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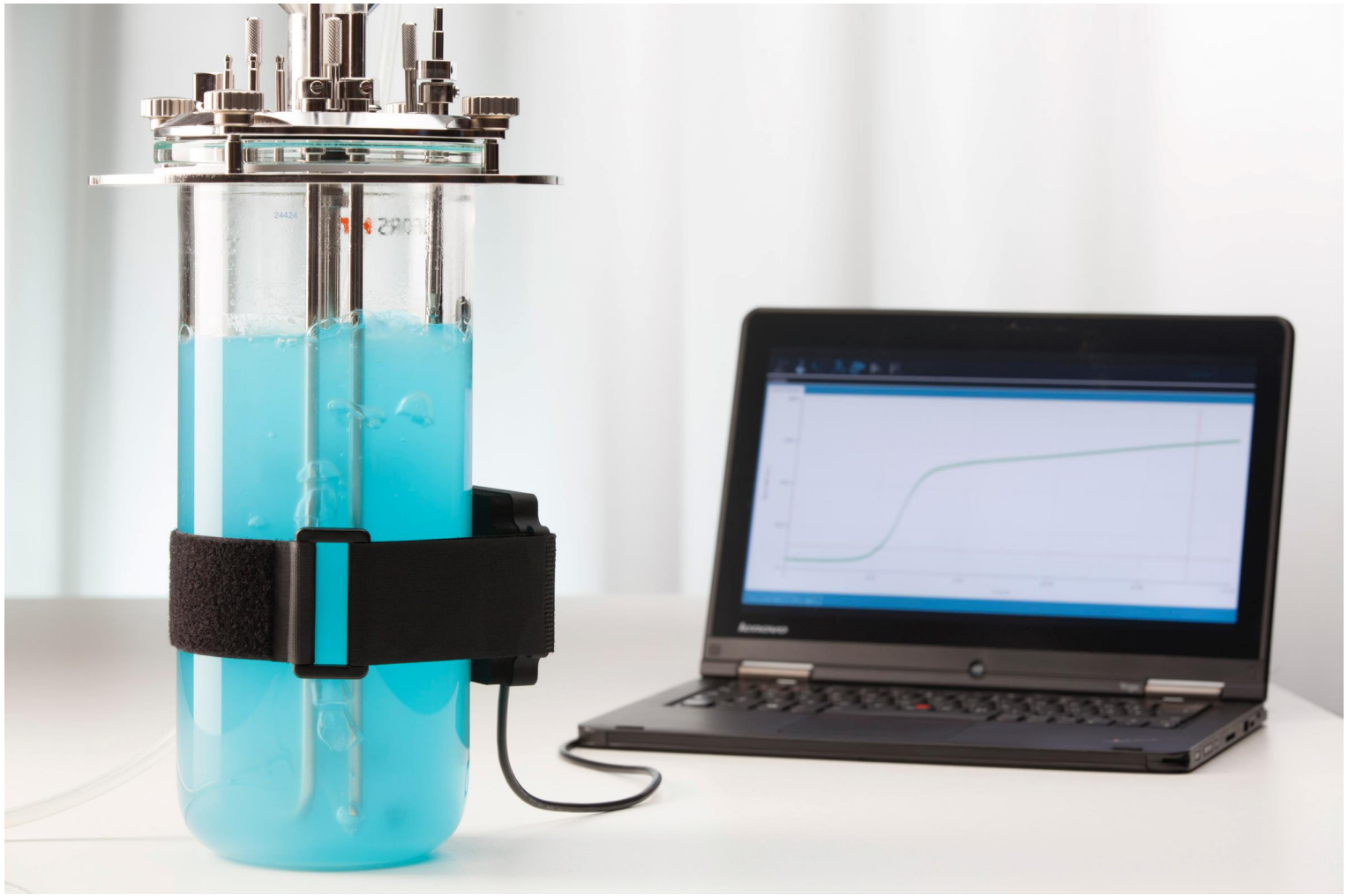
# CGQ BioR

