

Rotating spiral bioreactor: a compact, high performance alternative to conventional bioreactors for biotechnological manufacturing



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Bioprocessing has yet to fulfil its promise

- Low productivities
- Decreasing productivity and titres with scale up
- *Therefore, limited to low volume, high value products*

**We are leaders in synthetic biology and engineering biology
But still very far from achieving the societal benefits**

SCALABILITY is the key challenge

A new bioreactor that allows

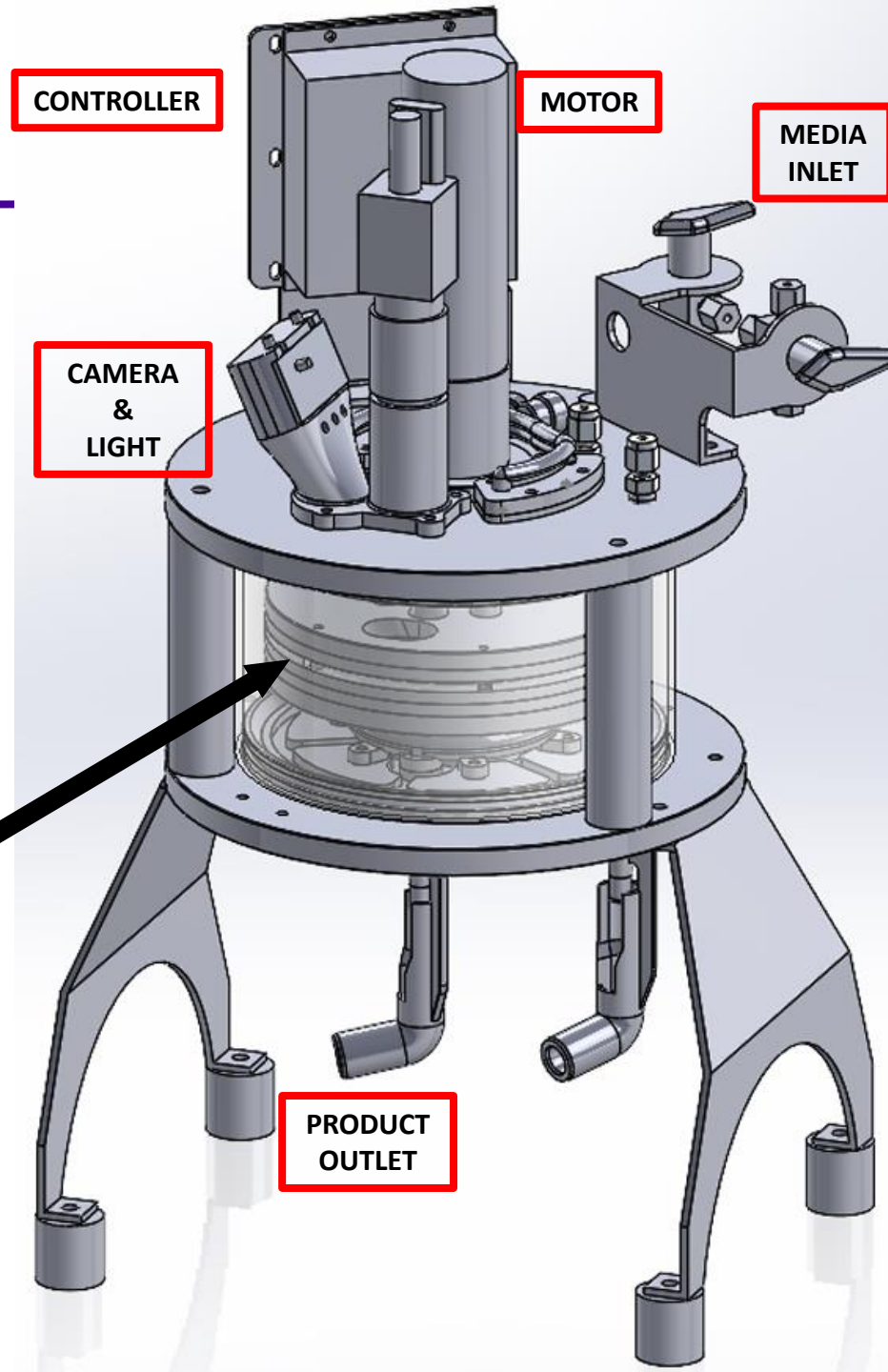
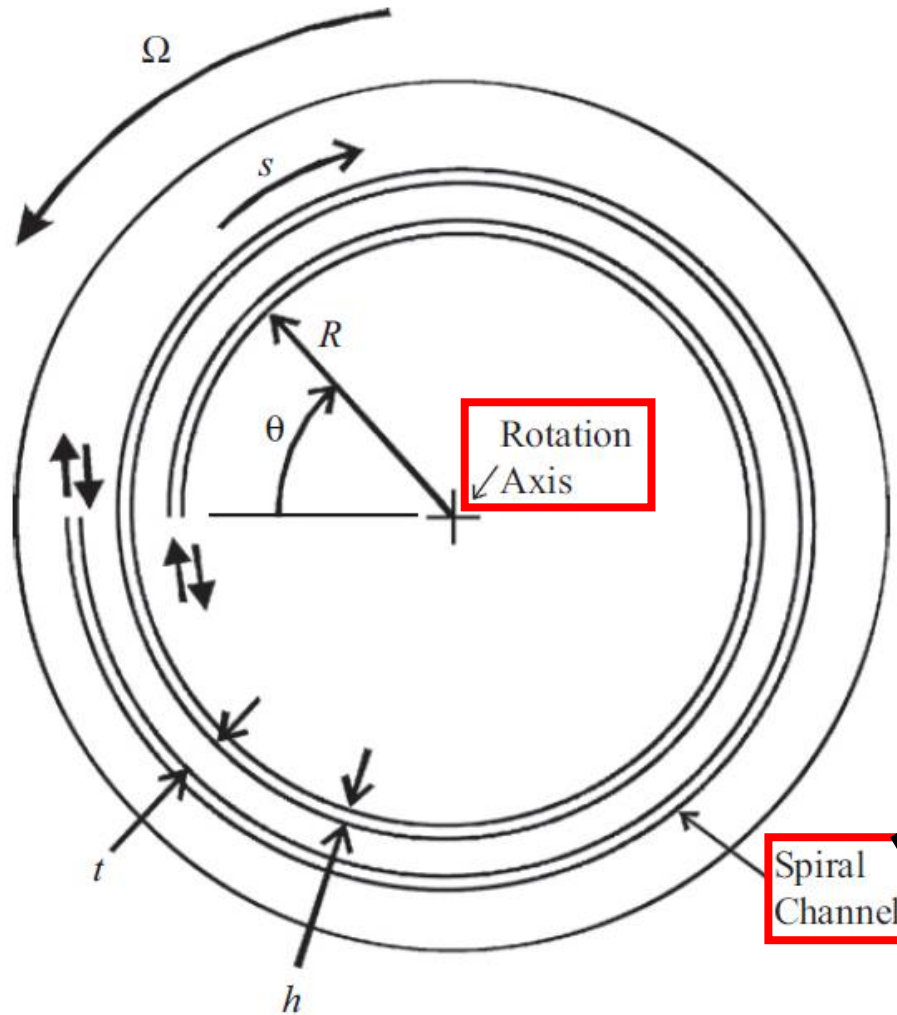
- 1. Scale up in a single step**
- 2. Increased productivity by 30X**
- 3. Continuous operation**

