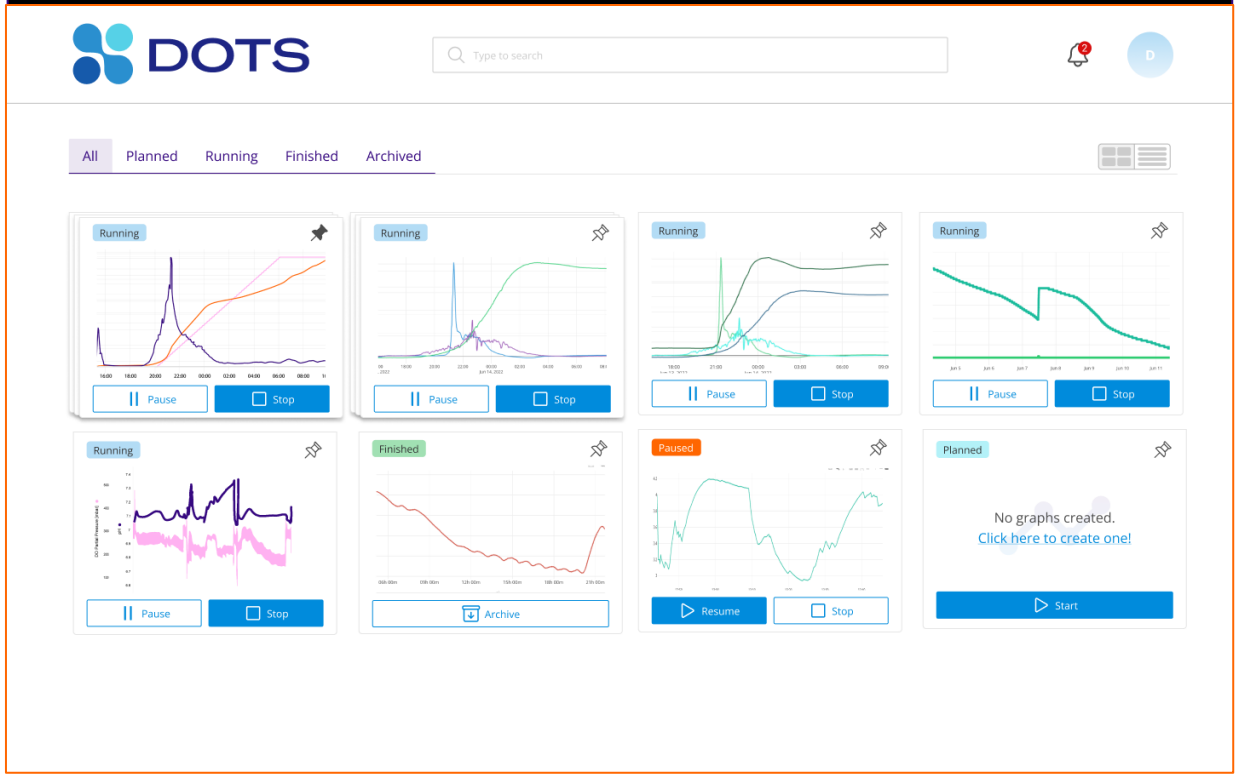
Assign sensors to planned experiments via drag and drop