## Online Biomass Monitoring for Bioreactors

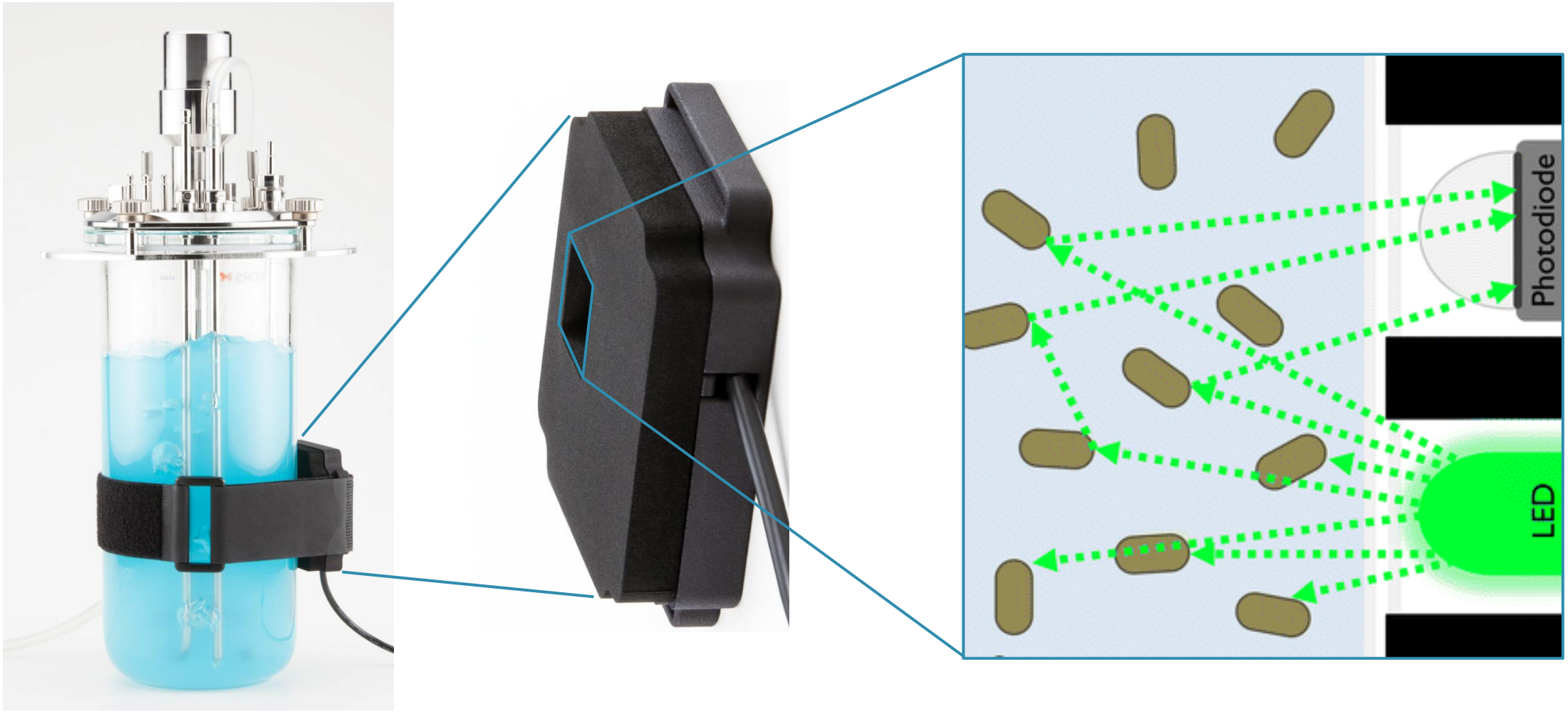
# The CGQ BioR is a sensor for online biomass monitoring in various types and scales of bioreactors.

## The CGQ BioR



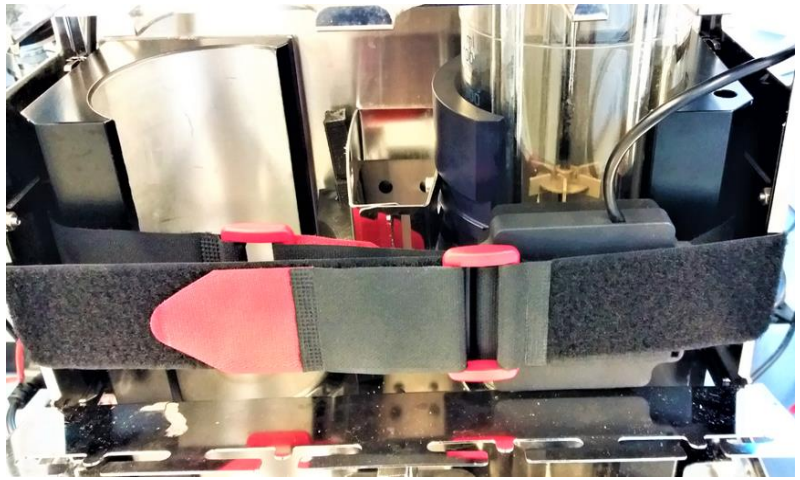
Backscatter measurements are used to monitor the biomass non-invasively through the wall of the bioreactor.

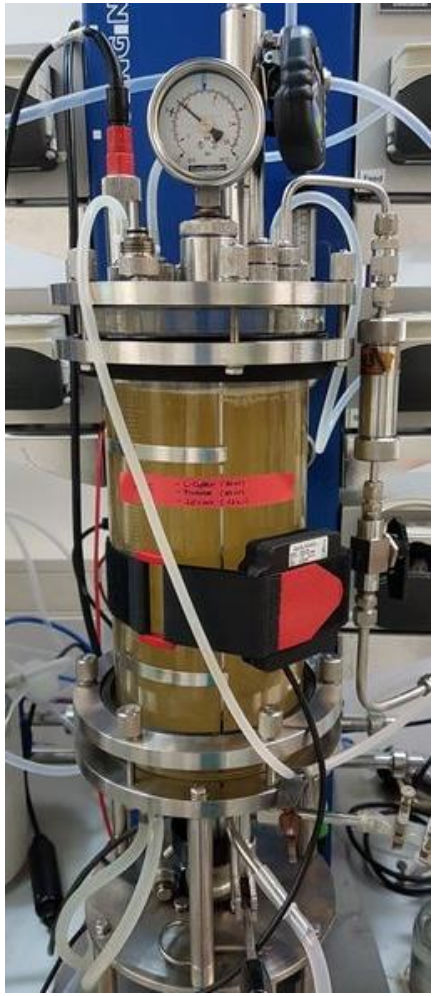
## The CGQ BioR Sensor & Its Principle of Measurement



# The CGQ BioR is mounted to the outside of the reactor vessel and is compatible with the majority of bioreactors (single wall and double wall).