Rotating Spiral Bioreactor

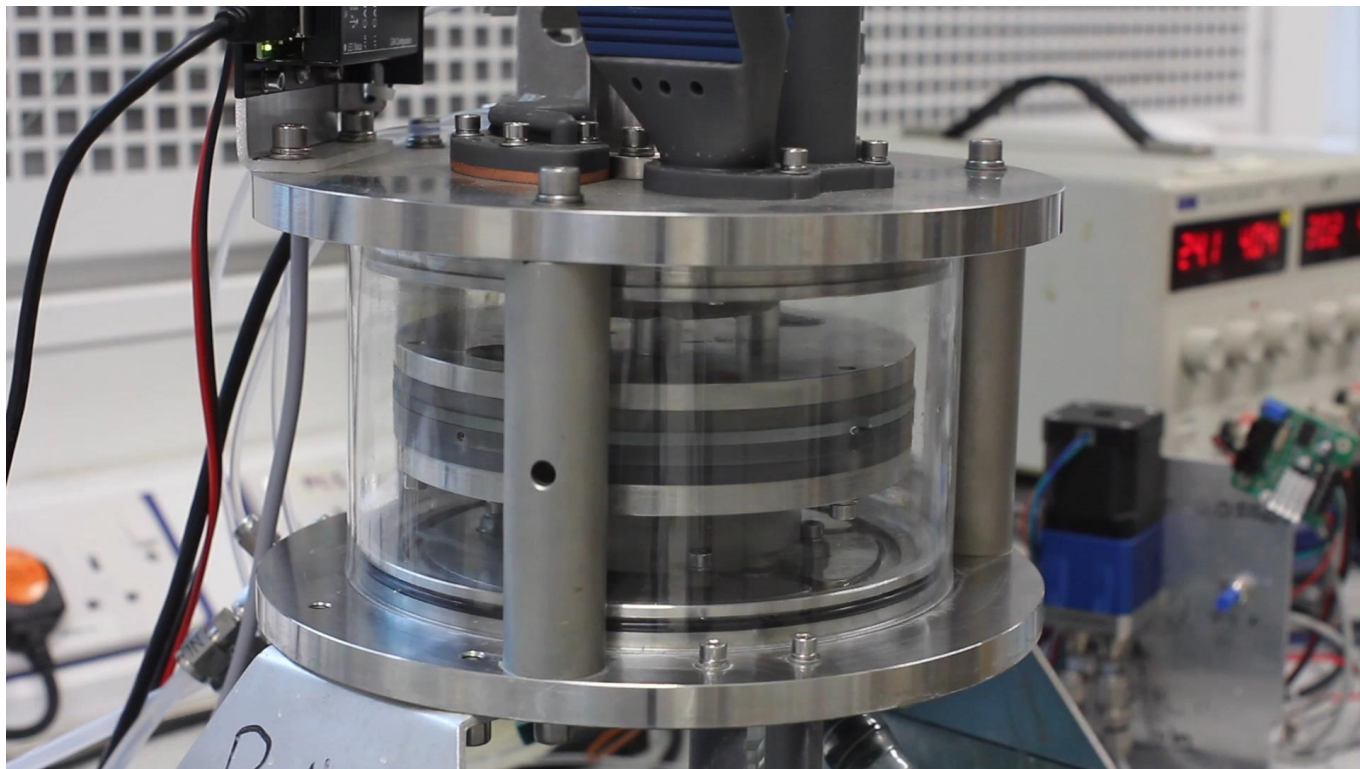
Dr. Jordan MacInnes
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