BioThrust

We thrust your process

The revolution in process aeration

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Overview

BioThrust offers two breakthrough product lines for the aeration and filtering of bioreactors

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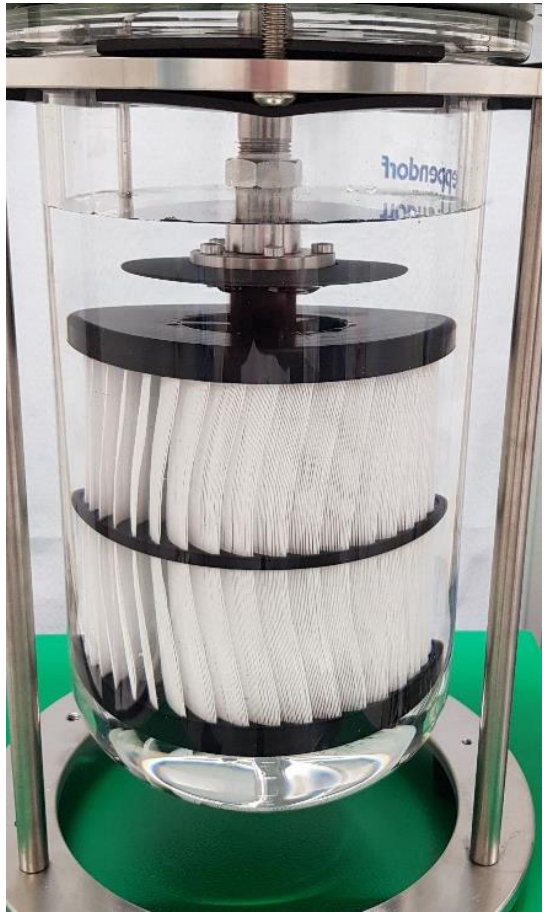
BioThrust Membrane Module



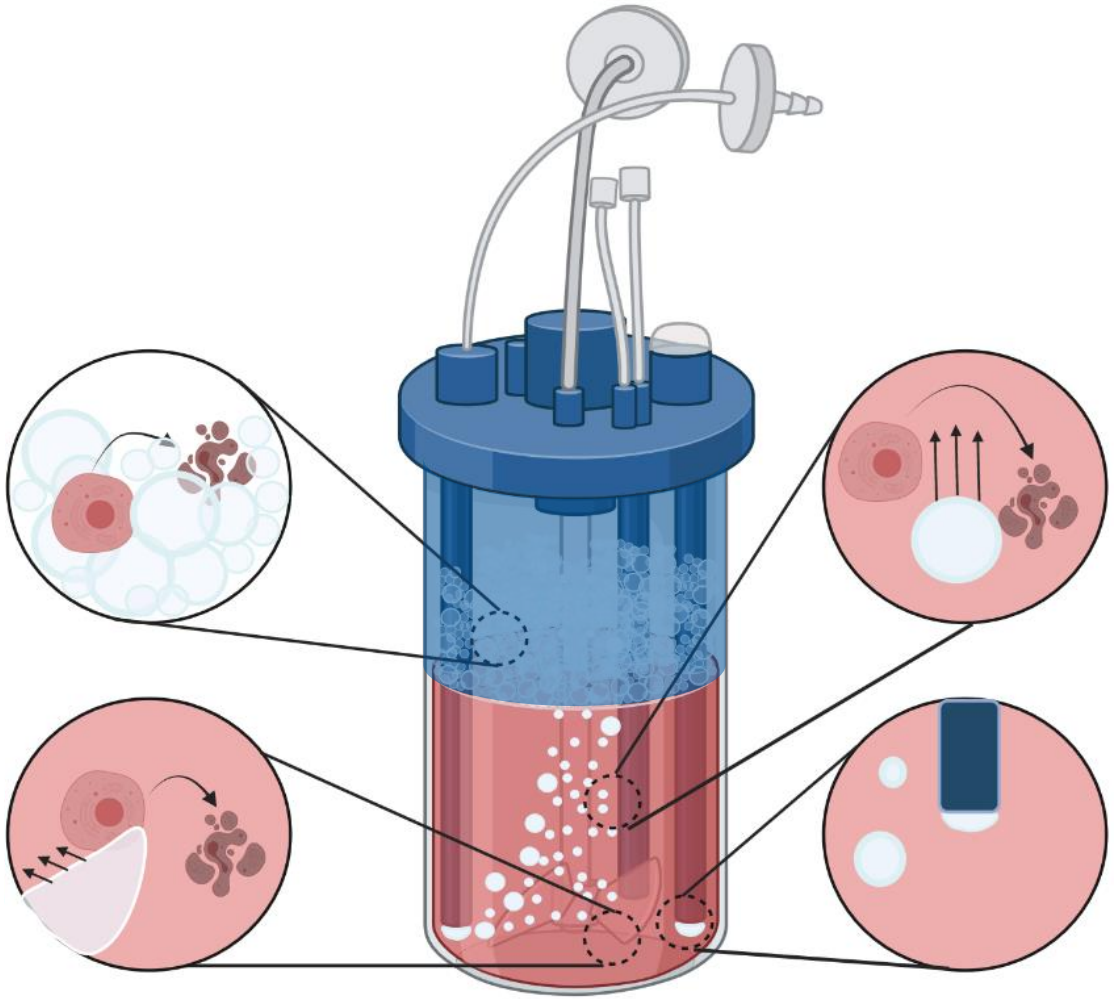
- World‘s first bubble-free bioreactor aeration
- Up to +250% space-time yield
- Up to +300% gas transfer
- Extremely gentle and mild conditions
- No foam formation