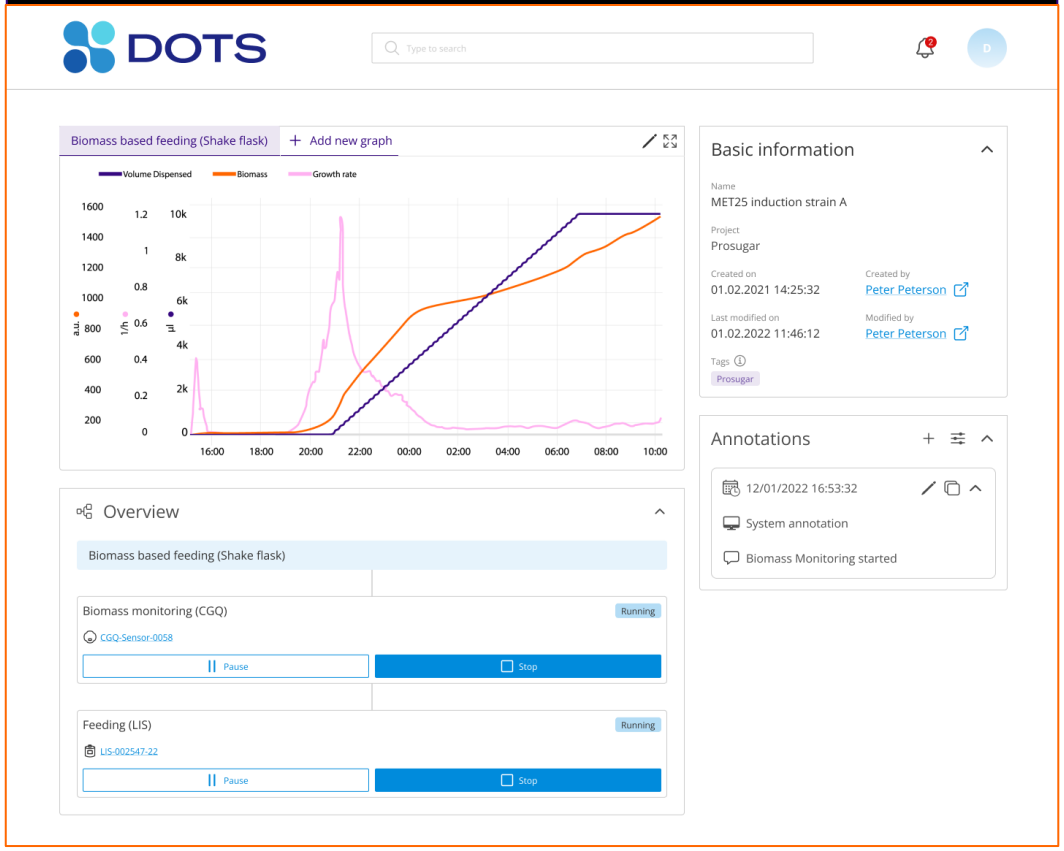
The DOTS Software provides a comprehensive overview of your experiments and visualizes your data in real-time.

DOTS Software Modules for Data Visualization

The dashboard schema provides an overview over all running, planned, or finished experiments



Data visualization tools enable a customized display of data in real-time



With the MPS, scientists can customize their shake flasks by selecting the parameters important to their unique culture.

Parameters Measured By The MPS

Biomass

Dissolved Oxygen (DO)

