Chlorella sp. harvesting by flotation using amphiphilic flocculants

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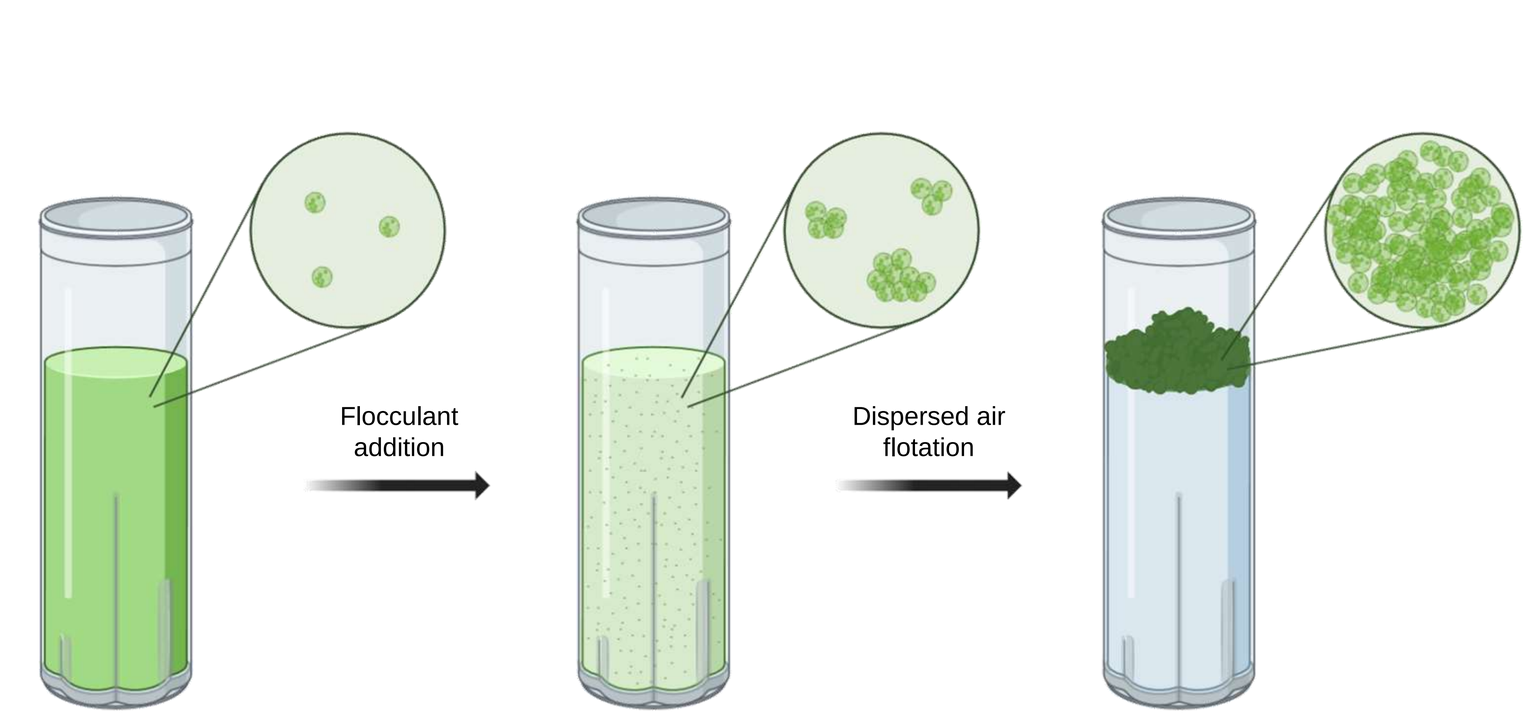
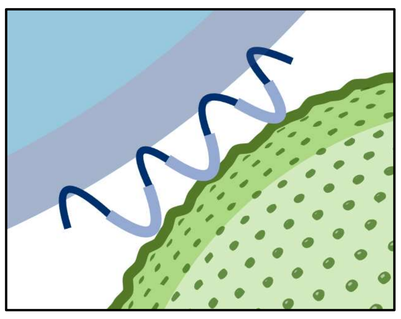
Principle





Harvesting microalgae in an efficient and cost-effective way is a bottleneck in the current industry. Therefore, developing a sustainable harvesting process is of key importance to transition towards the use of sustainable resources.