BioThrust Porous Spargers, Stirrers and Filters

- Fine-pearly bubbles
- Fully customizable as sparger or stirrer
- +30-300% gas transfer (depending on process)
- Autoclavable & radiation-sterilizable
- Also offered as filters for in-situ separation

Membrane Module – Problem

Our 1st product line addresses the problems of conventional bubble aeration which significantly reduce space-time yields



Only **1-15%** gas transfer efficiency

High shearing stress for organisms due to rising gas bubbles and rotating stirrer

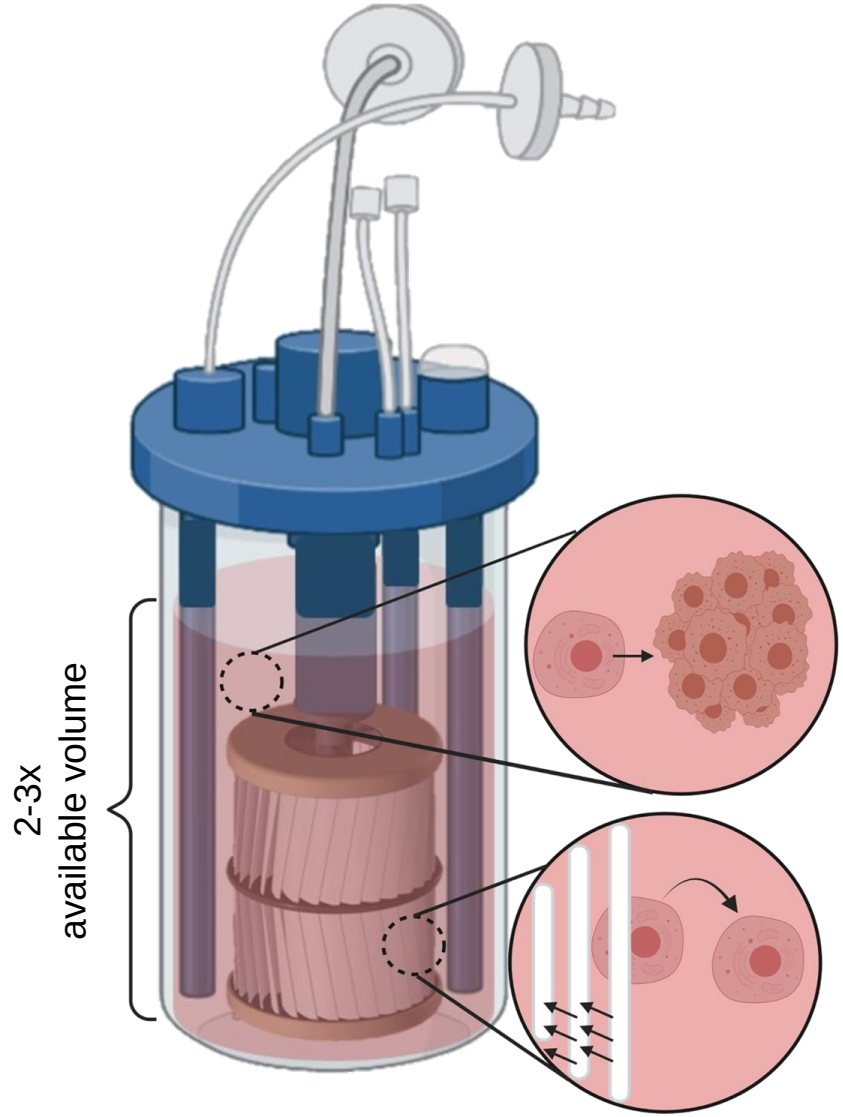
Foam formation (taking up to 50% of the usable reactor volume

Antifoam agents **impede downstream** processes / purification

Source: BioRender.com

Membrane Module – Product Overview

The BioThrust membrane module enables the world's first effective bubble-free aeration of bioreactors



- Up to **100% gas transfer** efficiency
- **Gentle, stress-free fumigation** and circulation of organisms
- **No foam formation**
- Chemical and radiation **sterilization** possible
- Available for **3L** and **10L** reactors – **scale-up** to 200L planned

Source: BioRender.com

Membrane Module – Customer Value

With this unique technology, our modules enable biotechnology companies to significantly increase their process yield and gas transfer