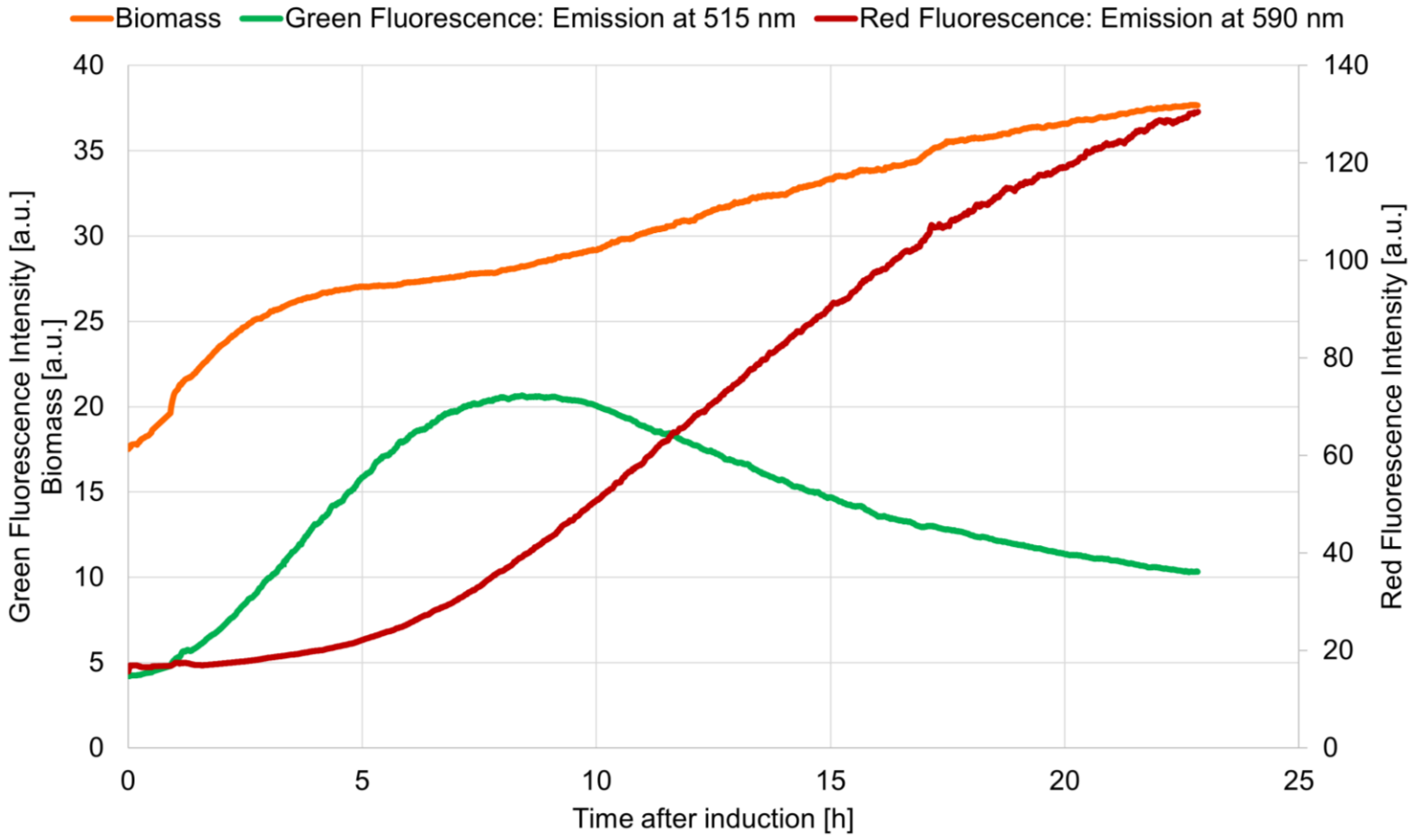
Fluorescence

Parameter-based Feeding

Environmental Parameters

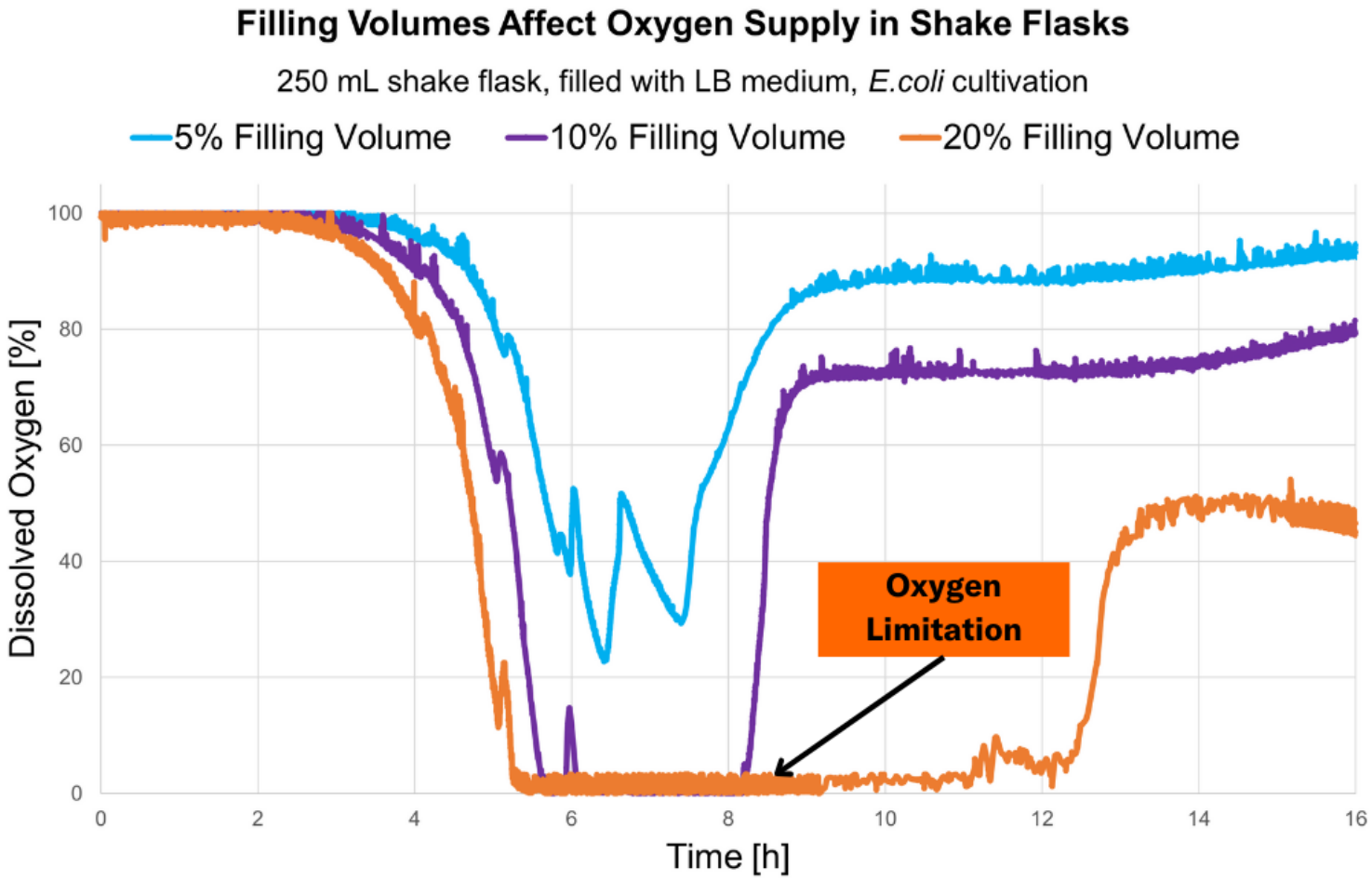
Exemplary data: By measuring fluorescence emission of different wavelengths, photoswitch processes can be tightly monitored.

