sbi SCIENTIFIC BIOPROCESSING

# Flow Cells

## Online pH and Dissolved Oxygen Monitoring in Flow Loops

# Continuously monitor pH and dissolved oxygen (DO) using fiber optic sensors for flow loops.

## Flow Cells

# A flow cell system consists of three components: The flow cell, the fiber optic sensor and the DOTS Software.

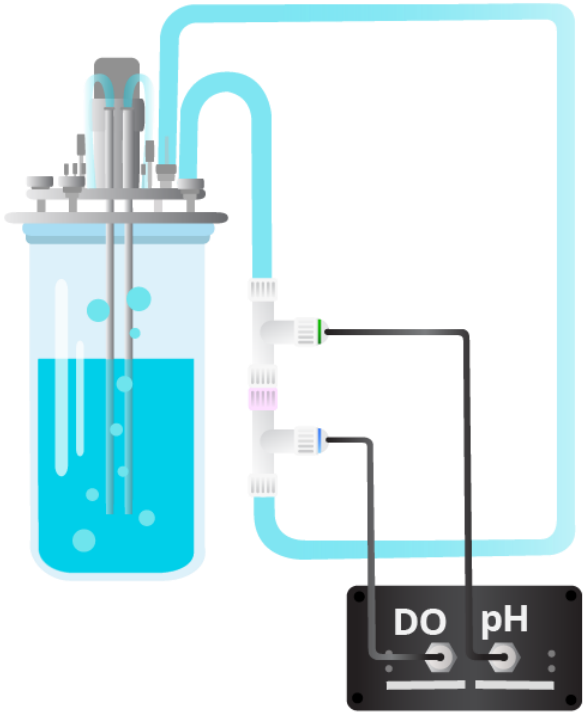
## Hardware & Software Components

| Flow Cells | Fiber Optic Sensor | DOTS Software |
|---|---|---|
|  |  |  |
| Single-use flow cells with integrated chemosensors for pH and dissolved oxygen (DO). | Contains an LED, which excites the chemosensor, and a photodiode that detects the emitted luminescence. Collects the data from all connected flow cells. | DOTS Software enables a simplified control of sensors and visualizes the received data from all monitored flow loops in real-time. |

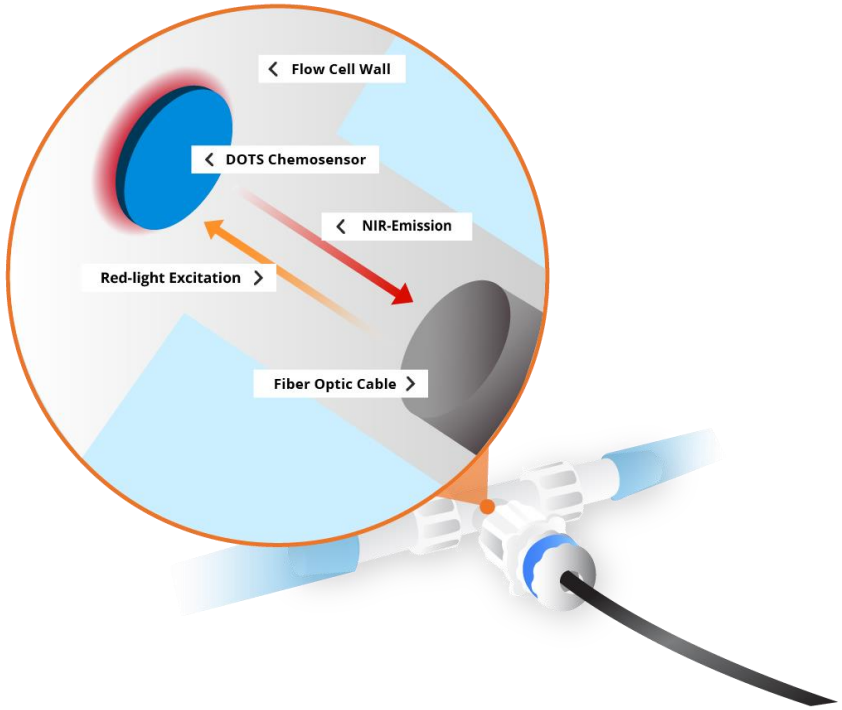
# The Flow Cells use the principle of spectroscopy for optical pH and DO monitoring.