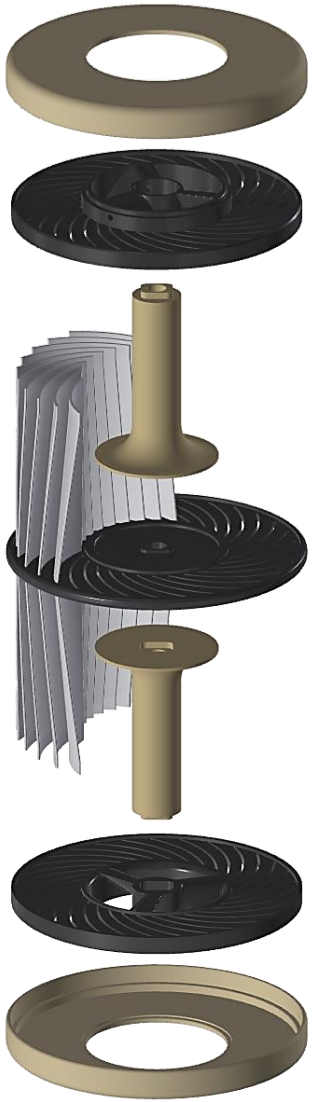
+250% Space-Time Yield

+300% Gas Transfer

No Foam Formation

Membrane Module – Technology

Our patented technology consists of two major technological breakthroughs



Unique **flow-optimised design** of membrane mats enables optimal and stress-free circulation

Highly efficient gas transfer through use of specific **hollow fibre membrane**

Membrane Module – Implementation

Using CFD analysis, our membrane modules are fit to the popular bioreactor types and can therefore easily be installed

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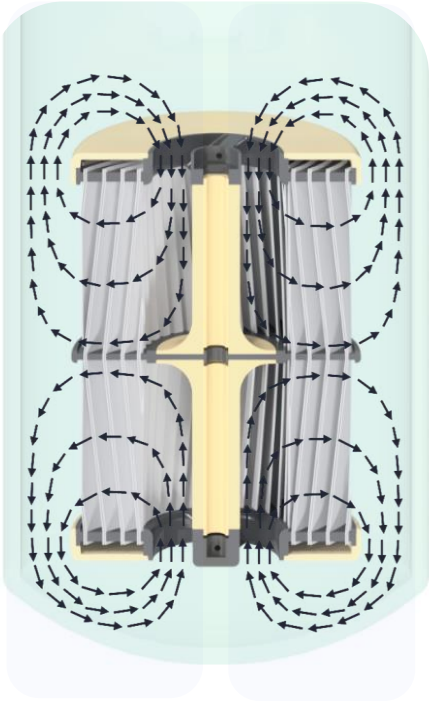
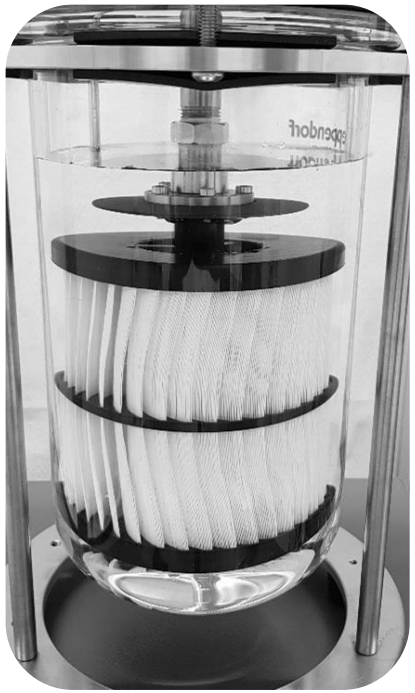
Digital twin of the bioreactor



Module design (with optimized flow conditions)

Flow analysis using CFD

Prototype fabrication



Installation in the bioreactor

See also: Bongartz, P., Bator, I., Baitalow, K., Keller, R., Tiso, T., Blank, L. M., & Wessling, M. (2021). A scalable bubble-free membrane aerator for biosurfactant production. Biotechnology Bioengineering. 118, 3545– 3558. https://doi.org/10.1002/bit.27822

Membrane Module – Scale-up & Single Use

Plug-and-Play modules are currently available from 3L-10L reusable and single-use with further scale-up ongoing