## Exemplary Pictures of CGQ BioR Sensors Mounted to Different Types of Bioreactors




# The CGQ BioR creates significant value for its users by saving time and costs as well as creating detailed understanding of the bioprocess.

## CGQ BioR Features & Benefits

### Features & Benefits

**Non-Invasive Plug & Play Technology**
*No cleaning or autoclaving, no ports blocked, quickly install/uninstall at any time*

**Compatible with Various Bioreactors**
*Fully compatible with most bioreactors from all common manufacturers*

**Detailed Microbial Growth Kinetics in Real-Time**
*Real-time analysis of important process parameters in highest precision*

**One Sensor for All Needs**
*Covers the OD range from 0.5 to 300 in two measurement modes*

**Saves Time & Costs**
*No manual sampling for biomass quantification needed, increases productivity and reduces personnel costs*

**Monitoring at All Times**
*Continuous measurements: during the day, at night and over the weekend*

# The CGQ BioR has several clear advantages over currently used invasive biomass sensor for bioreactors.

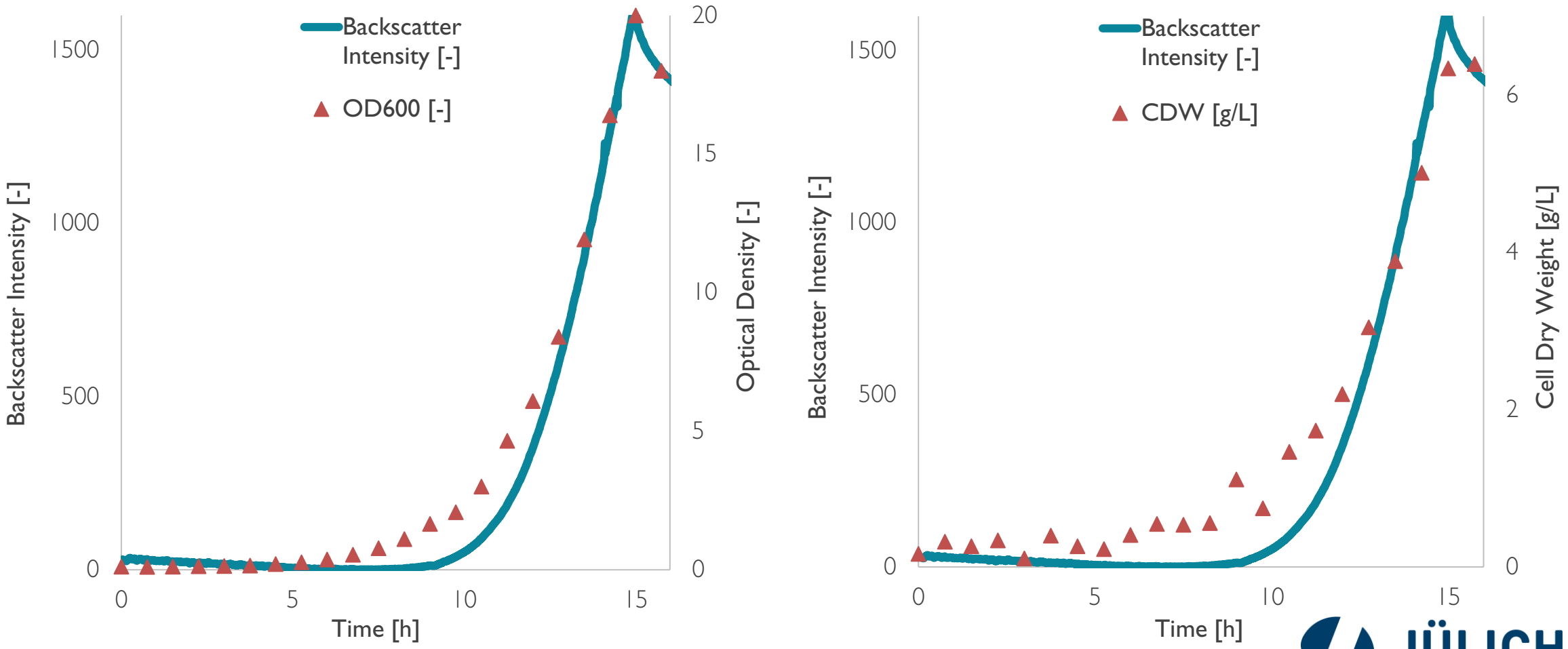
## Comparison: CGQ BioR vs. Invasive Biomass Sensor

| | CGQ BioR | Invasive Biomass Sensor |
|---|---|---|
| Cleaning & Autoclaving | – Non-invasive sensor that does not need to be autoclaved or cleaned | – Needs to be cleaned and autoclaved with the vessel after every use |
| Available Ports | – No ports blocked since the BioR is attached to the outside of the glass vessel | – Requires a port |
| Flexibility | – Can be installed/uninstalled at any given time during the fermentation (plug and play) | – Must be installed before the experiment is started |
| Vessel Compatibility | – Compatible with most vessel types and sizes<br>– Simply attach to the glass wall or a glass window | – Can often only be used for one vessel size (limited by probe length) |
| OD Range | – Standard Mode (521 nm): OD 0.5-50*<br>– High Cell Density Mode (940 nm): OD 15-300* | – Depending on manufacturer<br>– Usually limited to a specific OD range |