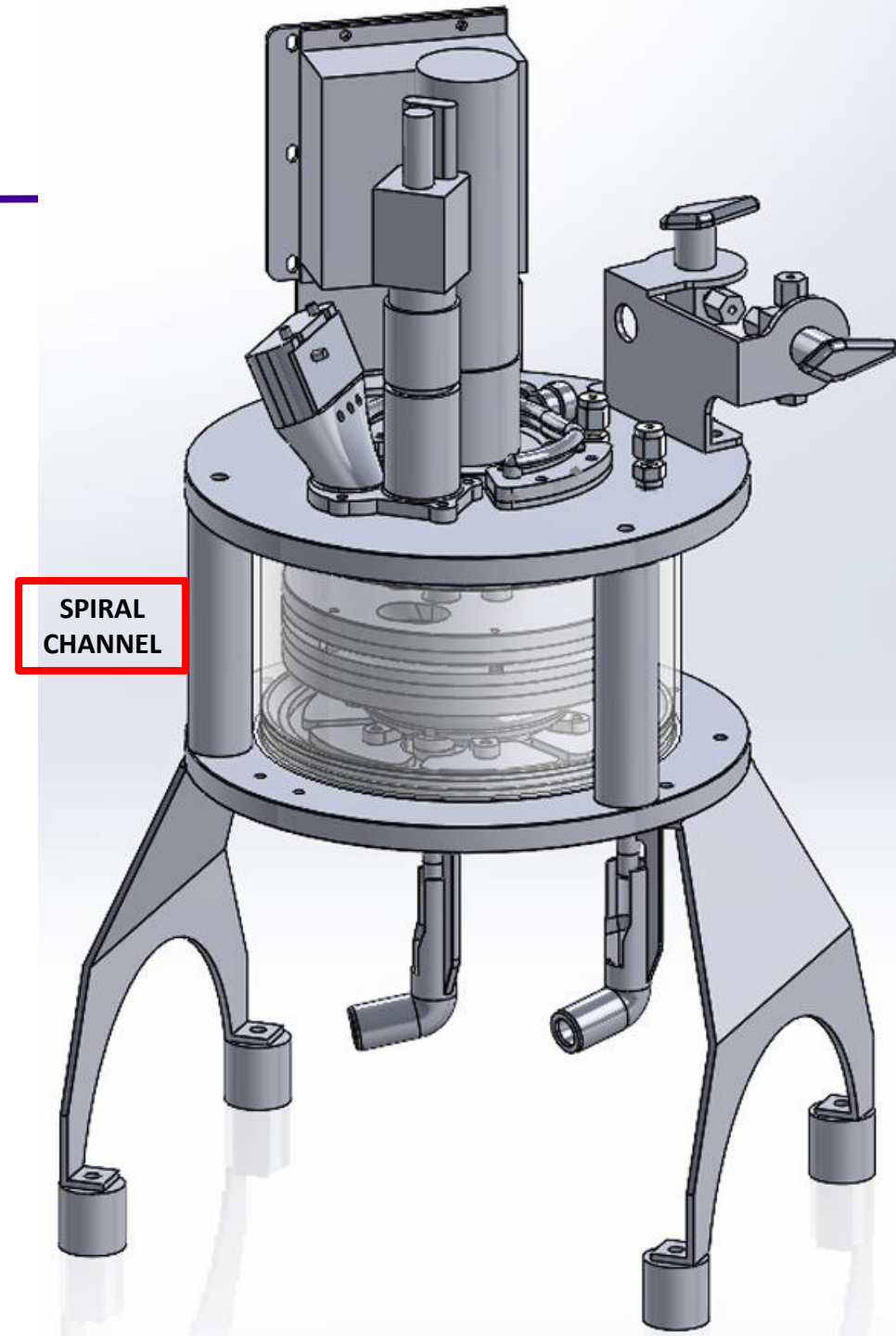
Rotating Spiral Bioreactor - component parts