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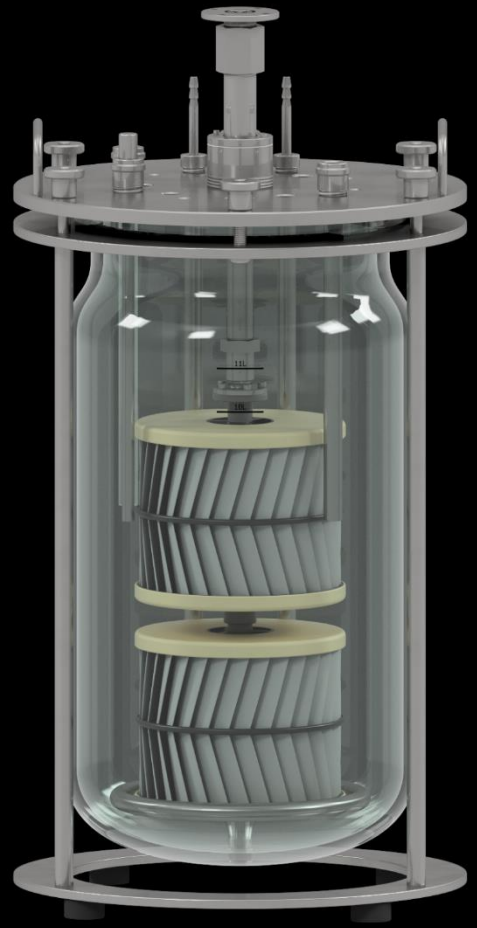
10L Reusable Module



10L Single-Use Module

Membrane Module – Shearing Conditions

Our simulations show mild and gentle shearing conditions for organisms even at 300 rpm

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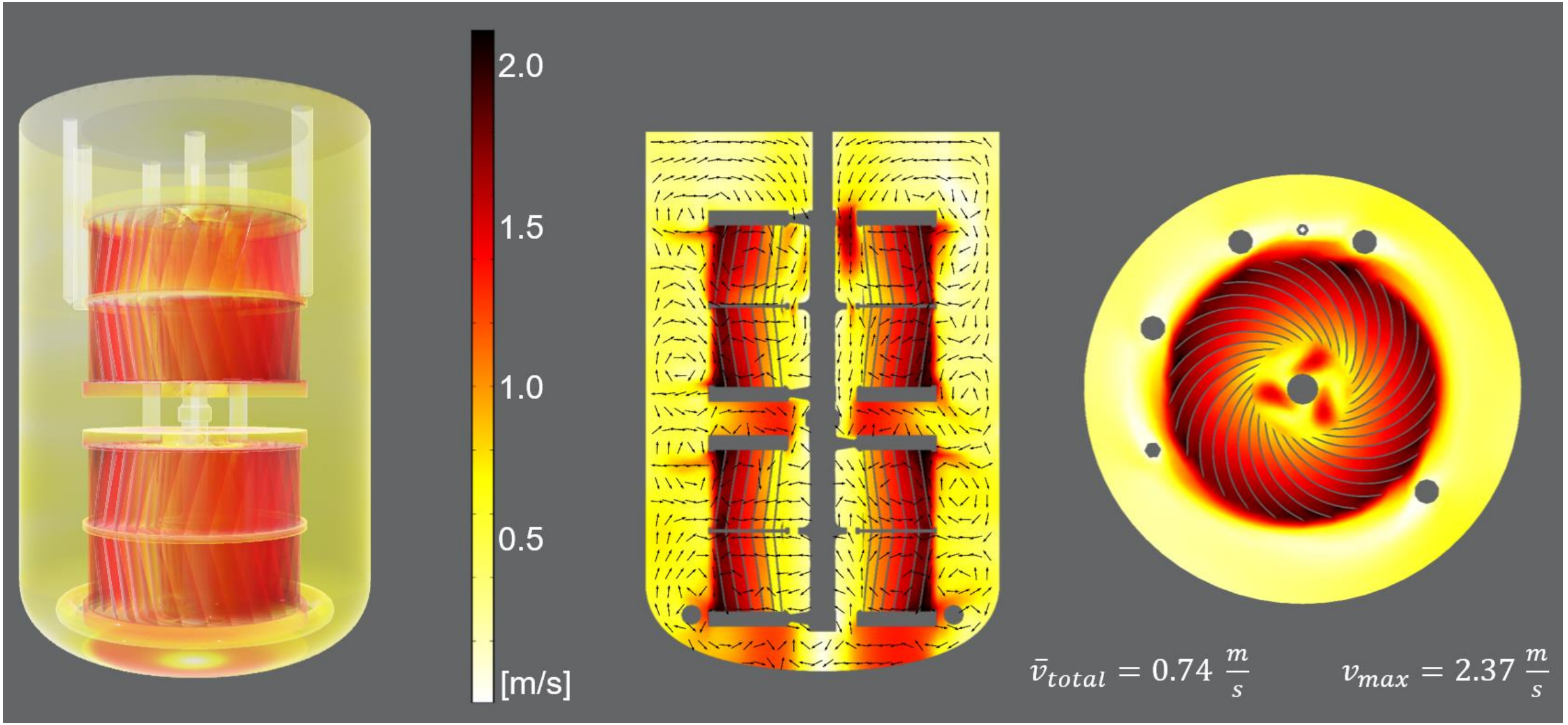

Porous Fixtures – Highly Porous Spargers, Stirrers & Filters

Our second patented product line offers significant improvements for long established processes

