INFORS HT

in vitro technologies

Bioprocess trends and solutions, facing the challenges encountered in biopolymer production.

Shaman M. Gaspar
(Regional Director Southeast Asia & Oceania)

Challenges faced in production:

The battle against known, industrially produced polymers

Public awareness on the types of biodegradable plastics

Cost vs perfomance in bioreactor design.

CAPEX & OPEX in bioprocess, time, energy and infrasturucture leads to the need for midpriced ~ high volume product.

The right way forward for higher end applications, **single use bioreactors, membranes, diaphragm, medical implants or microcariers for cell culture.**

Japan International Cooperation Agency

Berliner Hochschule für Technik

UNIVERSITI SAINS MALAYSIA

made with

D-BSSE Department of Biosystems Science and Engineering

Massachusetts Institute of Technology

ETH zürich

Challenges in biopolymer production

Foaming conditions are difficult to manage, poor response to Antifoam

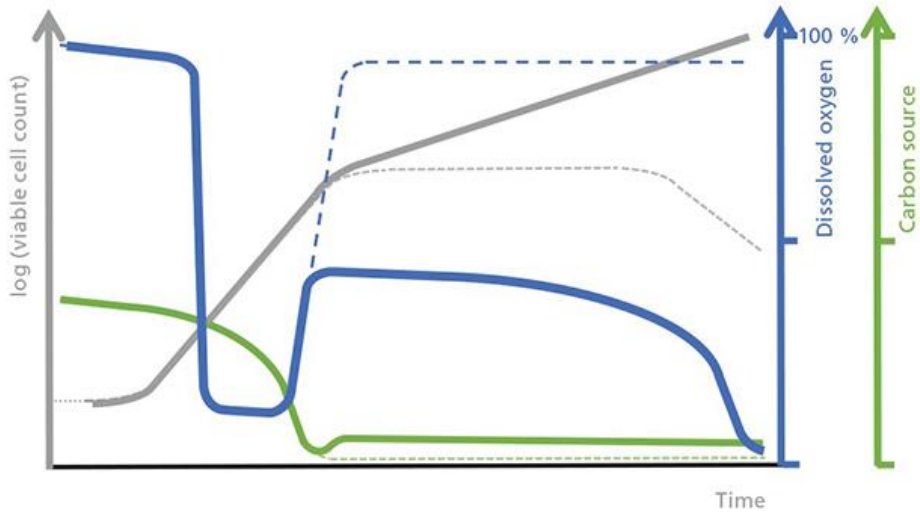
Oxygen limitations due to high OUR, O_2 blending is expensive in scale up, 300g/L is possible

Metal leeching in some applications where extremophiles are used, PEEK material is needed ***(PHA could be viable)***

