



BioMixing

Leaders in bioreactor mixing

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October, 3rd, 2022
MIT, Boston

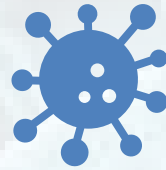
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Long processing
times



Product *quality*
(homogeneity, shear...)



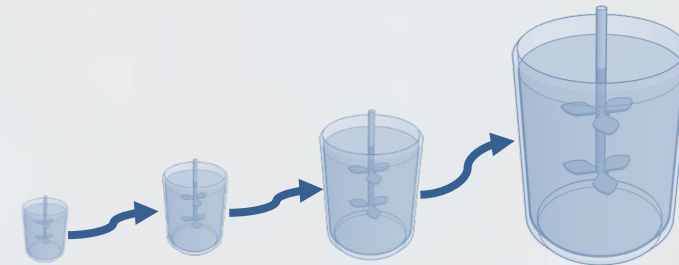
Expensive
equipment



Energy consumption
can be high



Many *steps* in the
scaling process



Problems in the bioreactor market

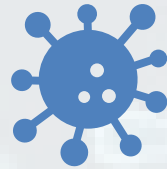
Our solution...



Higher efficiency leads to **saving money**



Better design that leads to **energy saving**



Better mixing that leads to **higher yield & quality**

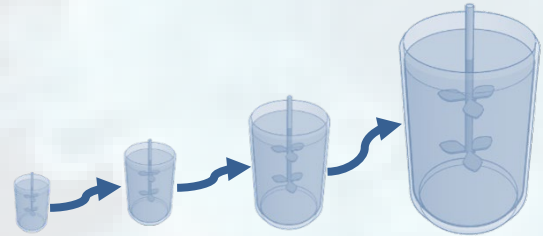


Our technology **reduce shear & mixing time (50%-75%)**

Make **simulations** that **reduce process of scaling**

**PATENT
pending**

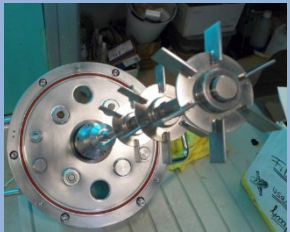
BioMixing



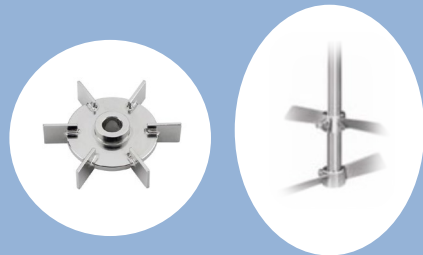
Stirred bioreactor components



- ✓ Vessel
- ✓ Pumps
- ✓ Aerators
- ✓ Agitator system
- ✓ Heating/cooling
- ✓ Sensors
- ✓ Filters
- ✓ Control system
- ✓ Software...



Standard
impellers



Where is our innovation?

It is based on fluid dynamic principles

- ✓ Different geometry of the impellers
- ✓ Different number & position of impellers
- ✓ Different baffle geometry
- ✓ Aerator system
- ✓ Combination of agitators-baffles-aeration

Biomixing technology allows a better mixing even in large bioreactors, where the blade tip velocity is usually limited to avoid shear

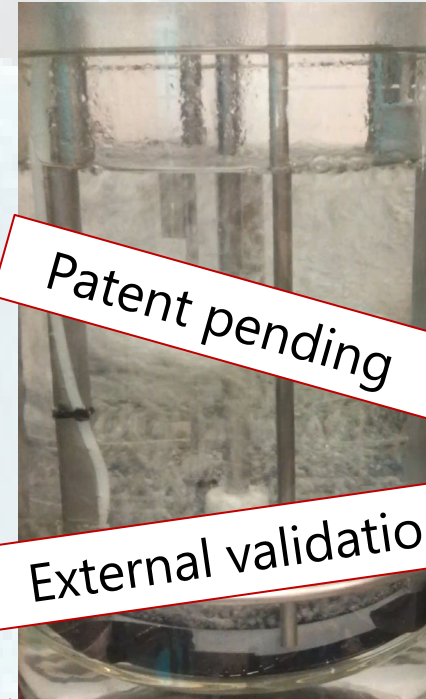
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Technology: a simple example (validation by a client)

Well-known brand bioreactor



BioMixing bioreactor



7 liters

+ 90 % oxygen transfer

- 50 % processing time

Lower shear stress

How do we do it?