## Principle of Measurement

### Flow Cell Architecture

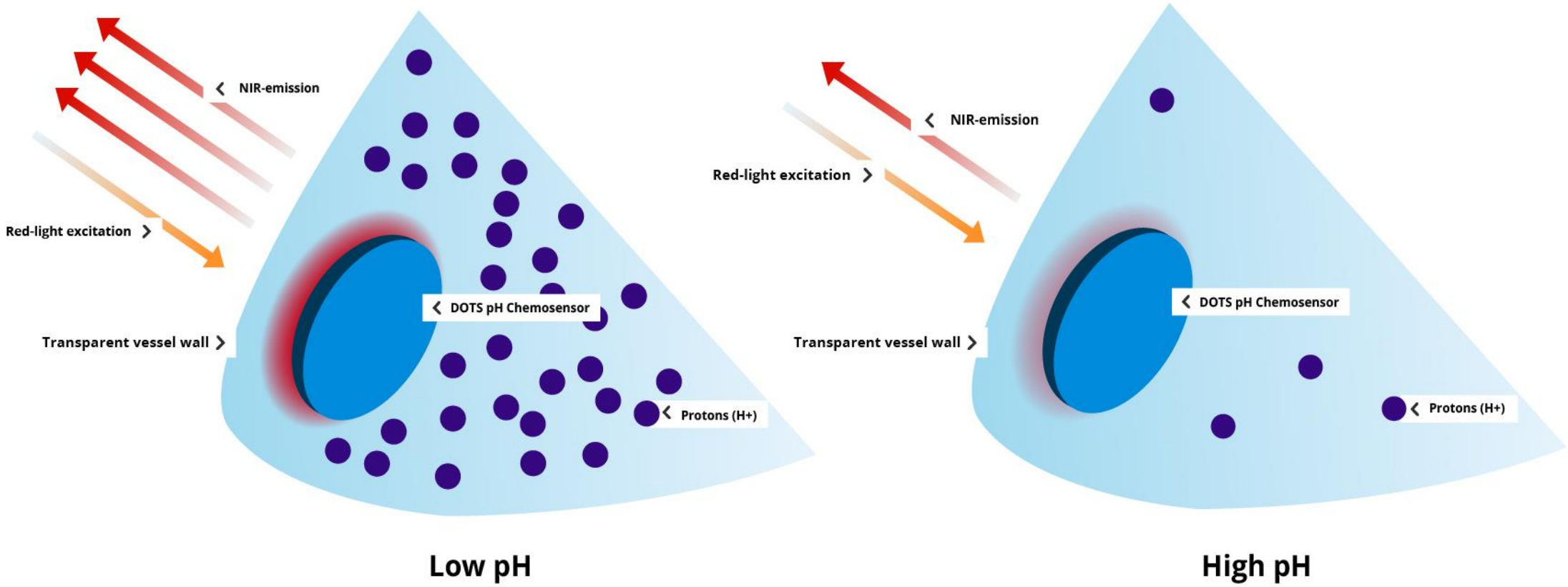



### Sensing Principle



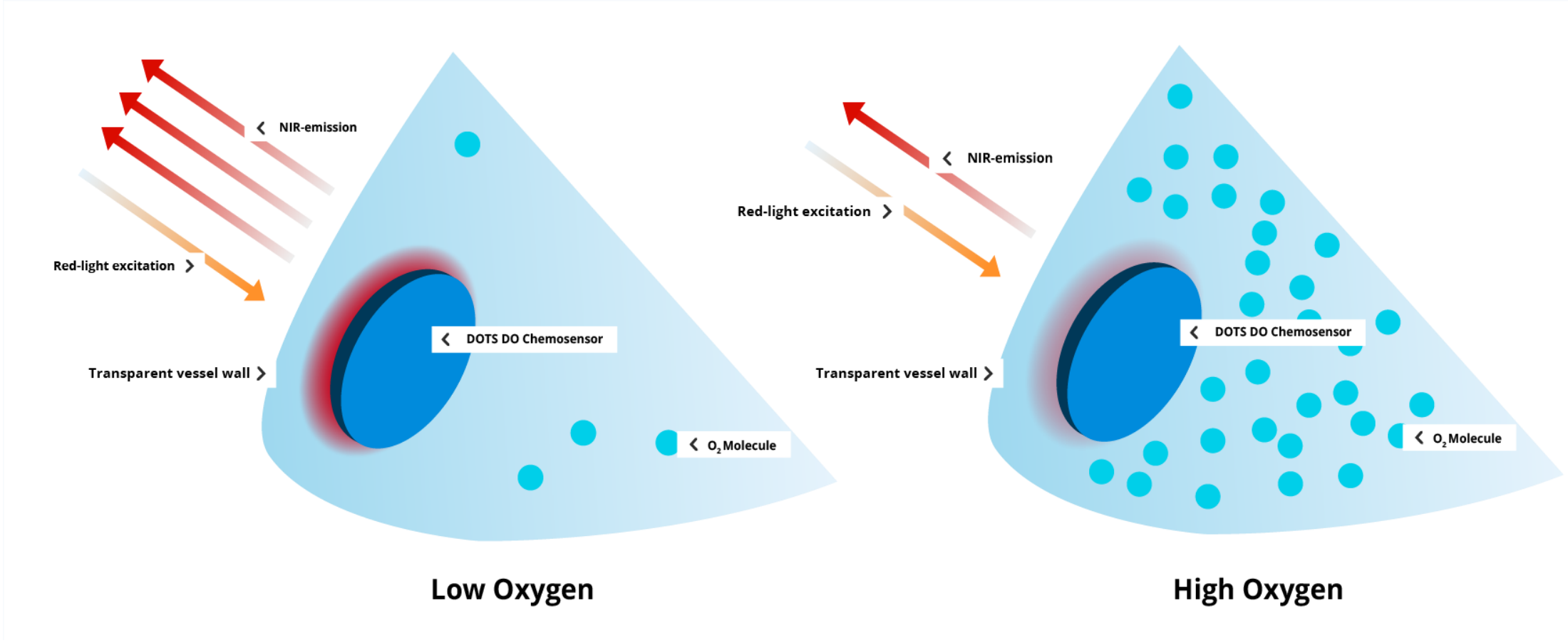
# The chemosensors contain indicator dyes which are excitable with red light (610-630 nm) and show luminescence in the near infrared region (NIR, 760-790 nm).

## Principle of Measurement - pH



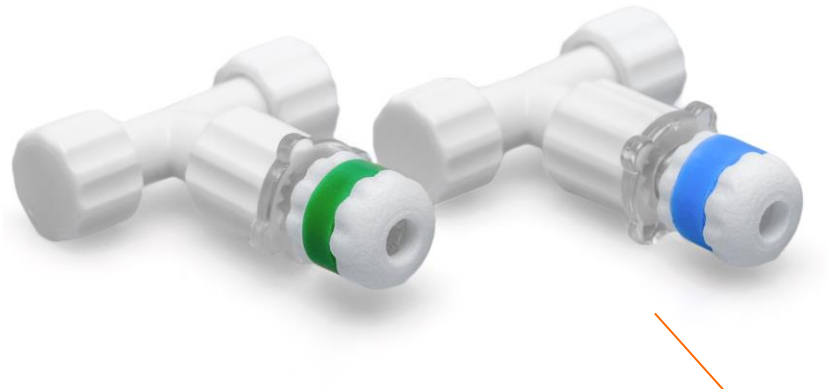
# Depending on the molecules present in the solution, the amount of luminescence changes. The fiber optic sensor measures this phase shift which is then calculated into the relevant parameter.

## Principle of Measurement – Dissolved Oxygen (DO)



# Flow Cells enable scientists to continuously monitor cell culture conditions, removing the need for manual sampling.

## Flow Cell Key Facts



### Key Facts

**Ranges for a variety of applications**
*pH ranges: 5-7, 6-8, 7-9*
*Dissolved Oxygen (DO) range: 0-50% $O_2$ (gas) / 0-100% $O_2$ (liquid) (mbar)*

**Single or dual Channel**
*Combine pH and DO flow cells with a luer-luer adapter and measure both parameters in the same flow loop simultaneously*

**Easy to install and use**
*Standard luer-lock connectors allow for easy installation into flow loops with different tubing sizes*