*Depending on vessel type/size, media, organism and other factors

# The CGQ BioR shows good correlation with offline biomass data such as $OD_{600}$ and Cell Dry Weight.

## CGQ BioR & Offline Biomass Measurements (1/2): *Corynebacterium glutamicum*




*Corynebacterium glutamicum*, CGXII Medium, DASGIP Bioblock (1,8 l), 30 °C

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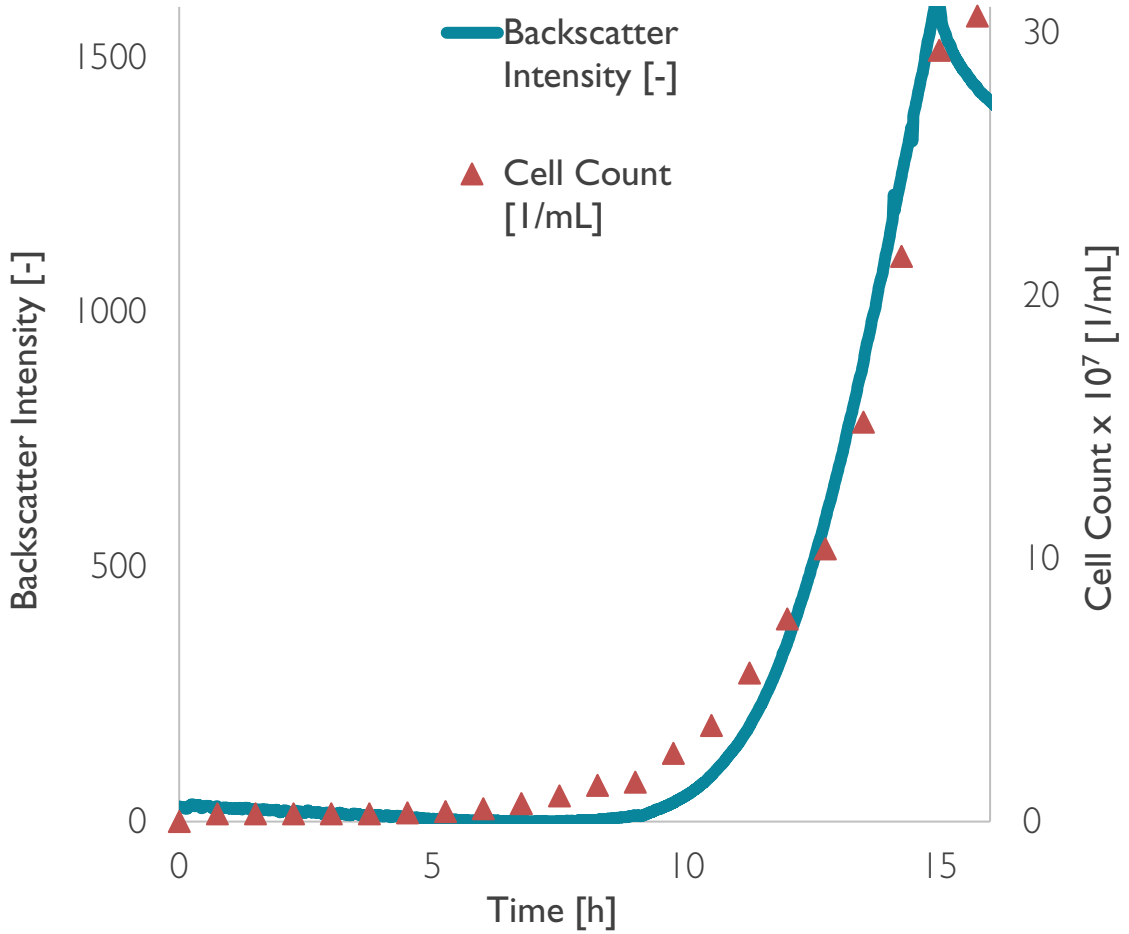
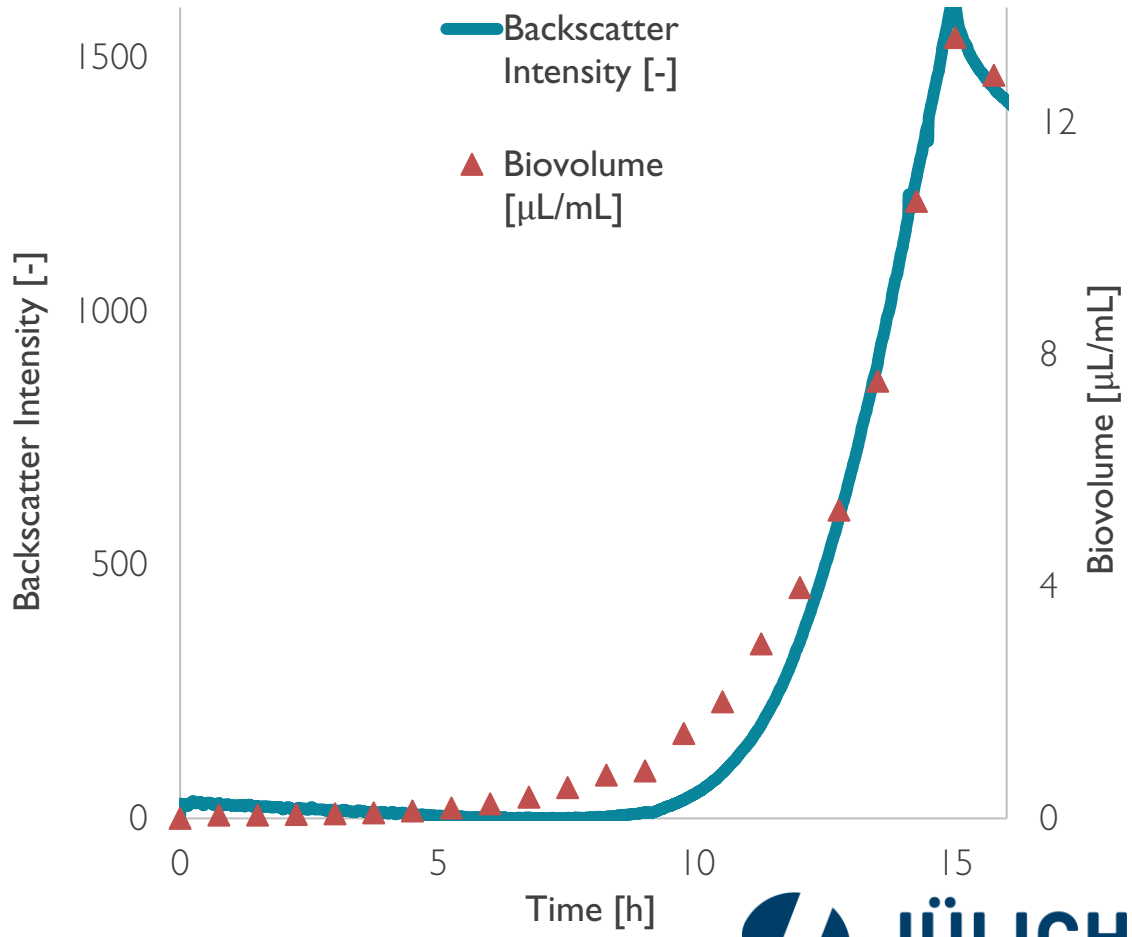
# The CGQ BioR shows good correlation with offline biomass data such as Cell Count and Biovolume.

