Revolutionizing Microalgal Processing and Safeguarding with Bacterial Cellulose Hydrogel

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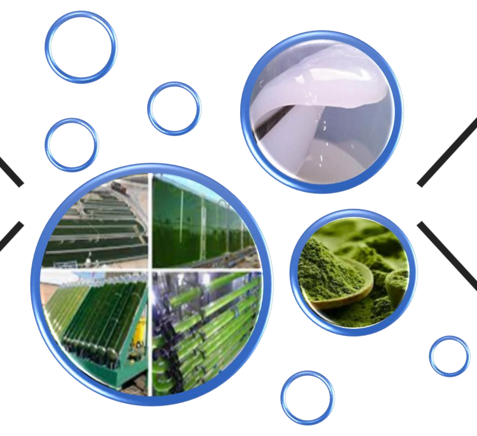
BACKGROUND

Introduce a groundbreaking microalgal biotechnology concept while addressing the challenge of harvesting their small, negatively charged biomass.

Sustainably derived from *Komagataeibacter saccharivorans*, bacterial cellulose hydrogel (BCH) offers versatile solutions across various industries, from biomedicine to environmental remediation.

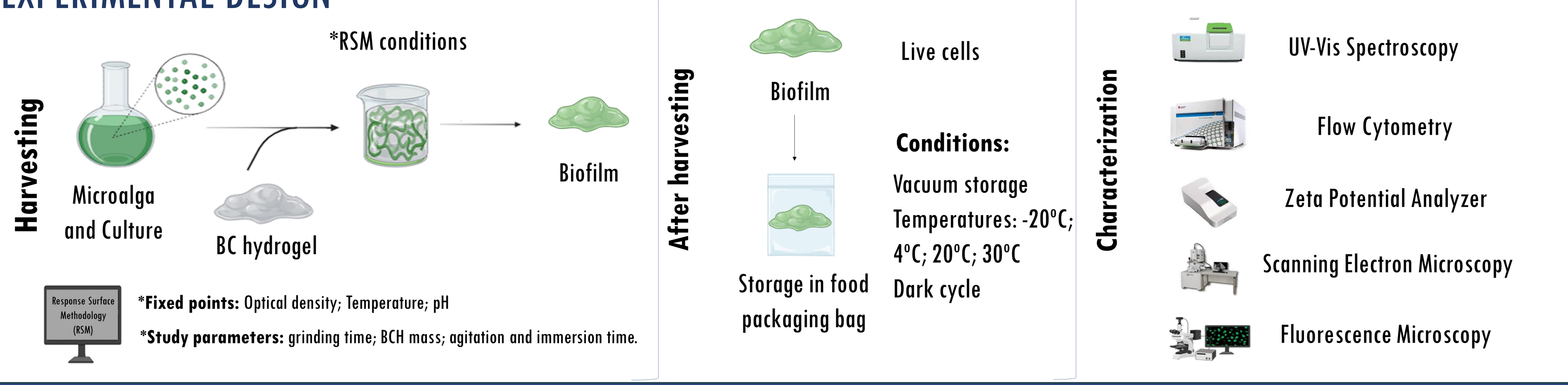


GOALS

Optimize microalgae harvesting using BCH, which provides a sustainable alternative to synthetic flocculants. This aims to minimize environmental impact and operational expenses.

Exploit BCH's unique properties beyond harvesting to maintain ongoing viability and activity of microalgal cells within BCH. The aim is adaptable platforms with bioflocculant-derived matrices for resilient microalgae.