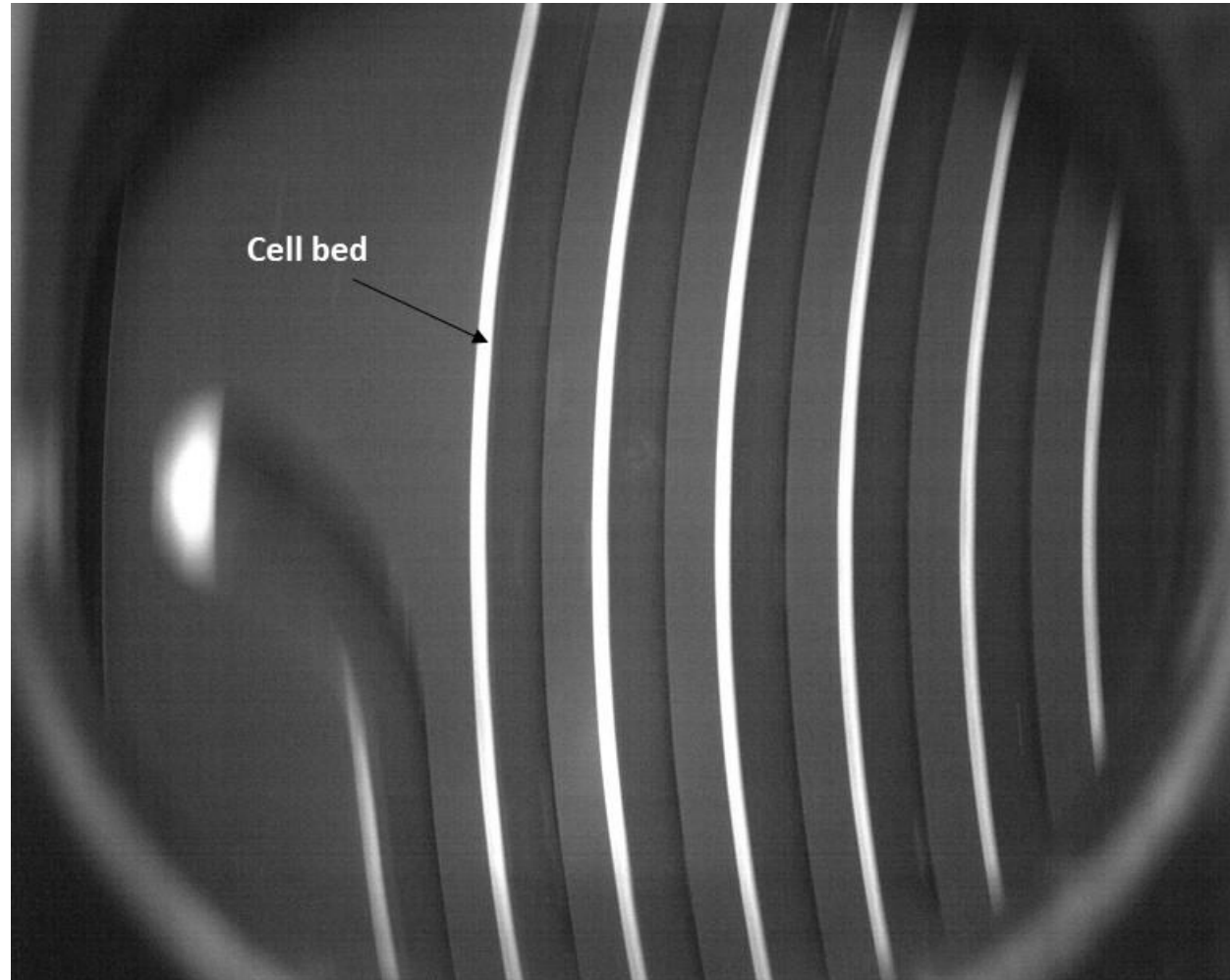
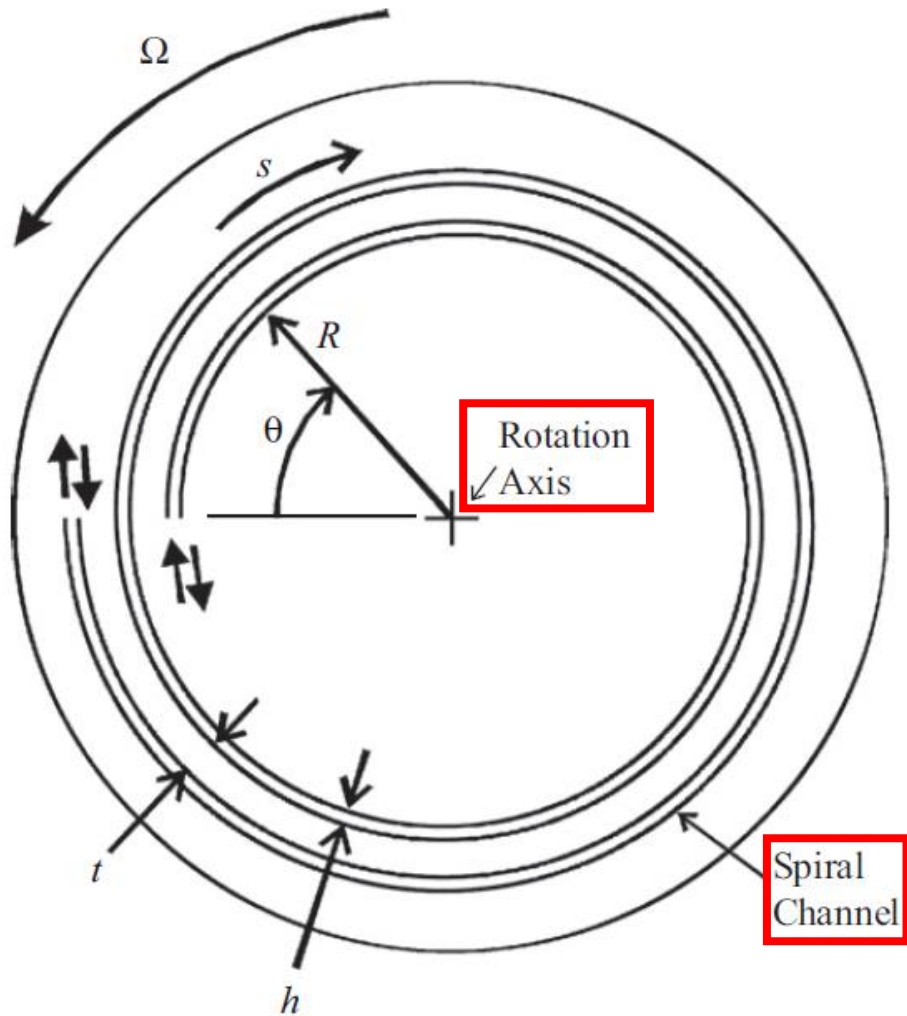
Rotating Spiral Bioreactor - operation