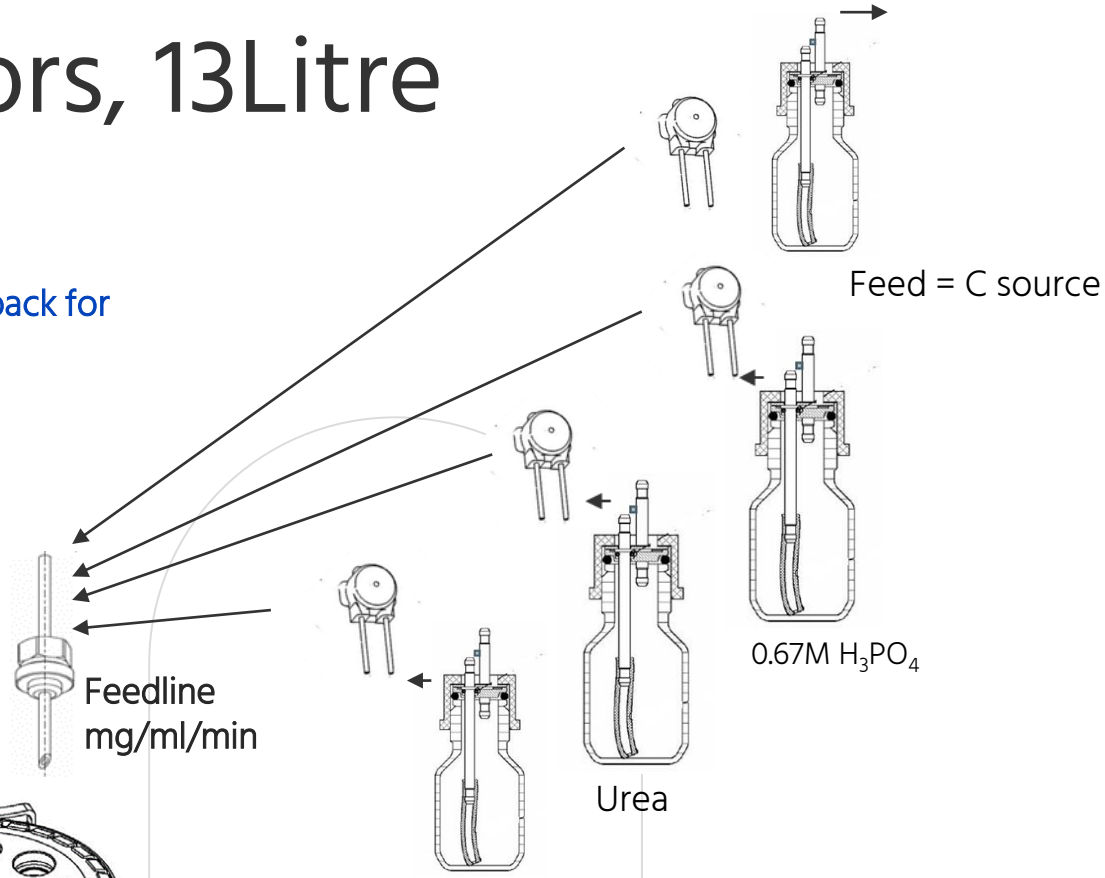
Multiple feedlines required; Challenge is in building a cost optimised approach from upstream to downstream in bioprocess

Biopolymer production in pilot scale

Fed-batch process in a Labfors, 13Litre



Soft-sensor, μ feedback for feed

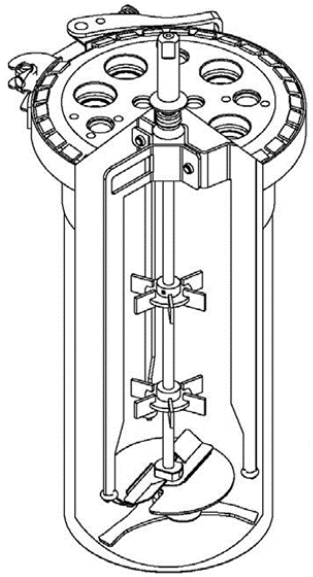


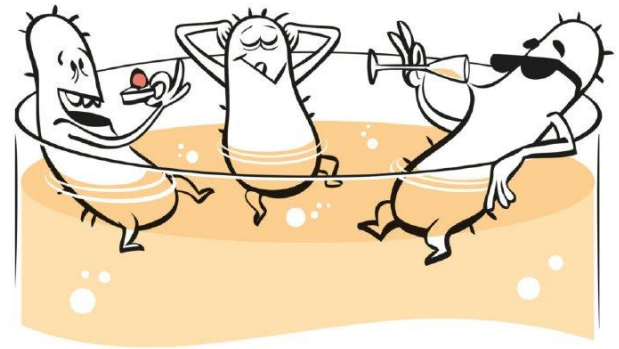
Air ⇨ Magnetic valve

O2 ⇨ Magnetic valve

⇨ Rotameter or MFC

vvm: gas flow (L min^{-1}) per culture volume (L)