## CGQ BioR & Offline Biomass Measurements (2/2): *Corynebacterium glutamicum*




*Corynebacterium glutamicum*, CGXII Medium, DASGIP Bioblock (1,8 l), 30 °C

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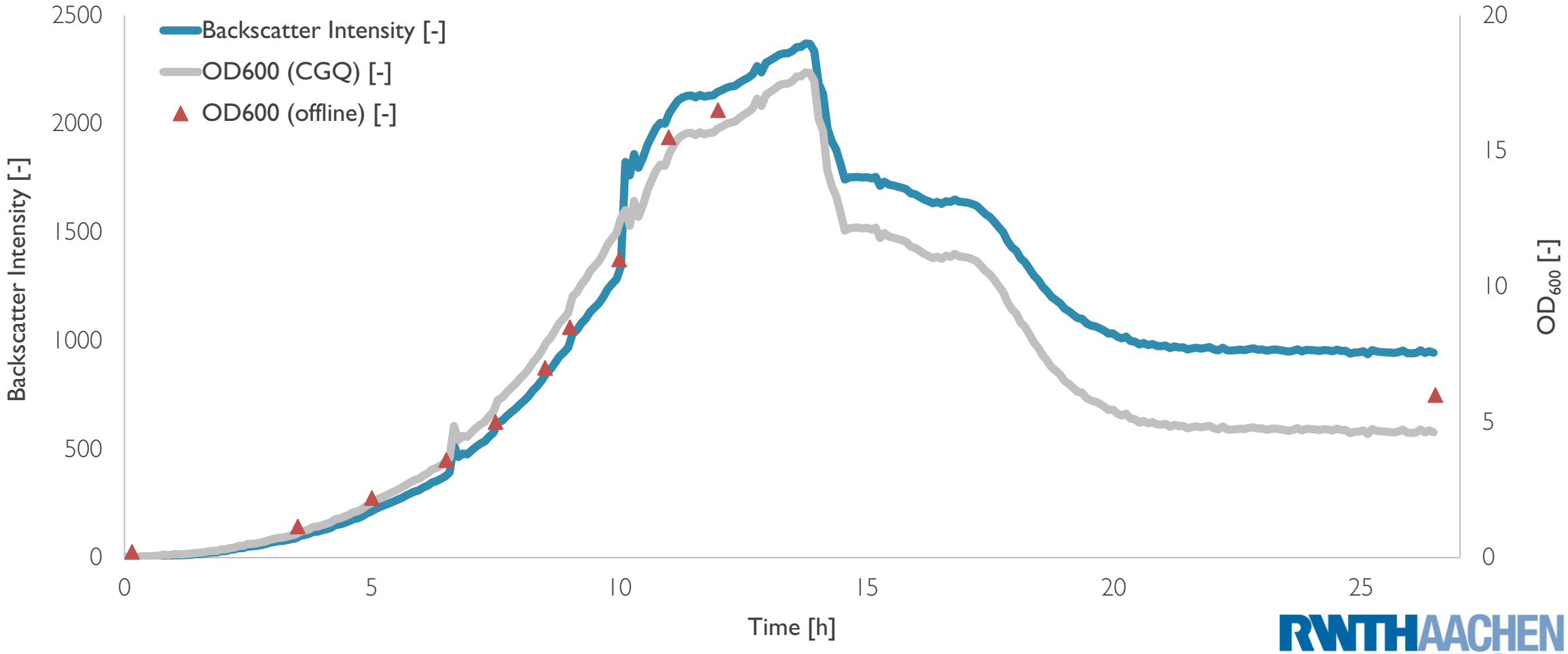
# Using a calibration file, the CGQ BioR is able to directly convert backscatter measurements to OD values.