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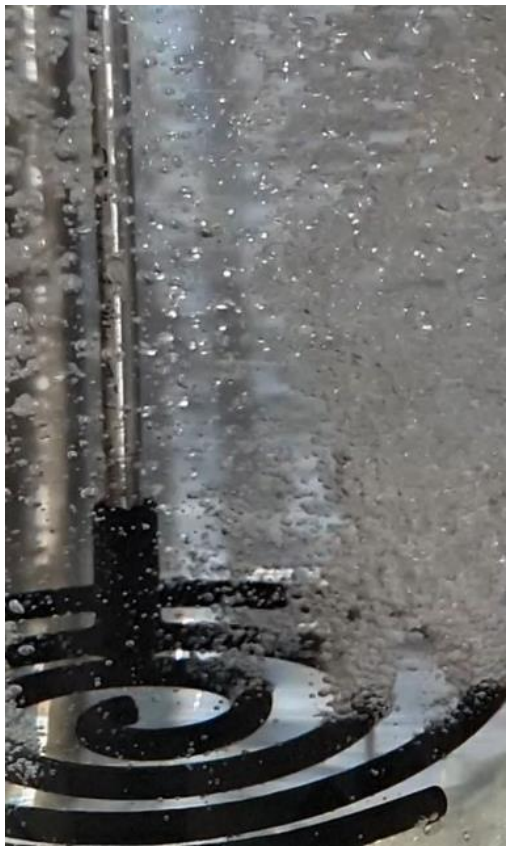
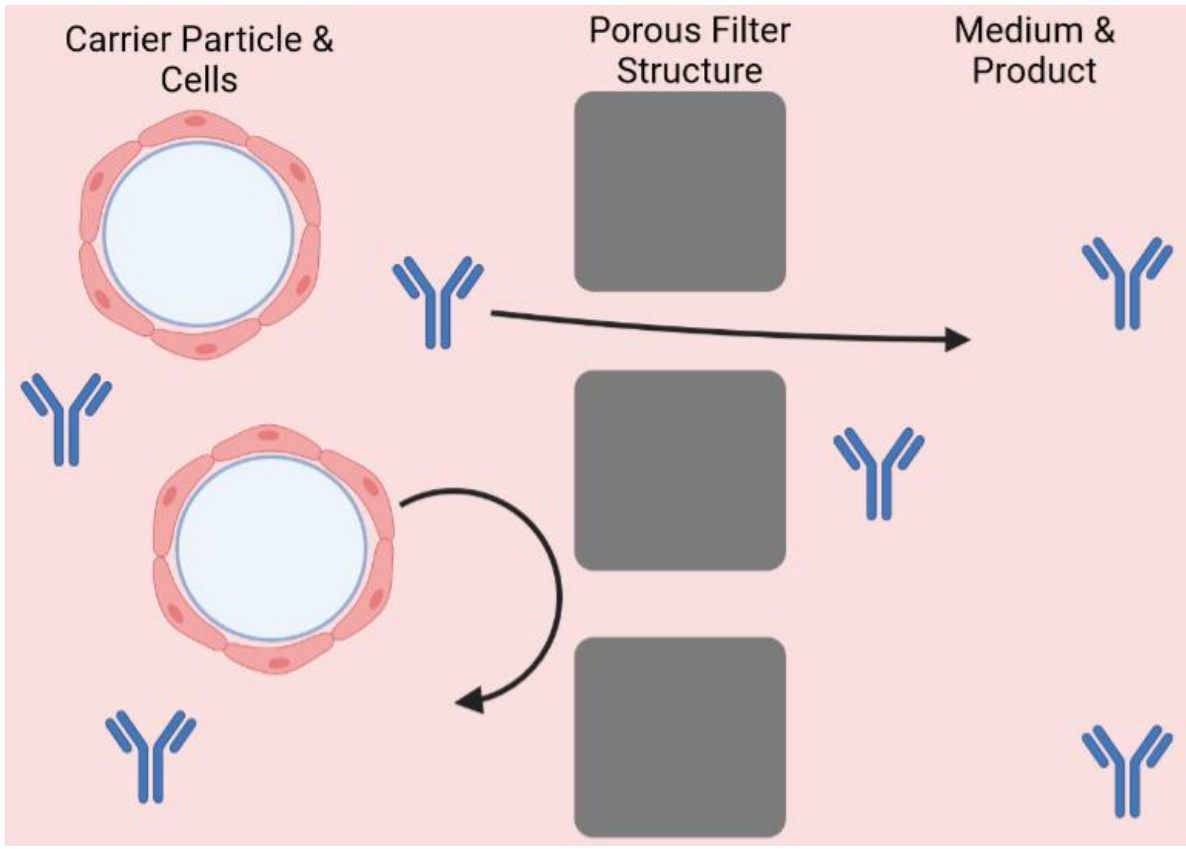
Porous Spargers & Stirrers



+30-300% Gas Transfer
(depending on process)

Filter Systems



In-Situ Separation

Source: BioRender.com

Porous Fixtures – Design Capabilities

Our 3D-printed, highly porous spargers and stirrers can be customized at different forms and process requirements