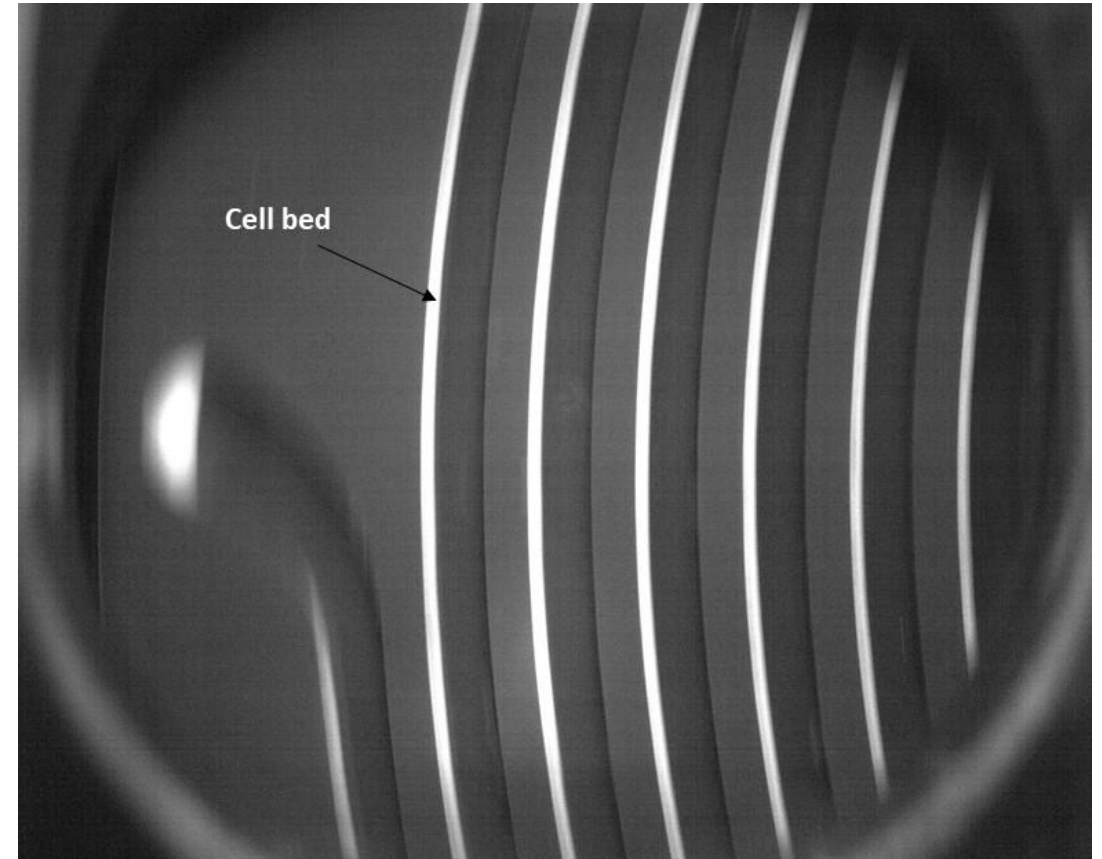
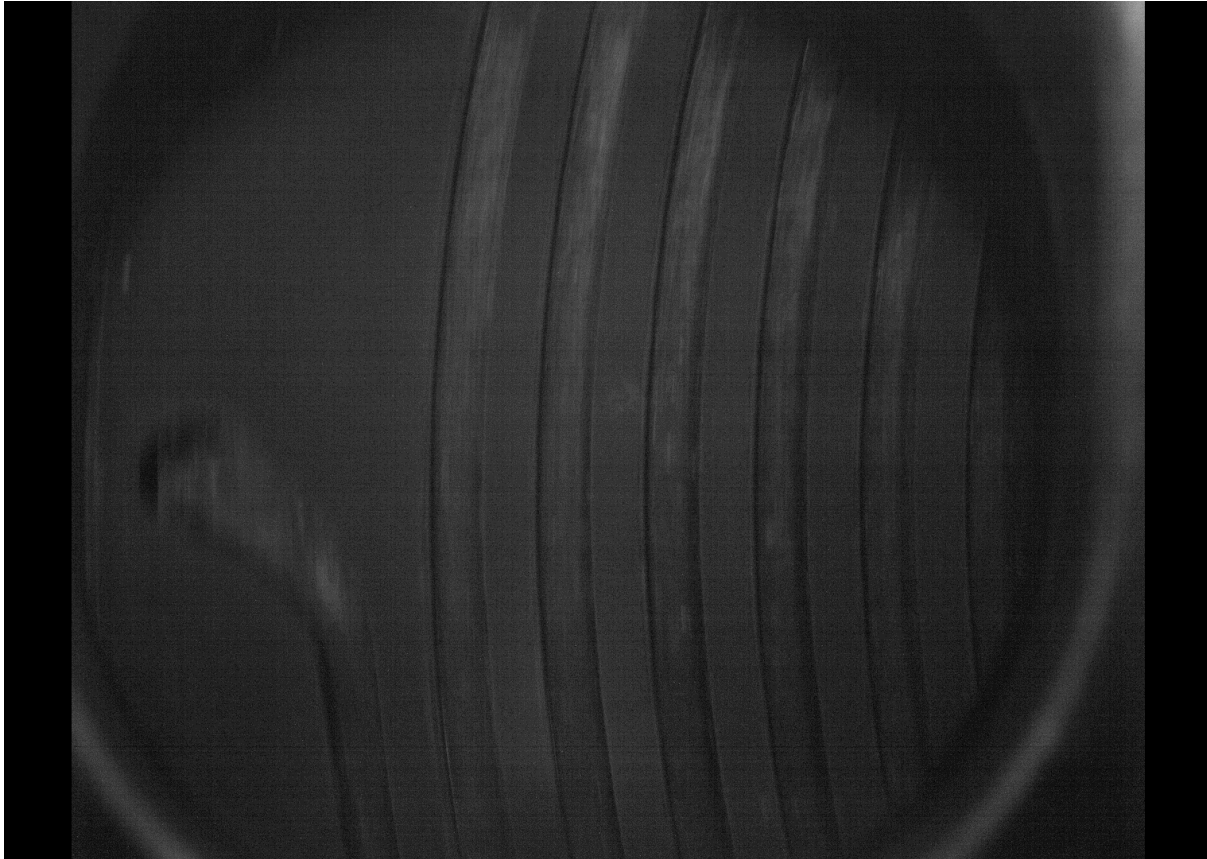
The rotation subjects the spiral channel to a centrifugal field