EXPERIMENTAL DESIGN



HARVESTING

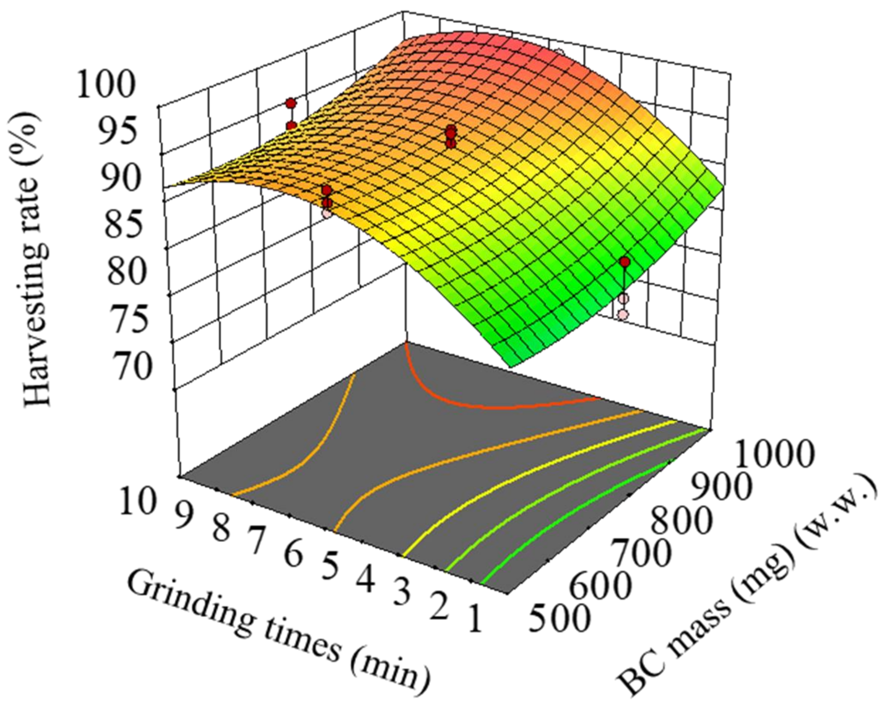


Fig. 1. Contour plot of harvesting rate as a function of grinding times and BCH mass for *Nannochloropsis gaditana*.

Optimal parameters:

- 60 min
- 15 min
- 1g
- 5.5 min

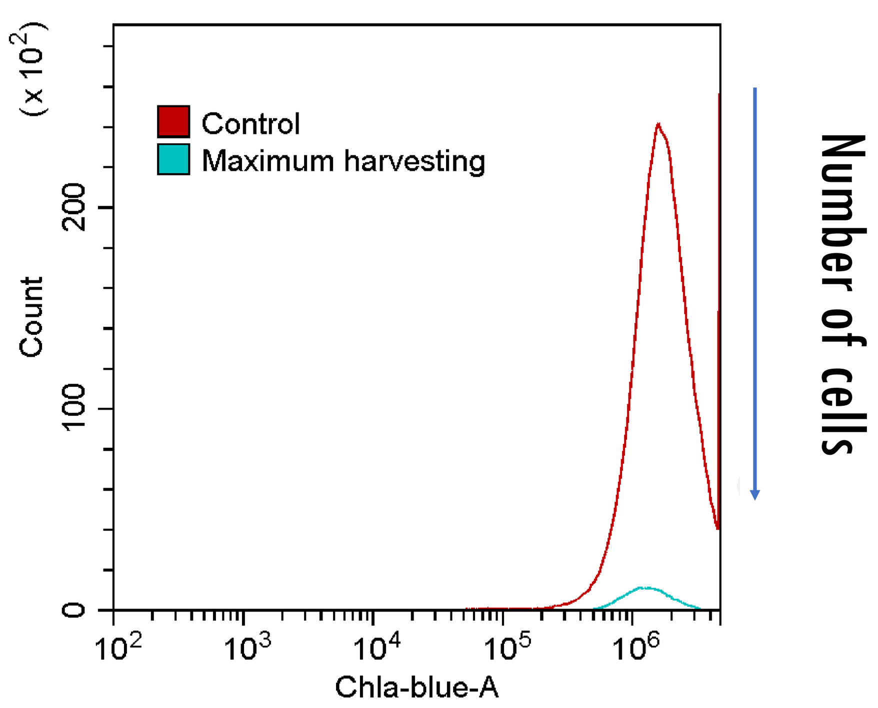


Fig. 2. Representative histogram from flow cytometry (FCS) analysis of microalgae cells before and after harvesting.