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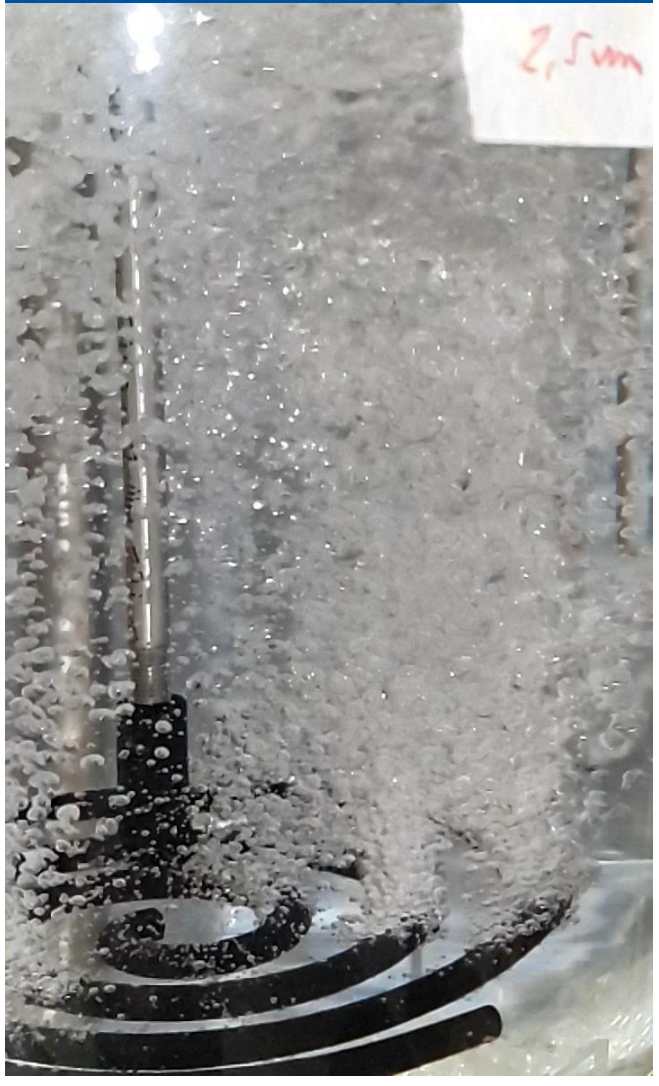
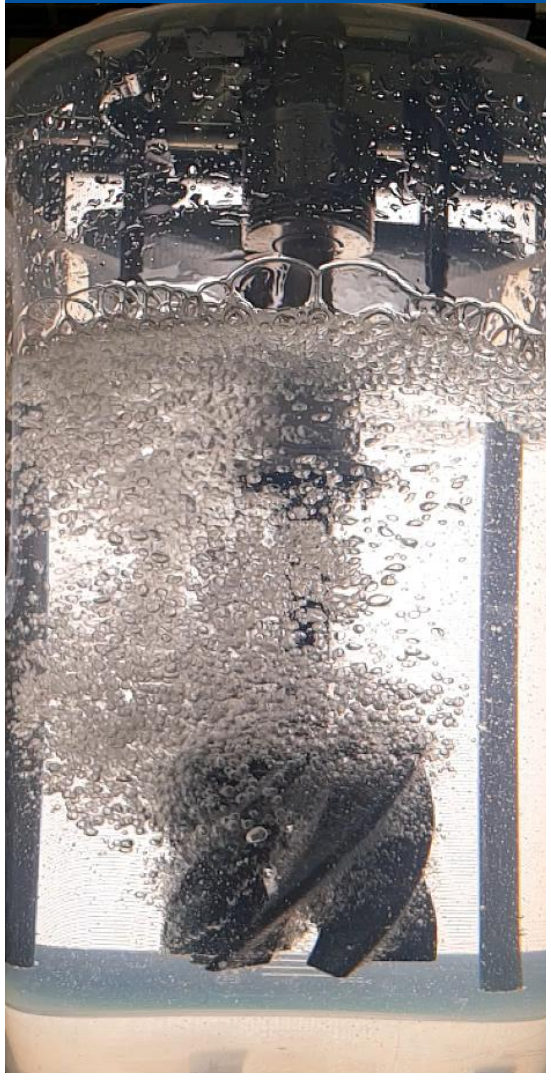
Porous Static Sparger