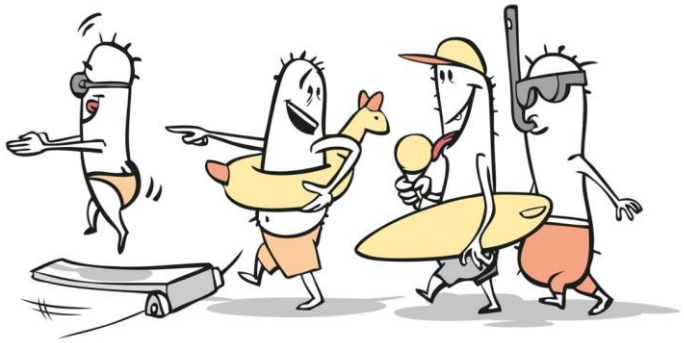


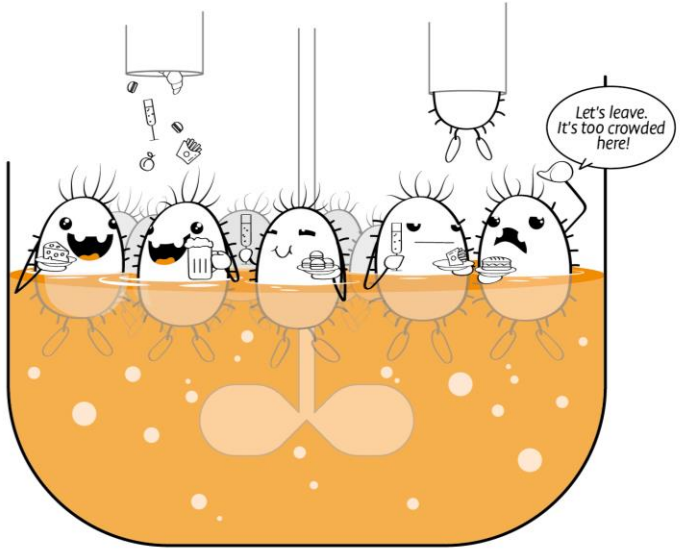
pO2 ~ 40%, MSM
Stirrer 300 to 1500rpm
Centrifugal foam breaker

c. necator

Charles F. Budde & Sebastian L. Riedel & Florian Hübner & Stefan Risch & Milan K. Popović & ChoKyun Rha & Anthony J. Sinskey - Growth and polyhydroxybutyrate production **by Ralstonia eutropha** in emulsified plant oil medium (2010) *Appl Microbiol Biotechnol* *DOI 10.1007/s00253-011-3102-0*

Tangible solutions in process improvement with **continuous** and **repeated fed-batch**



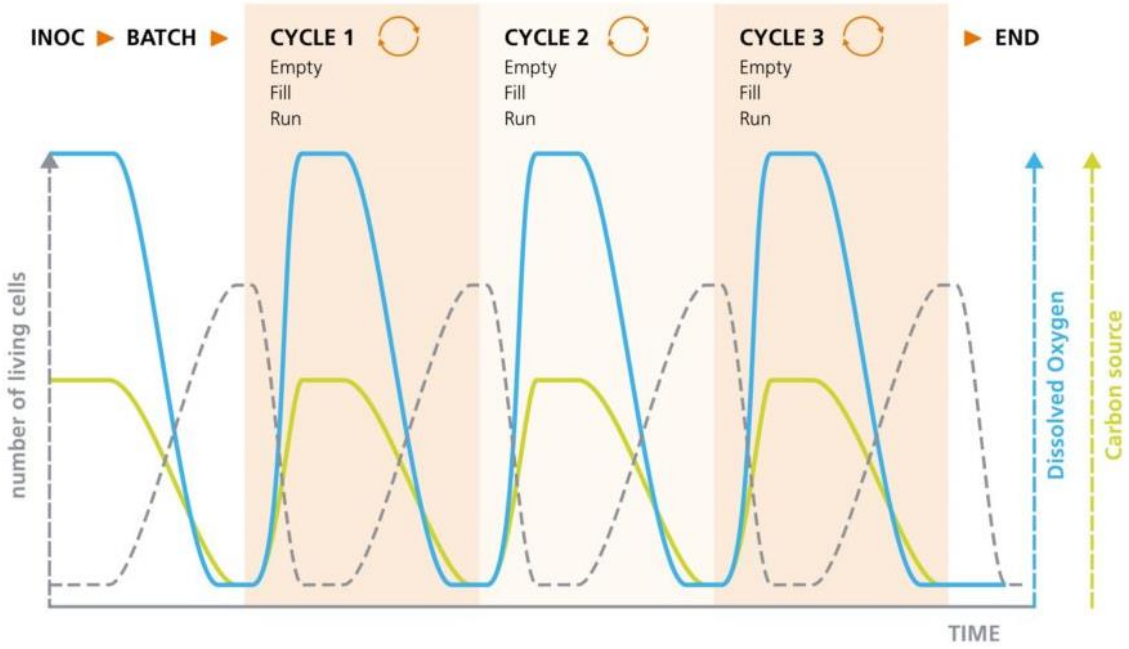


Studies are being conducted, aimed at simplifying and reducing issues with handling