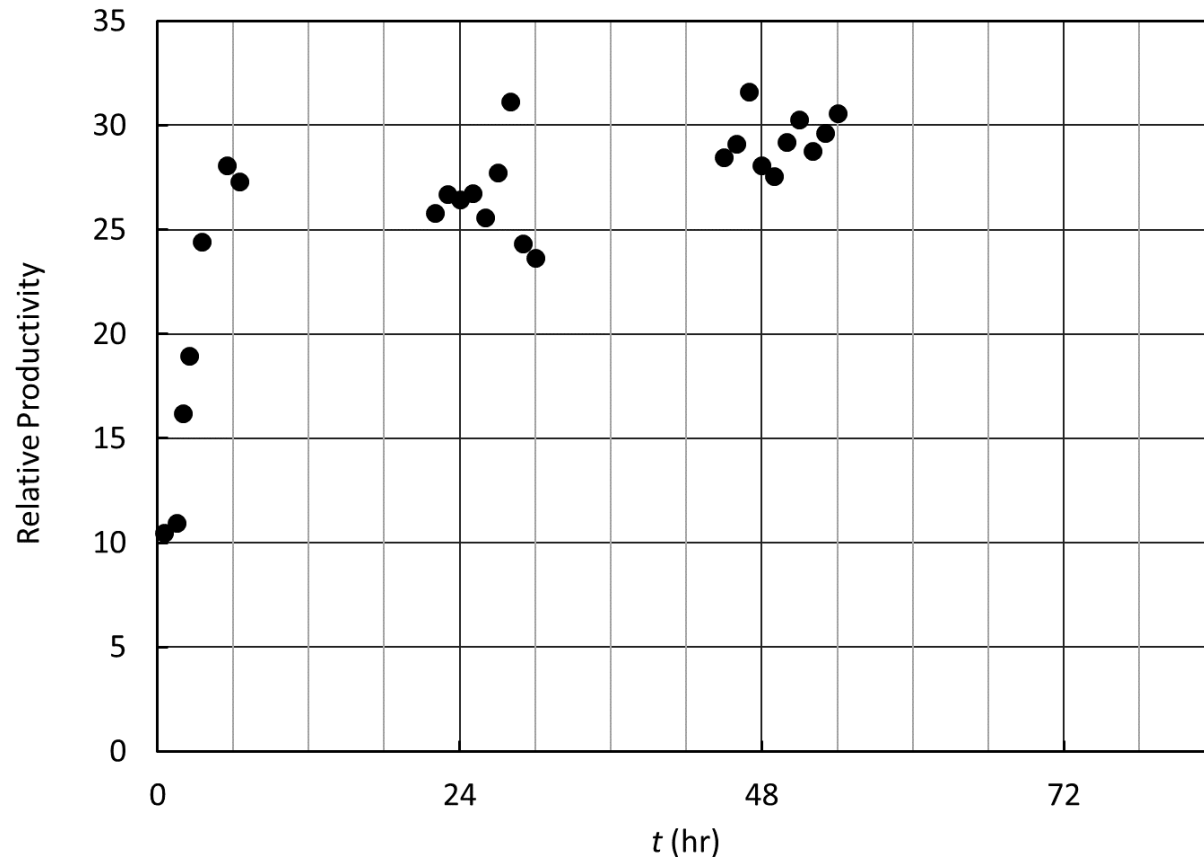
Rotating Spiral Bioreactor – cell bed positioning