**Ready-to-use**
*Factory-calibrated and pre-sterilized for immediate use*

**Flexible flow rates**
*From 1 mL/min to 500 mL/min*

**Powerful DOTS Software**
*Simplified sensor control and data visualization for improved comparability*

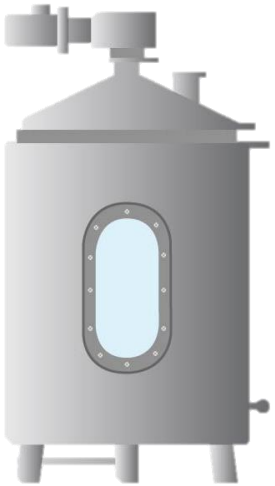
# Flow Cells are compatible with a variety of lab infrastructure.

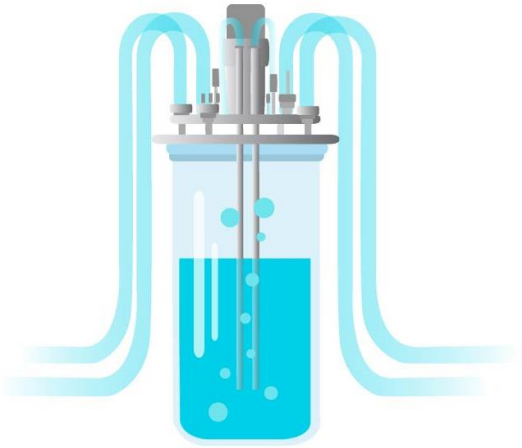
## Compatible Laboratory Infrastructure

**Perfusion bioreactors, custom benchtop bioreactors, and small-scale fermenters**

Flow Cell