Fluorescence Monitoring: *E.coli* Expression of a Photoswitch Protein



Exemplary data: Oxygen limitations can be detected with high sensitivity.

MPS And DO Pills Measure Oxygen Availability In *E.coli* Cultivations With Different Filling Volumes



The DOTS Platform enables communication between sensors and actuators, realizing advanced bioprocess options.

Parameter-based Feeding With The DOTS Platform

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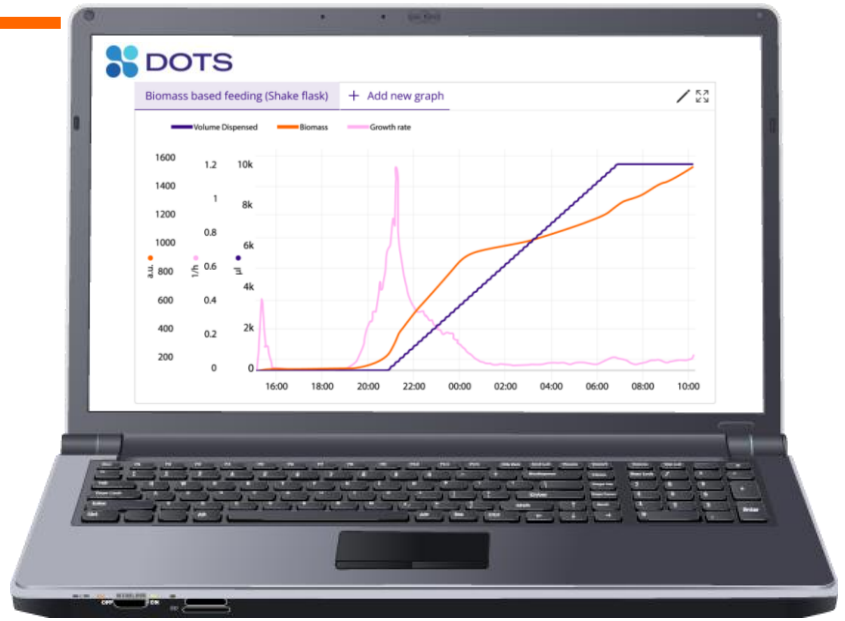
DOTS Software Detects
Preset Threshold