At reactor start up, the cell suspension is injected into the spiral and the imposed centrifugal field due to rotation enables the cells to rapidly sediment and form a uniform cell bed along the outer wall of the channel



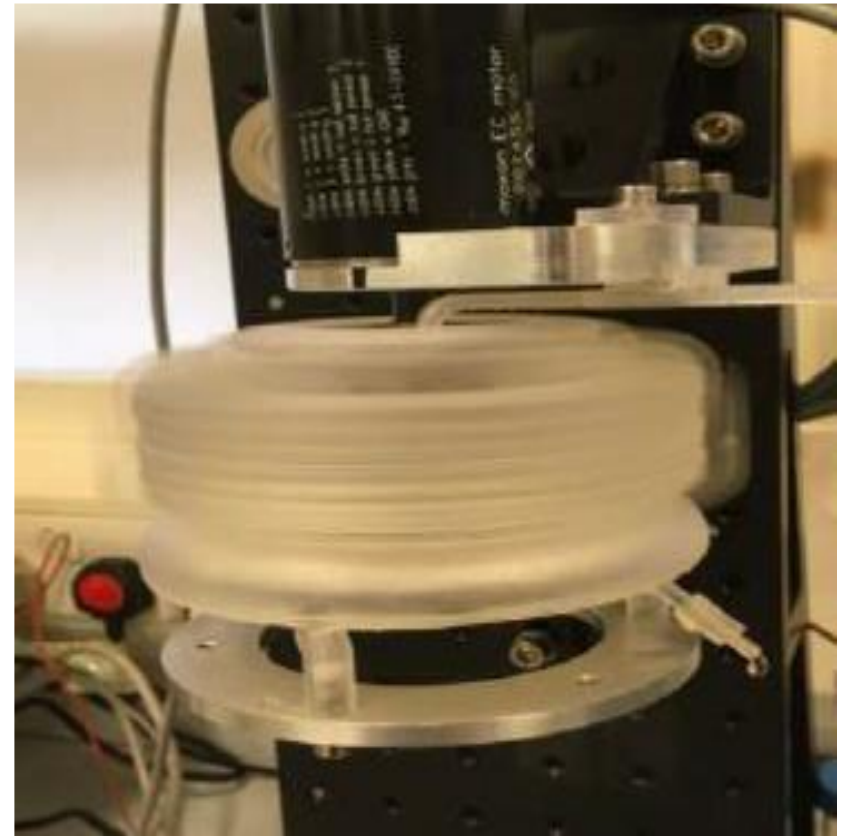
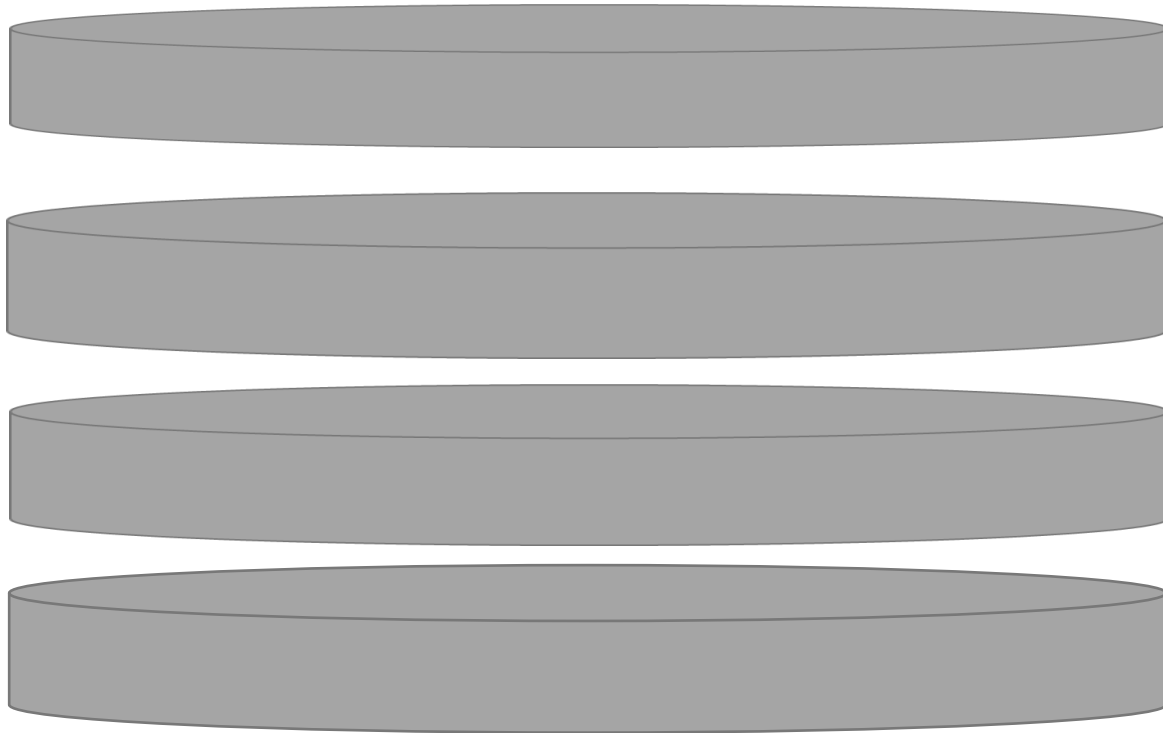
Once the bed is formed, a continuous flow of culture medium is passed over the bed. Spent culture medium with a high product concentration is collected at the outlet continuously.



- **Compact, high performance reactor**
 - 4 L reactor = 100 L CSTR
- **Continuous mode of contacting**
- **Excellent control over mass transfer without cell damage (no impeller, convective stirring instead)**

Case study results showing productivity (g/L/h) over time demonstrates a 30X greater productivity in the Rotating Spiral Bioreactor over conventional CSTR

Easy scalability from lab to industrial production as reaction conditions are uniform across reactors with single and multiple, stacked spiral channels



Form a spin-out company

- **Seeking a commercial director for the team**

Industrial partners

- **Demonstration data for your system**
- **Joint grants**

Rotating Spiral Bioreactor – air sparging