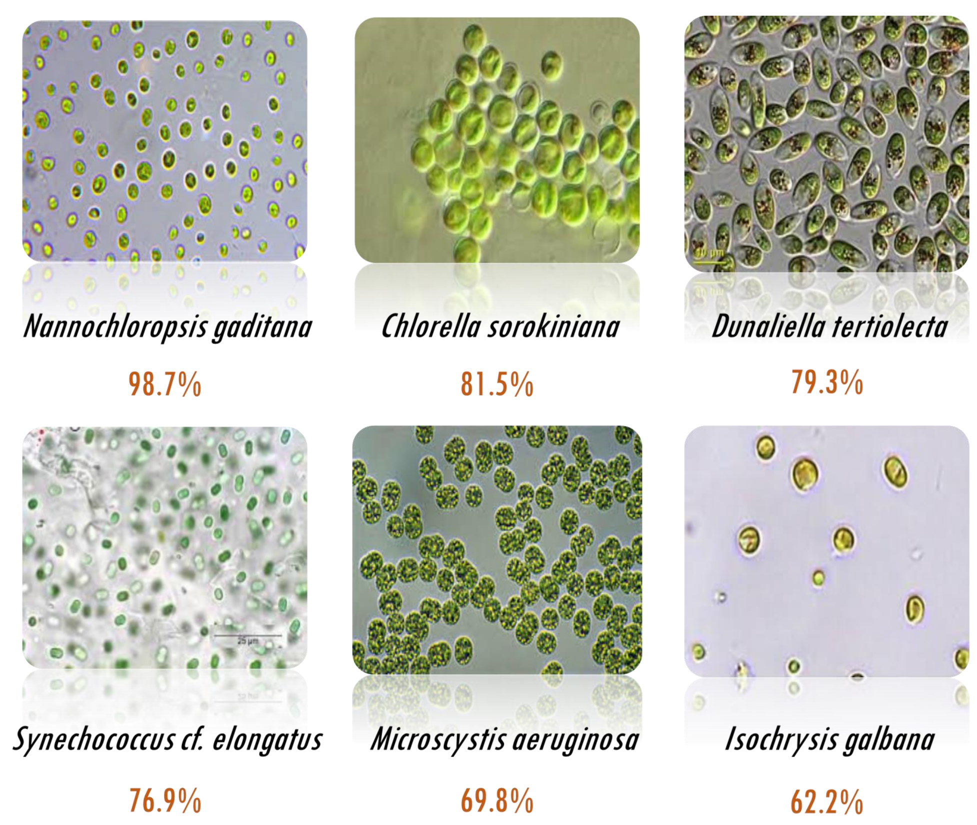


Fig. 3. Harvesting efficiency for different microalgae using the BCH matrix.

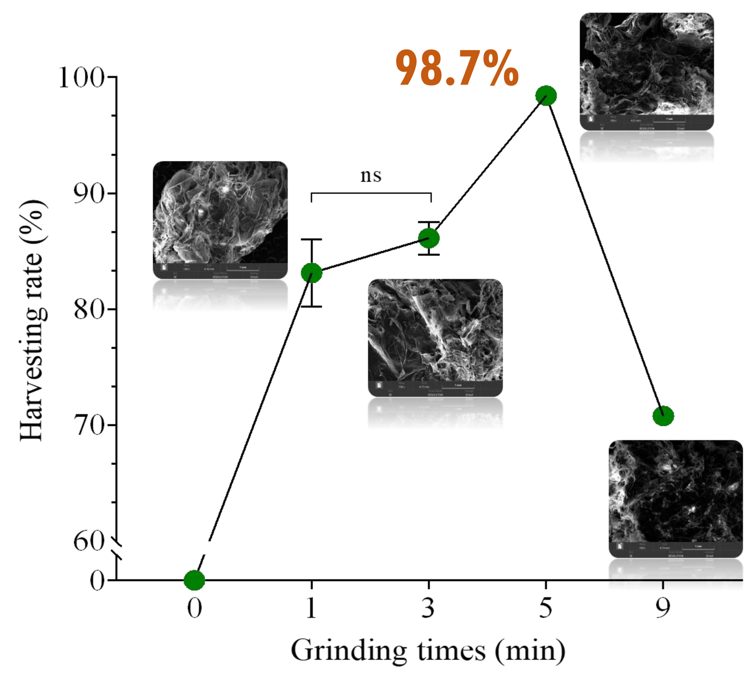


Fig. 4. Effect of varying BCH grinding times on the harvesting rate of *Nannochloropsis gaditana* cells.

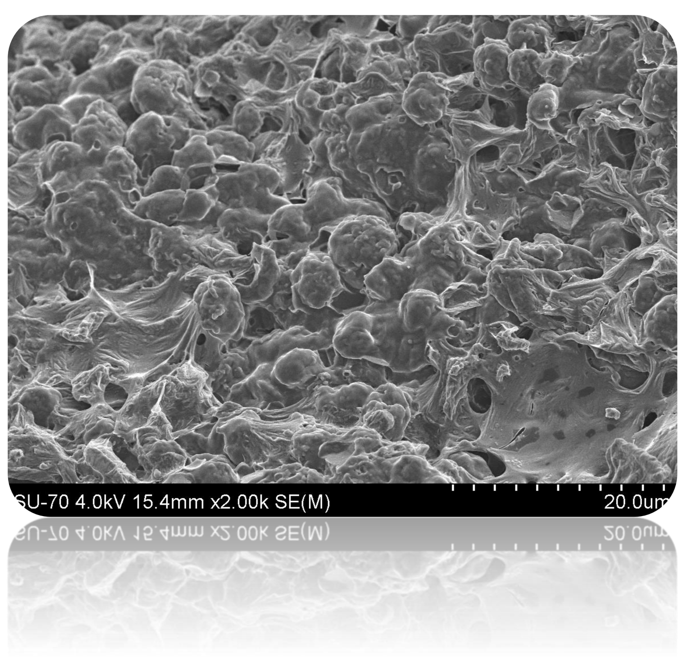


Fig. 5. SEM micrograph of microalgae cells incorporated into the BCH network.