**Harvest lines, sampling lines, media in/out flow lines, waste removal lines**

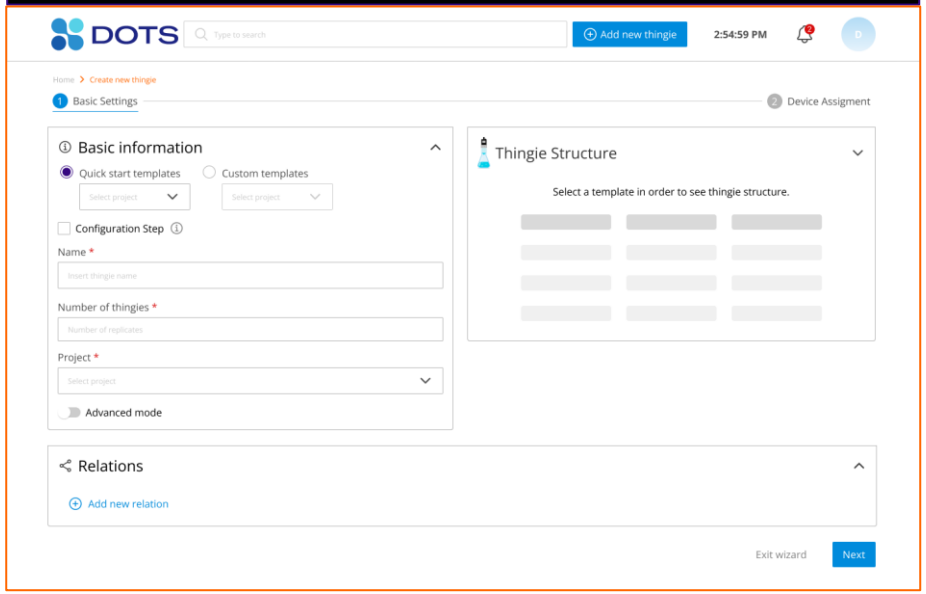




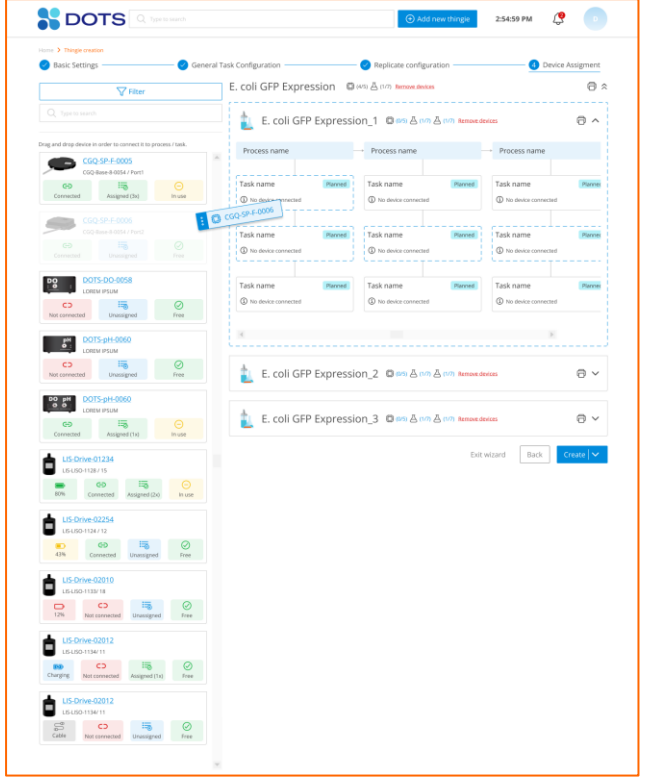
# The DOTS Software enables easy sensor handling and real-time data visualization.

## DOTS Software Modules

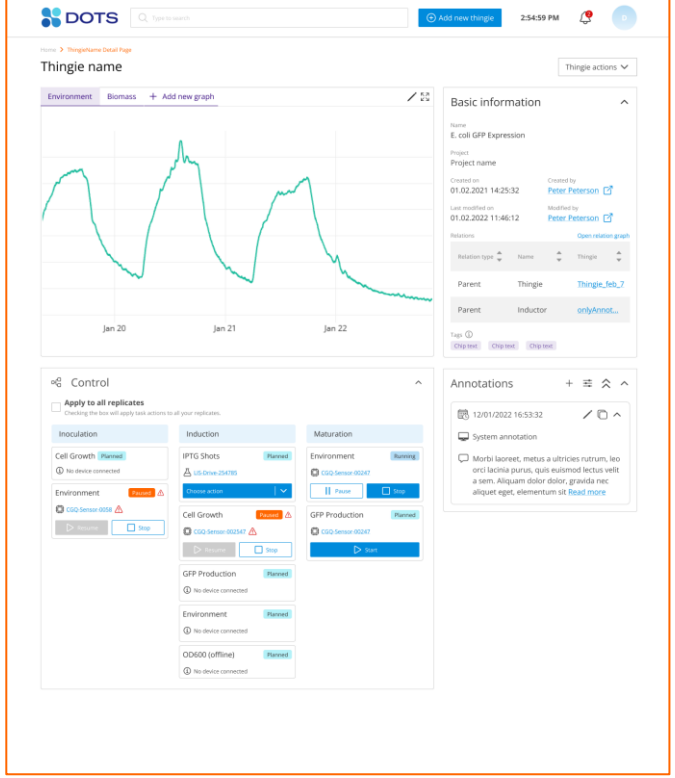
### Create an experiment with pre-defined application templates or via the custom template generator