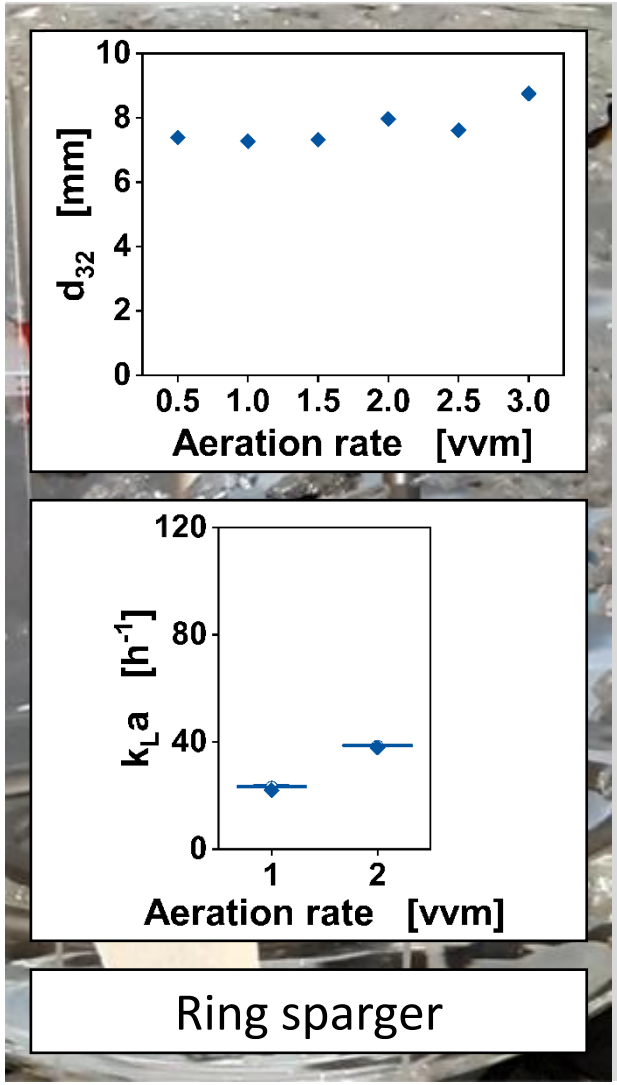
Porous Rushton Turbine

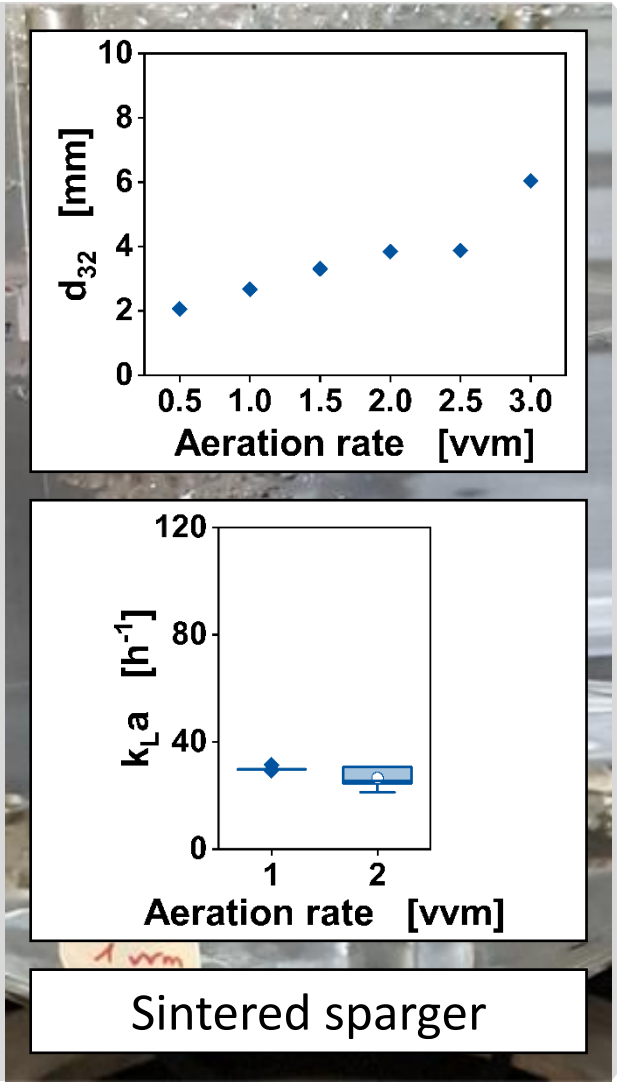
Porous Spiral Stirrer

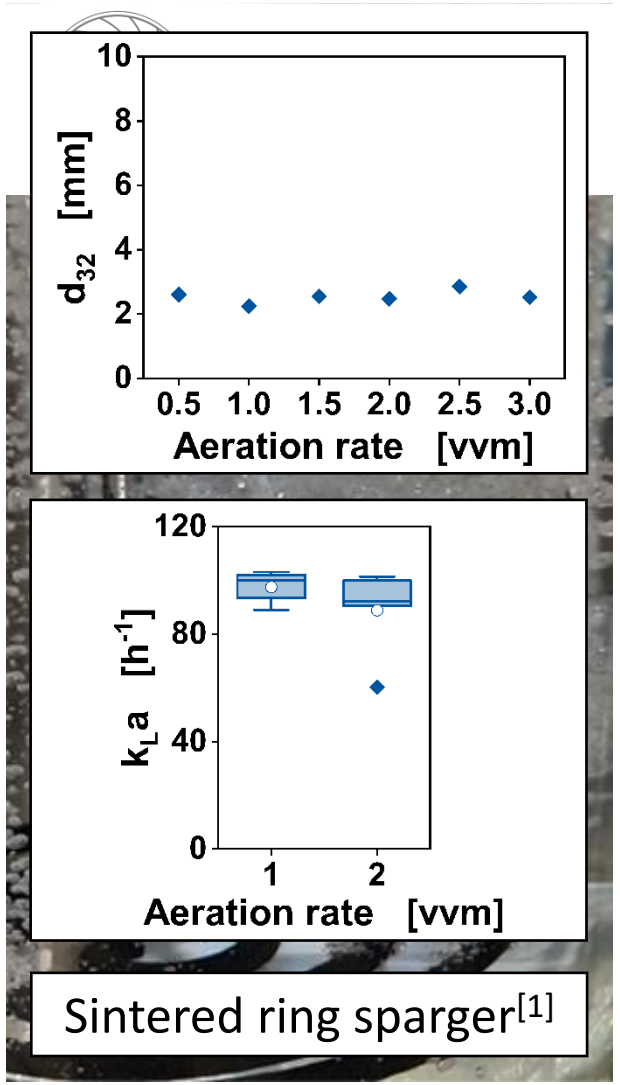


Porous Fixtures – Static Sparger Performance

Due to the very fine-pearly bubbles, our porous sparger increases k_La by 2-3x compared to traditional spargers







[1] Bongartz *et al.*, 2021, DE10 2021 116 862.7, Düsseldorf, DPMA

Next Steps

Interested? We are looking forward to collaborating with you!