BEYOND HARVESTING

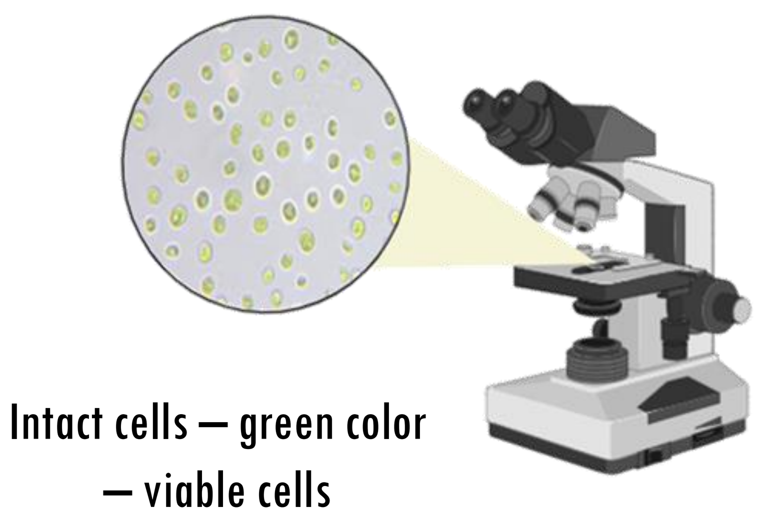
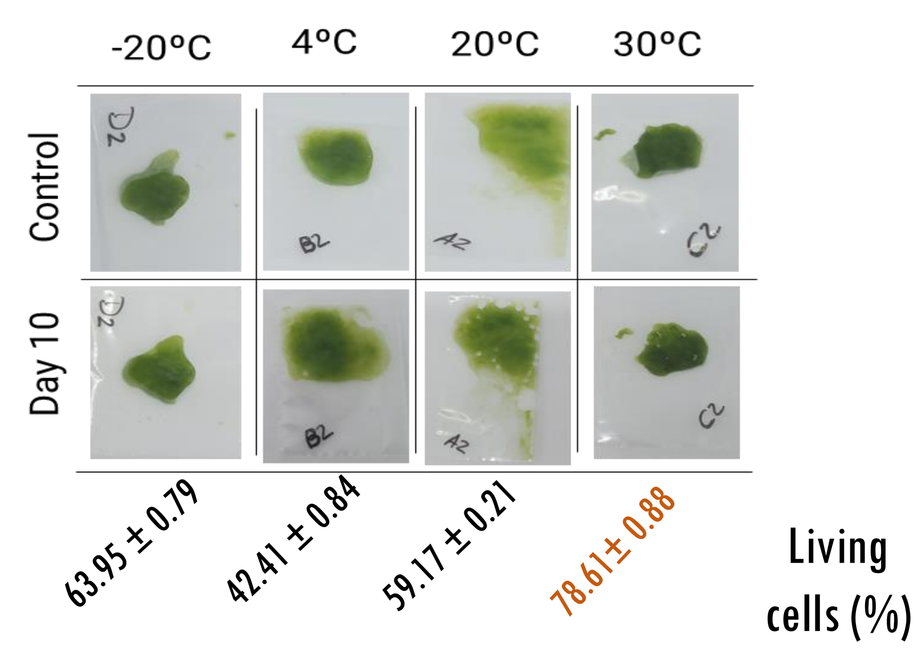


Fig. 6. Microscopic visualisation of microalgae cells after storage conditions.

Table 1. Living cells (%) incorporated into the BCH matrix after storage at various temperatures.



INNOVATION AND FUTURE PROSPECTS

- **BCH** has been revealed to be a **suitable matrix for harvesting microalgae** and has proven to be a **viable storage vehicle for living microalgal cells.**
- The use of **BCH** polymers hold great promise for a sustainable and eco-friendly future in harvesting and stocking living microalgal cells.
- **This approach opens a wide scope** for applications in microalgae preservation, animal feed, microalgae consumption and food applications.

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