Feeding of
Liquid

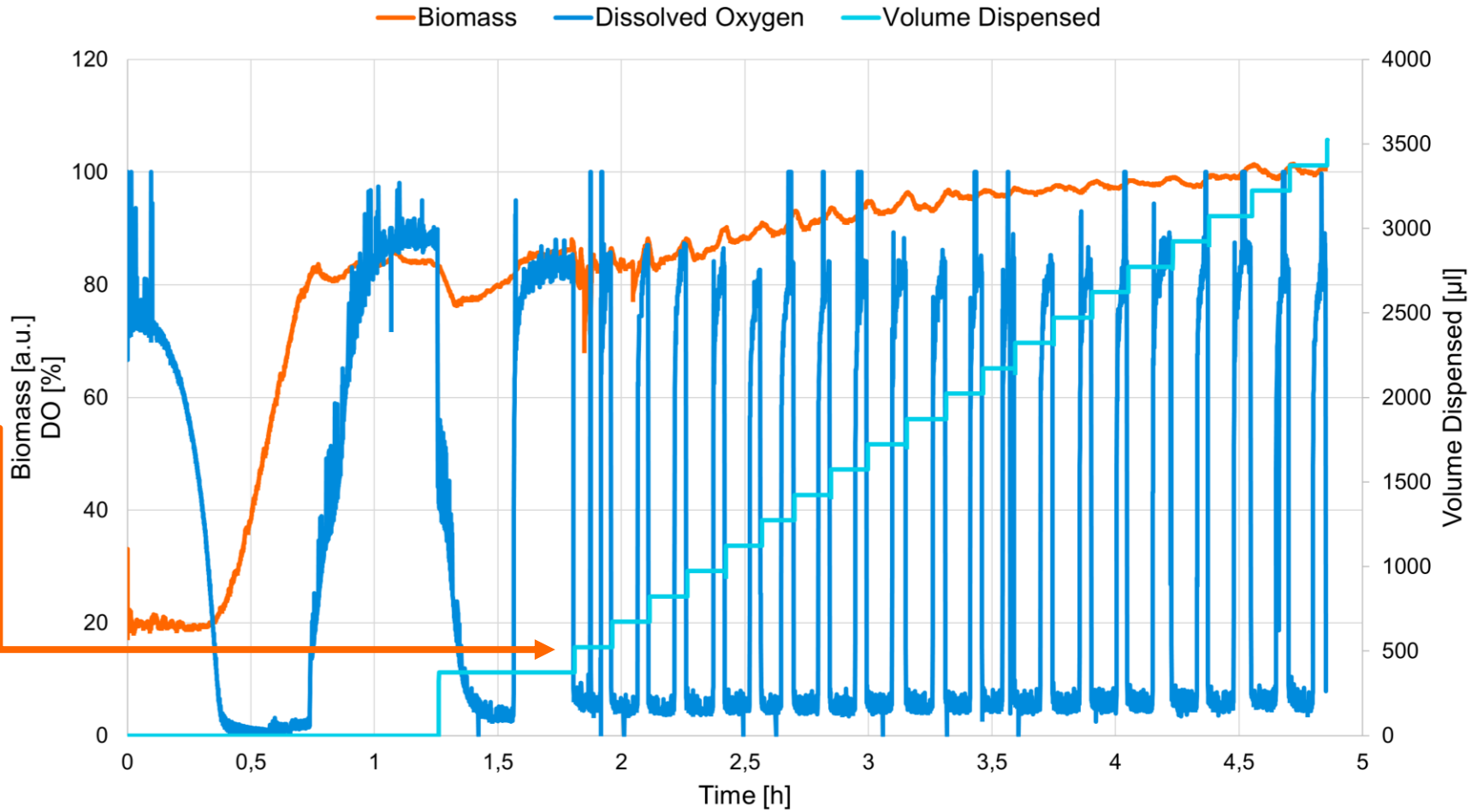


Real-time Monitoring of
Parameters (e.g., Biomass or DO)

Exemplary data: Feeding with the Liquid Injection System starts when a preset DO-threshold, measured with DO Sensor Pills, is reached.