## CGQ BioR and Offline OD Measurements: *Bacillus subtillis*




*Bacillus subtilis*, Minimal Medium, New Brunswick Glass Bioreactor (3 l), 37 °C

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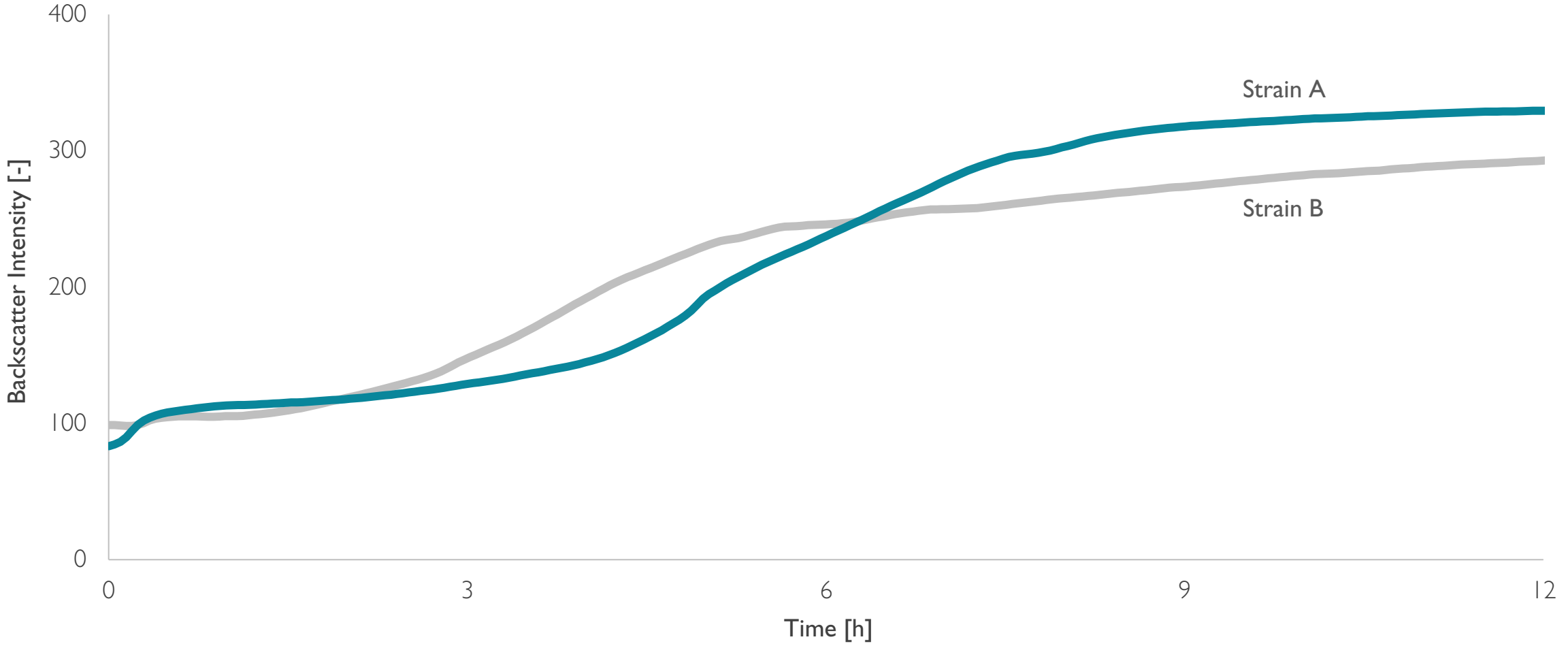
# The CGQ BioR is ideal for screening experiments in bioreactors such as strain or media comparisons.