CURRENT WAY OF DOING



NOW... we are **designing standard kits** of aeration/agitation systems for most common cultures and once we get th...

NEW WAY OF DOING



Traction (I): high client satisfaction in biotech industries

Company/Project	Scale	Type of bioreactor	Results of our clients' <u>retrofitted</u> bioreactor compared to gold standard
<i>Spanish biotech company</i>	7 L	STR - fatty acids.	Up to +100% oxygen transfer
<i>Spanish biotech company</i>	100 L	Wave reactor - mammalian cell	87% increase in homogeneity 76% increase of oxygen transfer
<i>Spanish bioreactor manufacturer company</i>	1,5 L	Matrixes Adherent cell culture	Higher mass transfer Lower shear stress -75% processing time
<i>Spanish CDMO</i>	300 L	STR- Filamentous bacteria	300 L bioreactor. Simulations: +50% oxygen transfer -70% mixing time Measures under progress

Traction (II)

We have started **a collaboration with:**

- 1) the Spanish private research organisation
- 2) the Spanish start-up that has developed some cancer treatment (another potential patent)

We are **in contact with:**

- 1) two American food biotech companies (in conversation...)
- 2) Trying a **big pharma** to buy our agitator systems (contact pending)
- 3) Two Spanish bioreactor manufacturers (collaboration)
- 4) Two American bioreactor manufacturers (waiting for the results of our standardised kits)

Where we are and where we go

We have started **to look for capital** and we are in conversation with:

- 1) some Spanish angel investors
- 2) a small venture capital who seems to be interested
- 3) An American investor who seems to be interested

Our main goals are:

- 1) To offer bioreactor users our products (our system inside new BRs or to retrofit extant ones)
- 2) We would like to offer this range of (standard kits) agitation/aeration systems to bioreactor manufacturers, so that BioMixing can become their supplier.

Internal team and roles

Existing team (founders):

1. Scientific profile on Fluid Dynamics (Ph.D) - founder
2. Scientific profile on Mathematics (Ph.D) - founder
3. Engineering profile
4. Mathematical-computing student
5. Ms Engineering students



Needs: biotech processing expert, sales team...

- We will **keep internal** the design of key components
- We will **outsource** the manufacturing of components and legal advice
- We will assembly the bioreactor components



External team: our advisors



Tod Snowdden

Ascent Business Advisors
Expert in business strategy



Pascual Riesco

Expert in fluid mechanics
European Patent Office
University of Seville



Jason Tucker – Schwartz
Marketing advisor



Lourdes Núñez

Director of Knowledge Transfer,
Internationalization and Entrepreneurship at
PTS Granada and Co-Founder at WA4STEAM



Andrea Pomeranz
Expert in bioprocesses and strategy



Francisco Martín Molina

Genyo. Lentistem
Scientific advisor

Goals (June vs October 2022)

- 1.- Classify the cultures in groups in terms of flow properties
(shear stress, oxygen/CO2 demand, mixing time, ...) 
- 2.- Introduction to American biotech companies for collaboration (large&small) 
- 3.- Getting the first investment (FFF or business angels) 
- 4.- Looking for a very good team: marketing, expert in bioreactors 

Resetting of goals (October 2022)

- 1.- Standard kits fully designed: to achieve standarization of products for different types of cultures
- 2.- Introduction to American biotech companies for collaboration (large&small)
- 3.- Getting the first investment (FFF, angel investors, VCs).
- 4.- Looking for a very good team: marketing, expert in bioprocesses...



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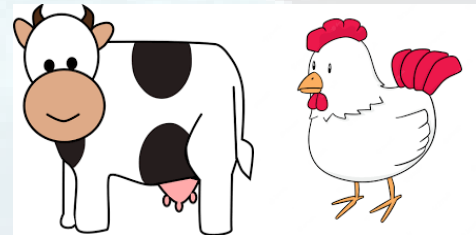
Scalability

Market size

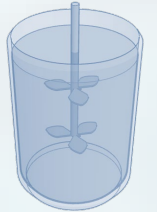
- TAM BIOREACTOR MARKET:
5400 M€/year (CAGR: 18%)

Agitation and aeration systems:

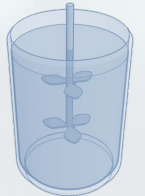
- SAM: **1200 M€/year**
- SOM: **300 M€/year**



*Biotech
food*



Cosmetics



Nutraceuticals