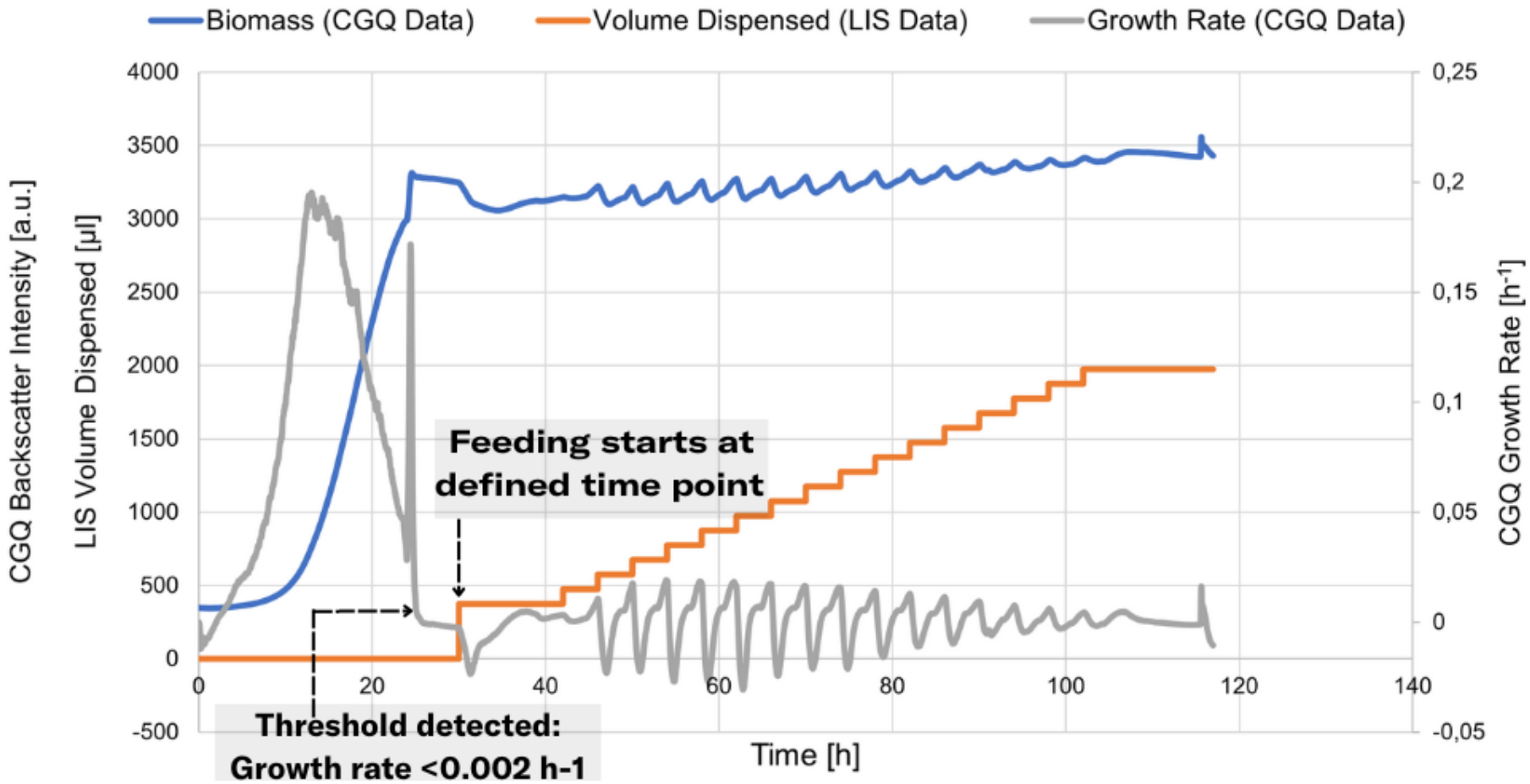
DO-based Methanol Feed to *Pichia pastoris* Cultures to Keep Promotor Activity Constant

- With a DOTS-integrated controller, methanol feed is adjusted
- As soon as the DO of the culture has recovered (>80% DO) the Liquid Injection System (LIS) starts feeding
- This enables ideal cell viability while keeping promotor activity constant



Exemplary data: With biomass-based feeding, the Liquid Injection System starts at a preset biomass or growth rate threshold.

Biomass-based Feeding: Methanol Induction With *Pichia pastoris*



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