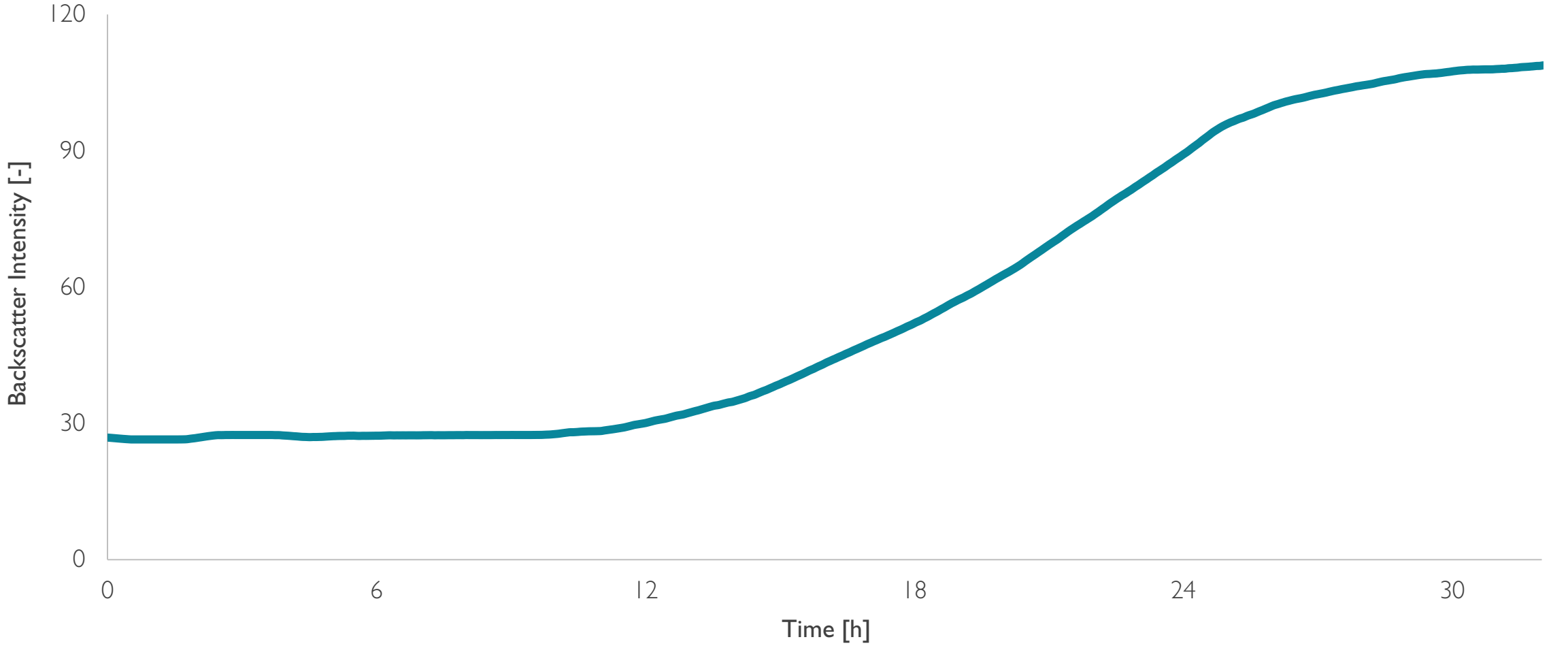
## CGQ BioR Measurement: Different *Escherichia coli* Strains




*Escherichia coli;* HCDC Medium, Infors Labfors (7,5 l), 37 °C

# The CGQ BioR allows for non-invasive online biomass monitoring in glass bioreactors with a double wall.

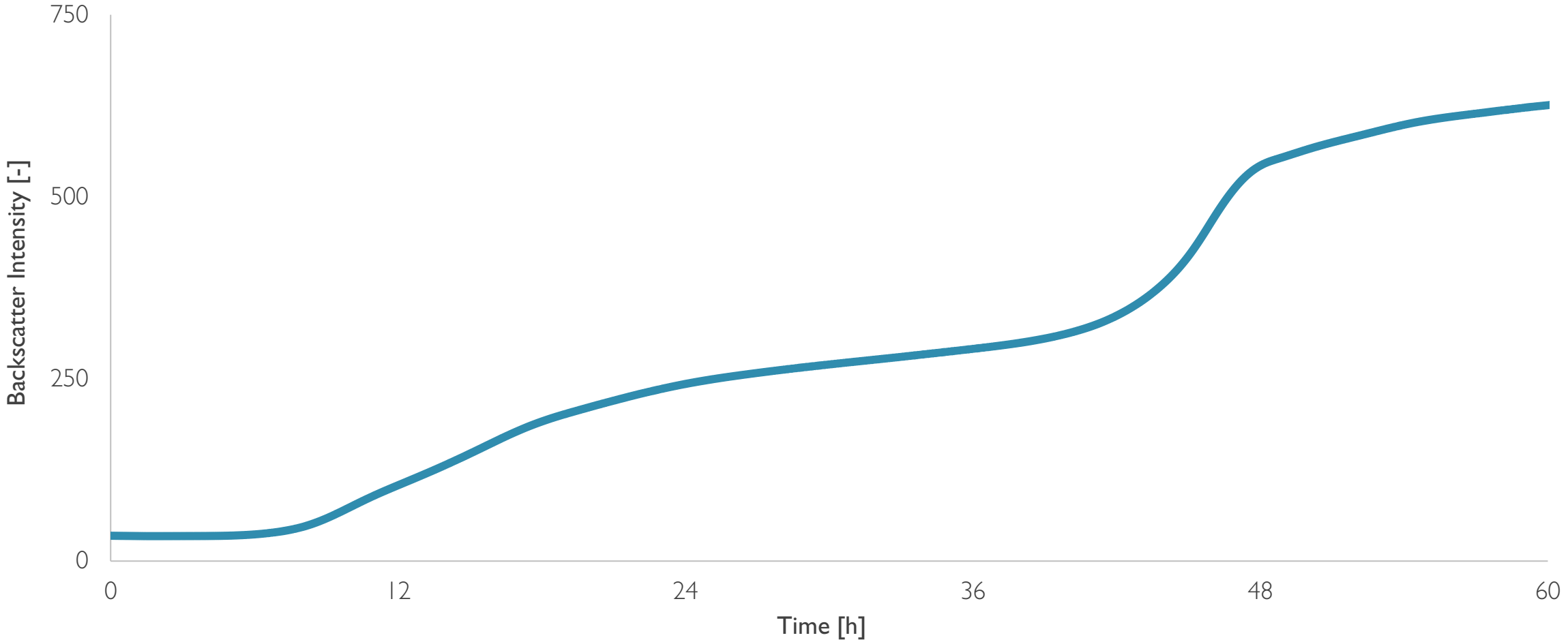
## CGQ BioR Measurement: *Escherichia coli*