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- We are happy to provide you with **additional information** on our technologies in a further meeting
- We can adjust all our products to your **existing systems** and processes

Give us the chance to thrust your business!

contact@biothrust.de

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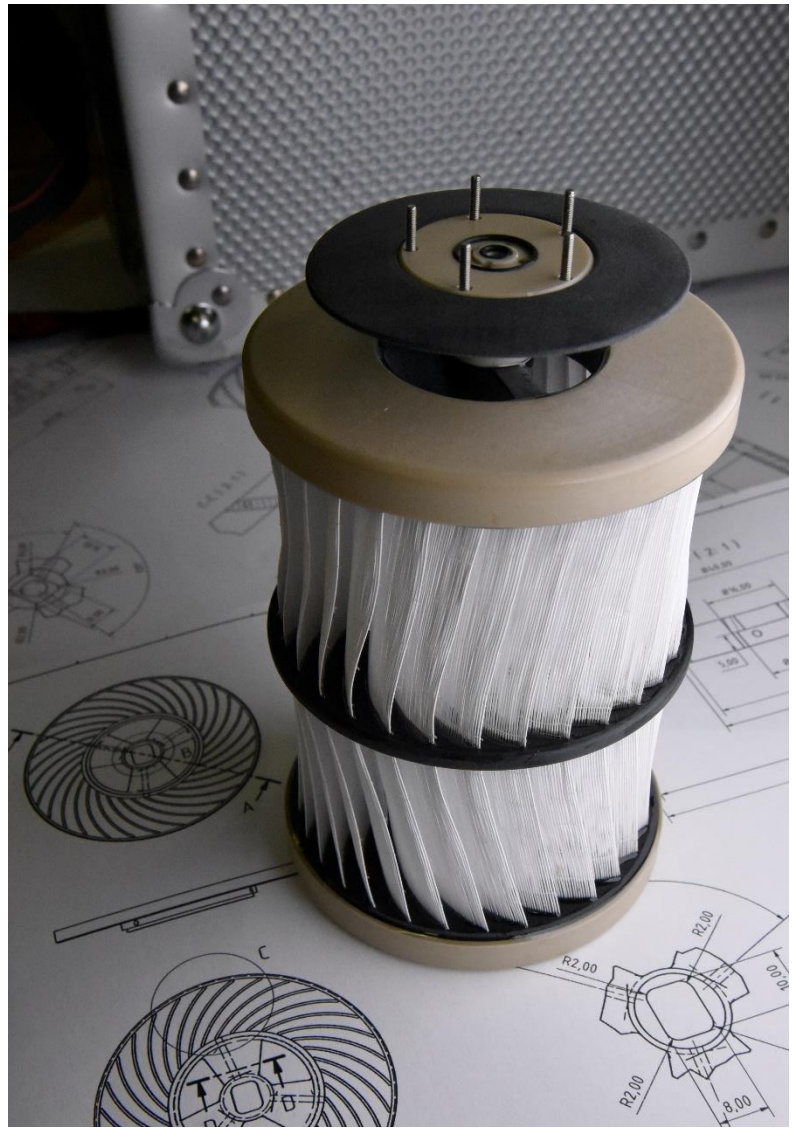
Link Video RWTH Innovation Award



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