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Using digital twin technology to optimise *Crocosphaera chwakensis* growth for Cyanoflan production

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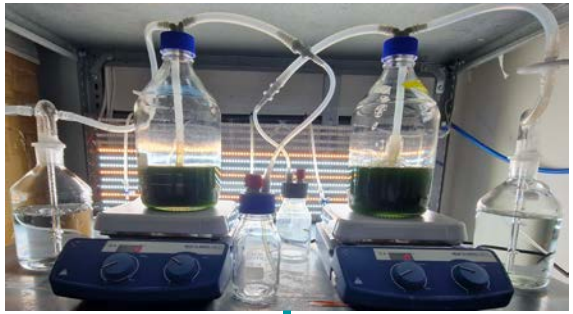
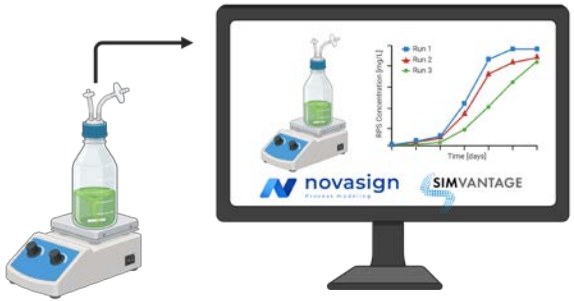
Aim



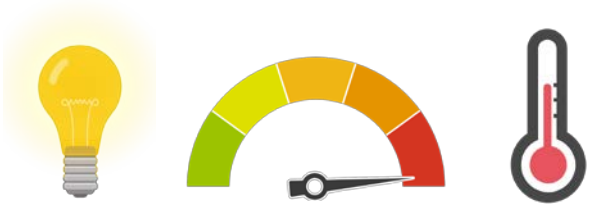
Optimising

Industrial Production



Digital Twin

Design of Experiments

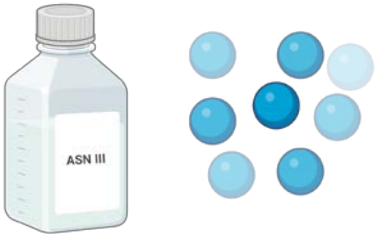


Varying parameters:

Run	1	2	3	4	5	6	7	8	9
Light Intensity [Lux]	4000	4000	1300	4000	4000	4000	2700	4000	1300
Stirring Speed [rpm]	150	150	150	450	150	450	450	150	300
Temperature [ºC]	30	20	20	30	20	20	20	20	25

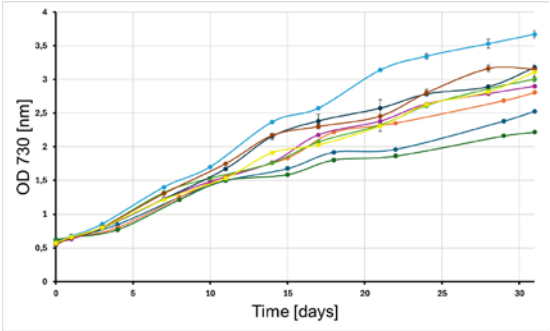
Constant parameters:

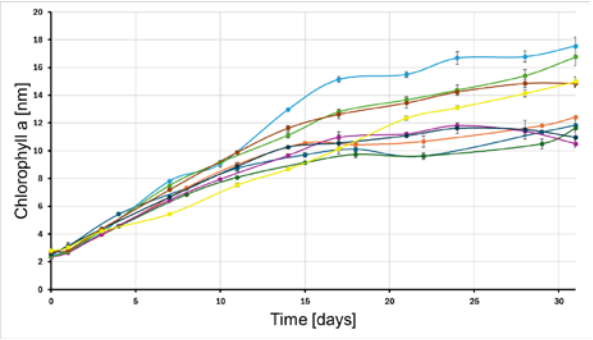
- Culture medium (ASN III)
- Aeration (1.5 L/min)



