

# Characterization and scale-up of a wave mixed single-use bioreactor (CELL-tainer®)

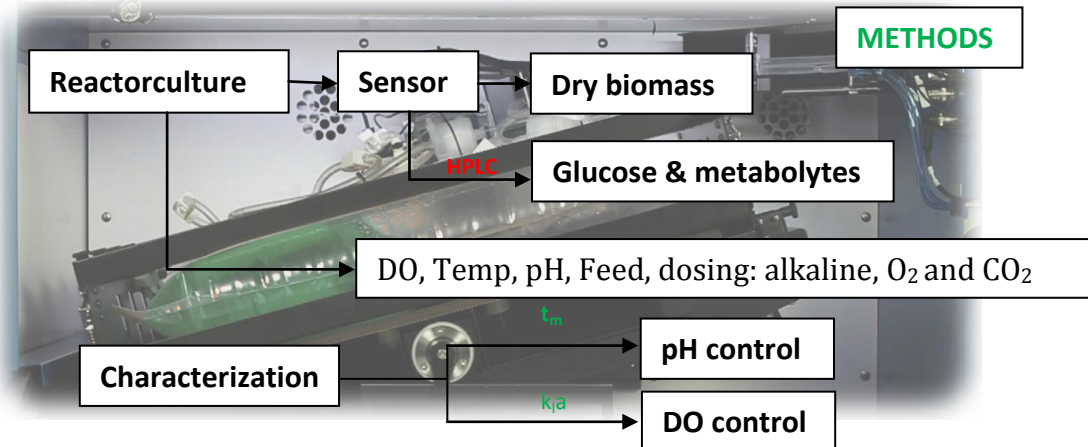
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## Introduction

The usage of single use bioreactors is increasing over the last years, this because of the simplicity of usage, lower costs and faster apply.

In this study the 15L CELL-tainer is compared to a larger system in a fed-batch cultivation of *Escheria coli* up to high cell densities. The cells express an amylase enzyme.

In both scales of bioreactors mixing times ( $t_m$ ) and oxygen mass transfer coefficients are compared at different operating volumes and rocking speeds.



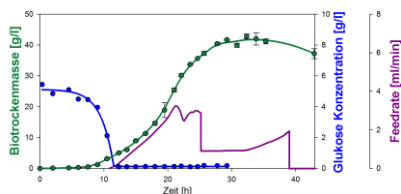
## Hypothesis

Due to the applied rocking motion (a 2-D motion), higher  $k_{La}$ -values and better liquid mixing compared to other types of single-use rocking bioreactors are expected. Such way, high cell density bacterial cultures can be performed under substrate limited fed-batch conditions.

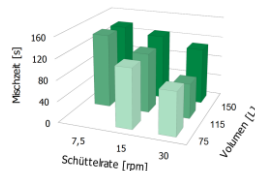
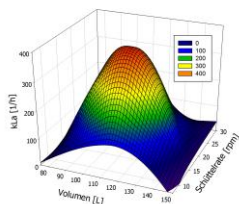
## Results

Figure shows *E.coli* cultivation data in a 10L CELL-tainer (substrate limited fed-batch). Biomass concentration is in g/L (left axis), glucose concentration (g/L) and feed-rate (mL/min) are at the right axis.

The other figure shows the results of  $k_{La}$ - and mixing



time measurements in a CELL-tainer with a working volume of 75 – 150L.



## Future potential

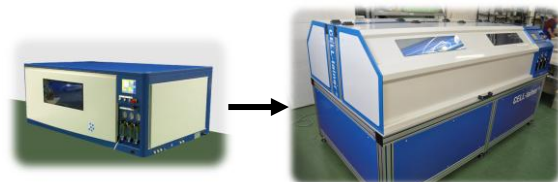
In the CELL-tainer single use bioreactor it is possible to achieve biomass dry-cell weights of > 40 g/L, which is close to industrial culture data. We will carry out a fed-batch fermentation in the 100L CELL-tainer. The  $k_{La}$ -values in the 100L CELL-tainer are only slightly lower than at 15L scale <sup>1)</sup>. Mixing times are 50% larger at 100L scale compared to the 15L scale.

In both reactors, these values are far above other wave-mixed single use bioreactors <sup>2)</sup>.

<sup>1)</sup> CELLution Biotech B.V., Celltainer product description, <http://www.celltainer.com/highlights.html>

<sup>2)</sup> Tibor Anderlei et alia, Einfache Maßstabvergrößerung bei geschüttelten Einweg-Bioreaktoren,

[www.process.vogel.de/anlagen\\_apparatebau/behaelter/fermenter/articles/249642](http://www.process.vogel.de/anlagen_apparatebau/behaelter/fermenter/articles/249642)



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