*Escherichia coli* BL21, M9 Medium, Applikon Glass Bioreactor (7,5 l), Room Temperature

# The high data density of CGQ BioR measurements enables the user to detect and visualize process events like metabolic shifts.

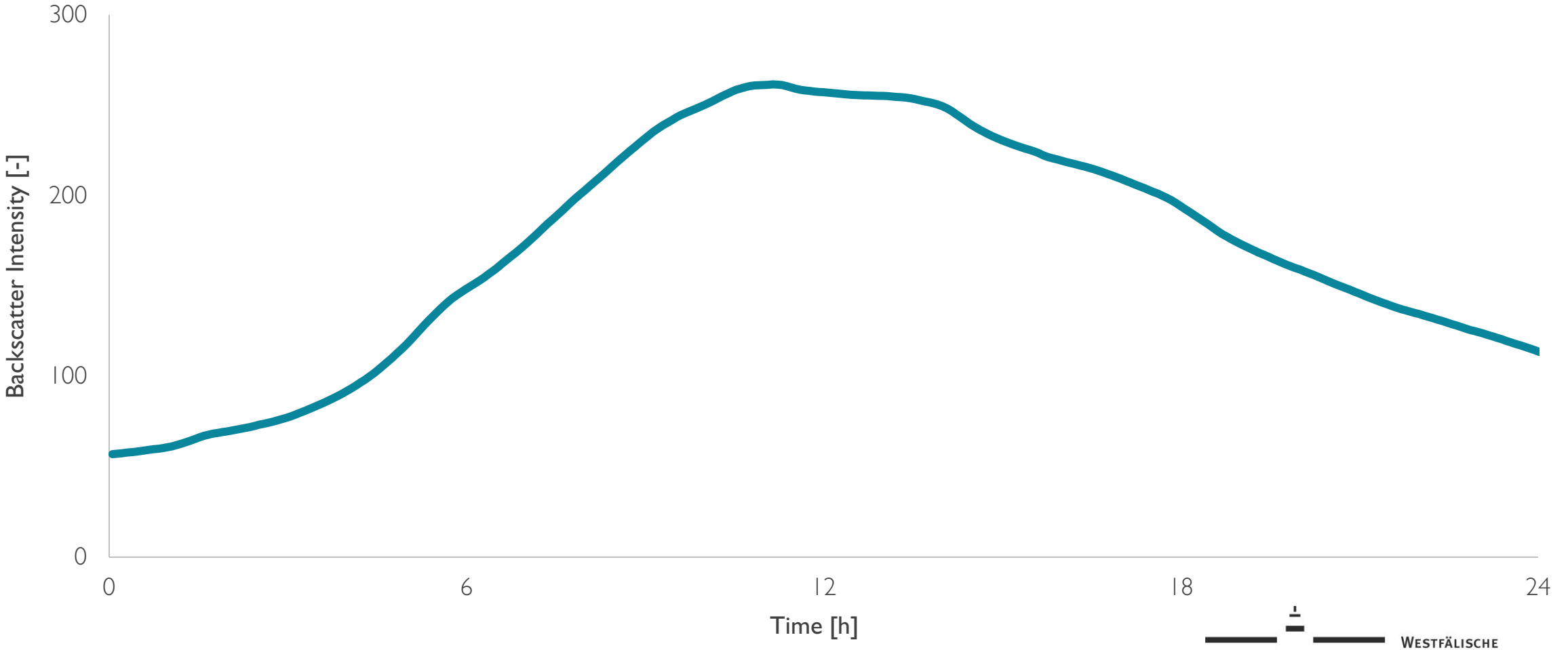
## CGQ BioR Measurement: *Saccharomyces cerevisiae* (Diauxic Growth)




*Saccharomyces cerevisiae*, YPD Medium, Applikon Glass Bioreactor (7,5 l), Room Temperature

# The CGQ BioR allows the user to closely follow the growth but also the dying of his/her cultures.

## CGQ BioR Measurement: *Amycolatopsis* sp. ATCC 39116




*Amycolatopsis* sp. ATCC 39116, Glucose Yeast & Malt Medium, Sartorius BIOSTAT b plus (2 l), 45 °C

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