Characterisation of *C. chwakensis*

Growth parameters

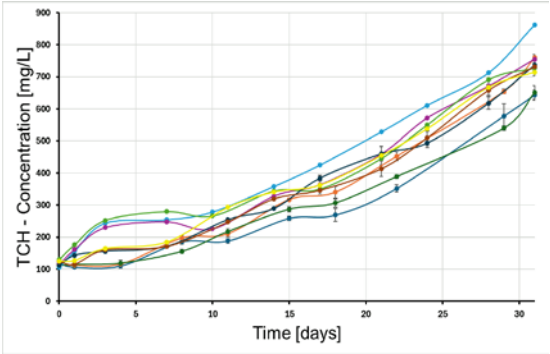


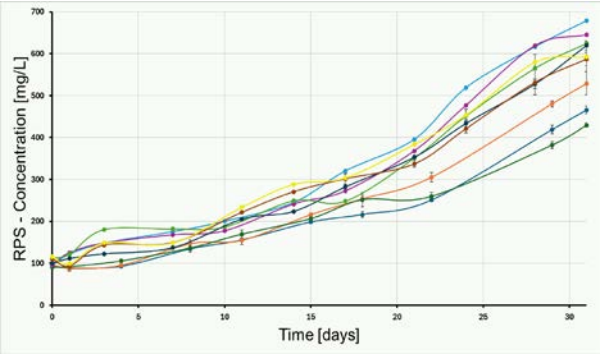


Run 1
Run 2
Run 3
Run 4
Run 5
Run 6
Run 7
Run 8
Run 9

Carbohydrates content is directly correlated with growth

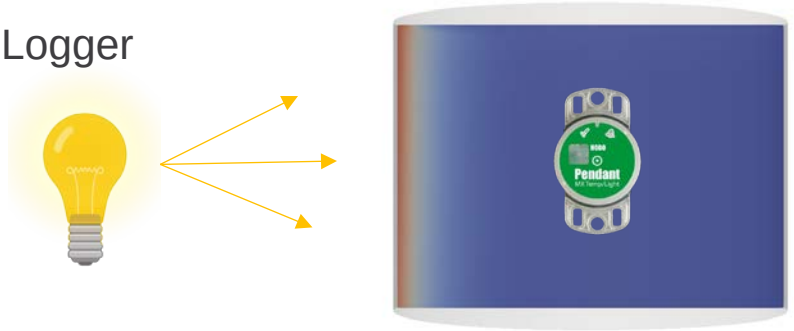
Carbohydrates quantification



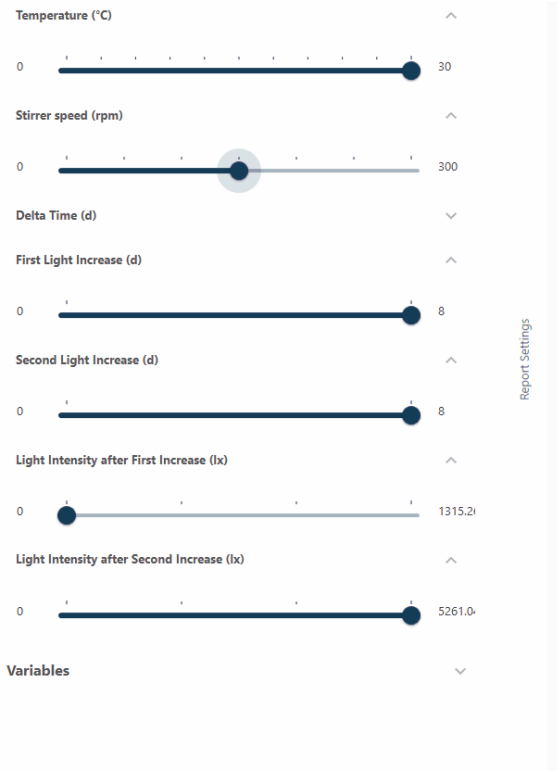


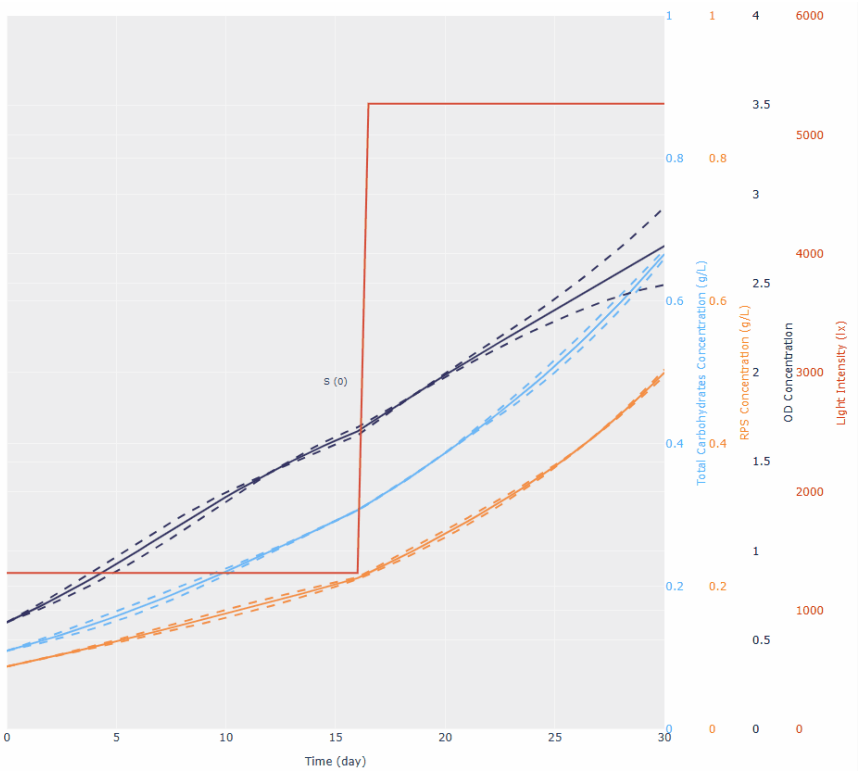
Light impact - model

- CFD (Computational Fluid Dynamics)
- Onset HOBO® Pendant MX Temp/Light Data Logger
- Modeled intensity field
- Impact of light intensity on cells
- Understanding of the process
- Easier scale transfer



Digital Twin





Take home messages

- **Optimisation of Cyanoflan production:**

Digital twin technology is being used to optimise the cultivation of *C. chwakensis* for enhanced Cyanoflan production

Focus on understanding the impact of light intensity on cells, enabling easier scale transfer.

- **Improved process efficiency:**

Modeling software ensuring more efficient and consistant bioreactor operations.

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