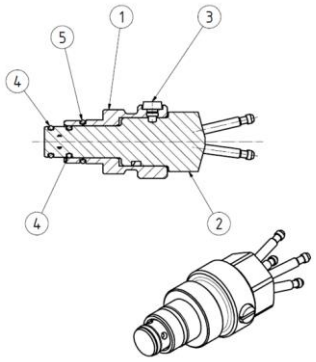
Repeated fed-batch allows several cycles in succession

Reduces the need for large bioreactors and eliminates the need for a repeat in inoculum preparation

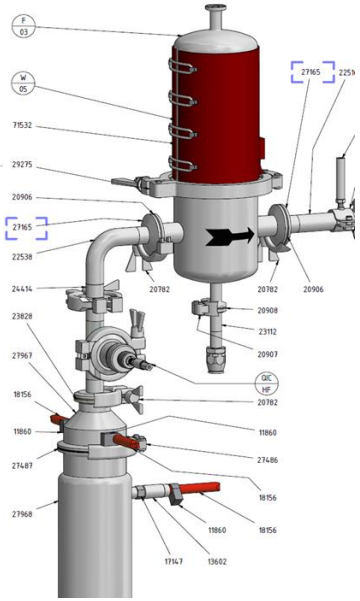
More sophistication in software technology needed for automation, **eve®**



In Pilot scale things get radically different

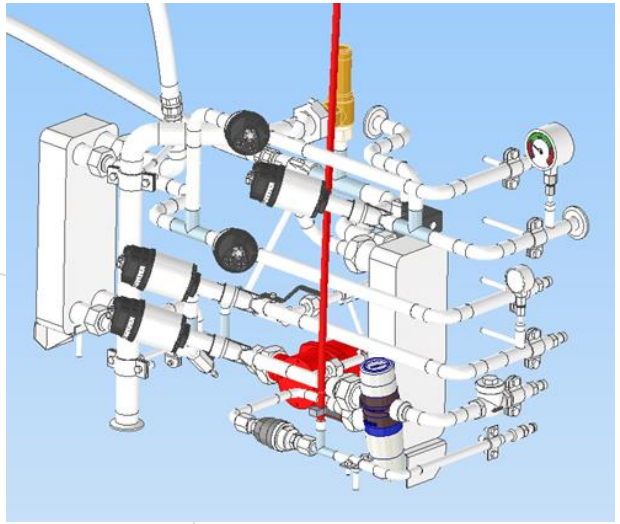


4 inlet push valve

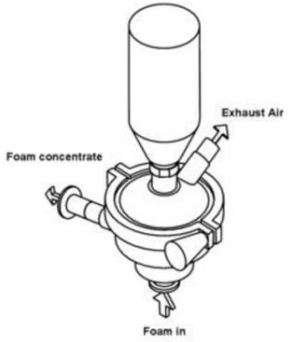


Foam sensor in exhaust line

Pressure Control, OTR



Multiple heat exchangers



Mechanical Foam Disruptors, Ultrasonic

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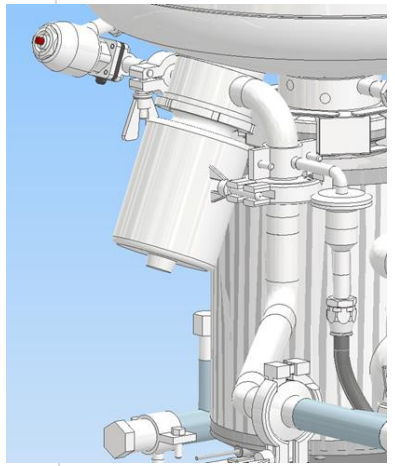
We bring life to your laboratory

20 years of experience in process development for biopolymers



Novaseptic harvest valve, total emptying