### Assign sensors to objects via drag and drop

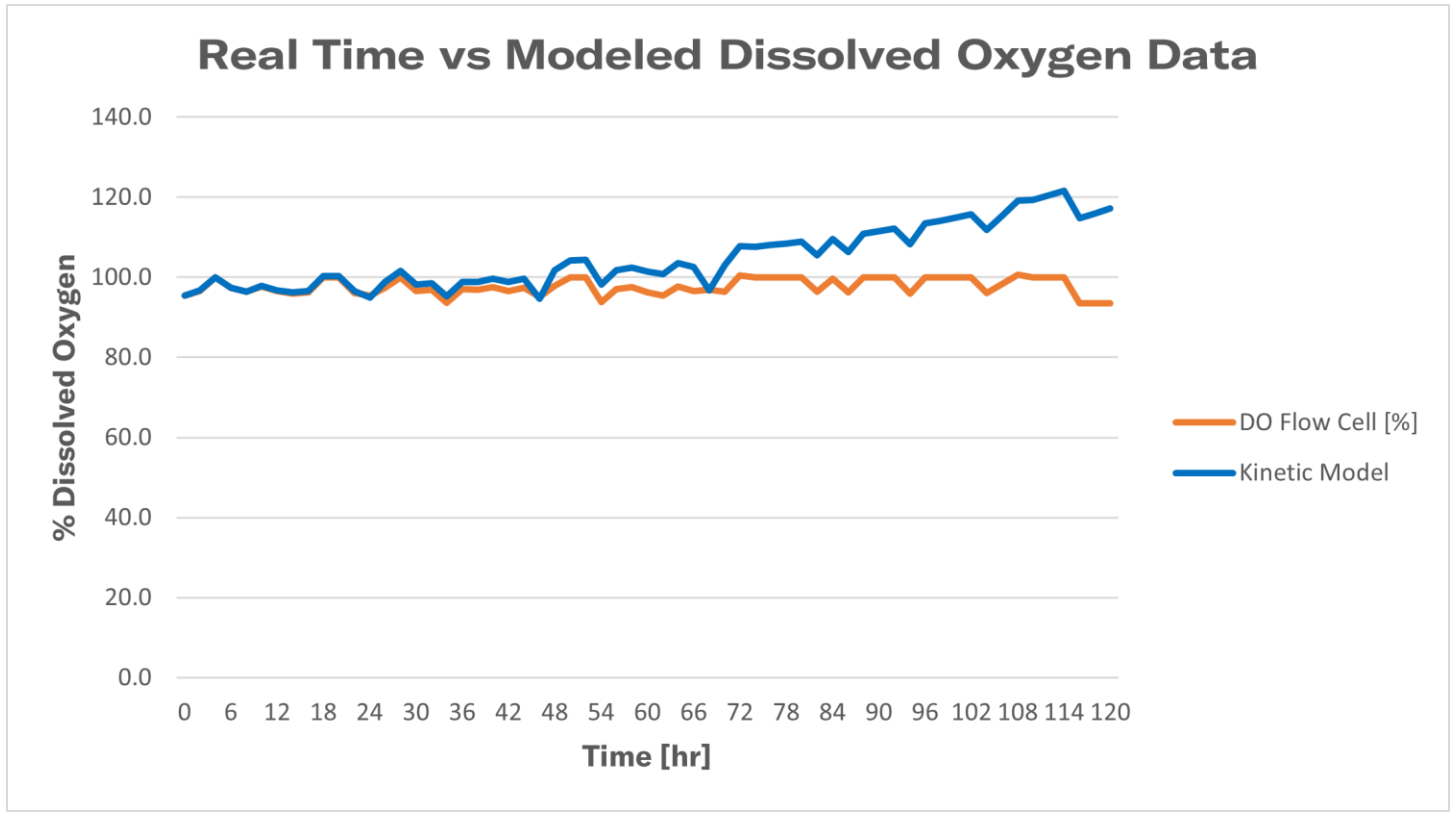



### Start your experiment and visualize your data in real-time



# Customer Success Story – Washington State University

## Integrated Dissolved Oxygen Flow Cells Optimize Centrifugal Bioreactor (CBR) Designed To Maximize Cytotoxic T Lymphocyte (CTL) Production




Fiber optic sensors reported approximately 5% higher, on average, than the values predicted by the kinetic model (based on OCR from static culture studies) highlighting that the cells are not consuming oxygen as fast as originally thought.

WASHINGTON STATE UNIVERSITY

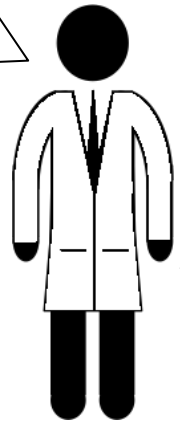
# Our flow cells are built around the sensing needs of our customers.

## Customer Feedback

"Incorporating SBI's pH and DO flow cells into our system removed the need for manual sampling, saving us time, reducing the risk of contamination, and providing information on how the CAR T-cells are growing even when we are not in the lab. With availability of this more detailed view of our culture, we can make informed improvements to our cell expansion process."

-Kitana Manivone Kaiphanliam

(Washington State University)



"Having an integrated oxygen flow cell made all the difference in getting our cell expansion culture to work. The consistent real-time data showed us we needed to provide a better oxygenation system for successful cellular growth."

-Dr. Bernard J. Van Wie

(Washington State University)

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# Let‘s Connect!

insights@scientificbio.com
www.scientificbio.com

@scientific bioprocessing (sbi)

@scientific bioprocessing

@scientific_bio