Dispersed air flotation is a technique that makes use of microbubbles to co-flotate microalgae to obtain a highly concentrated biomass layer. However, co-flotation can only be achieved when there is a strong affinity between the microalgae and microbubbles.

Amphiphilic flocculants have a high affinity towards both microalgae and microbubbles. Establishing this three-way interaction is the key feature for efficient isolation of microalgae by flotation.

Features

Scalability

Microalgae have the potential to become the new leading sustainable resource in the future. One big obstacle that must be overcome to achieve this, is efficiently harvesting microalgae at a large scale. Amphiphilic flocculants that are easy to obtain at a large scale, can overcome the harvesting limitation of today.

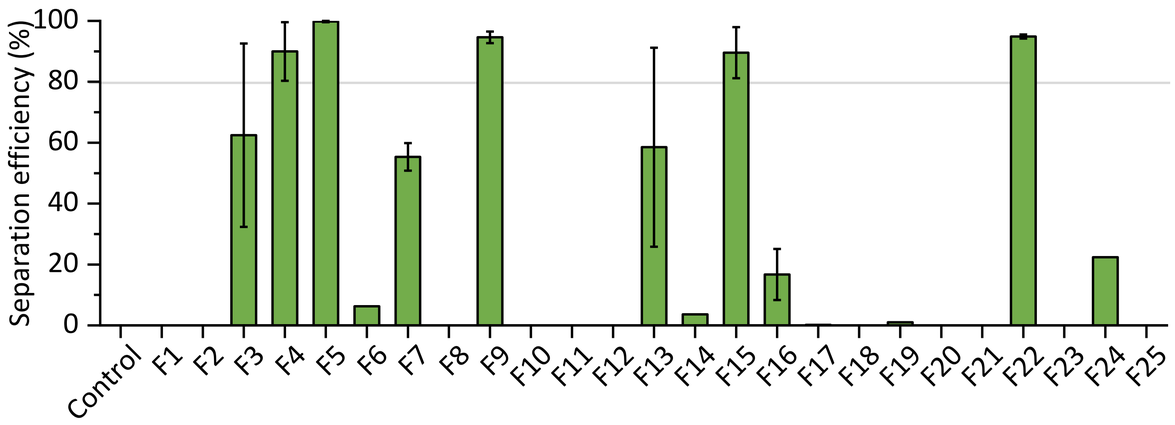
Biodegradability

The here described amphiphilic flocculants are bio-based flocculants and are therefore intrinsically biodegradable and non-contaminating to microalgae. As a result, the biomass can be used for any application, which is a huge improvement compared to commercially available flocculants such as $FeCl_3$.

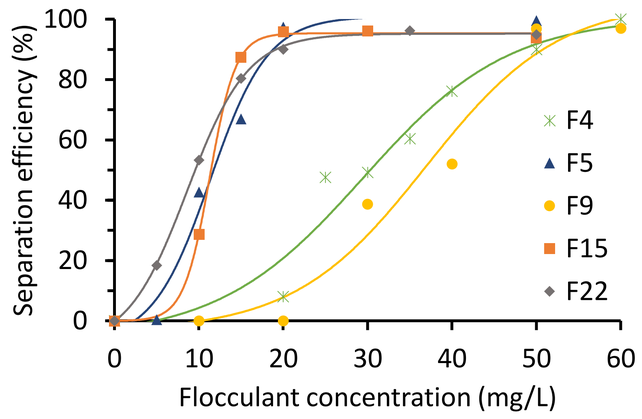
Low energy cost

Several harvesting techniques with high separation efficiency exist. However, an important aspect that differentiates these techniques, is the energy cost. Of all the harvesting techniques, flotation is a technique with low energy cost, especially when talking about dispersed air flotation.

1. Flocculant screening at 50 mg/L

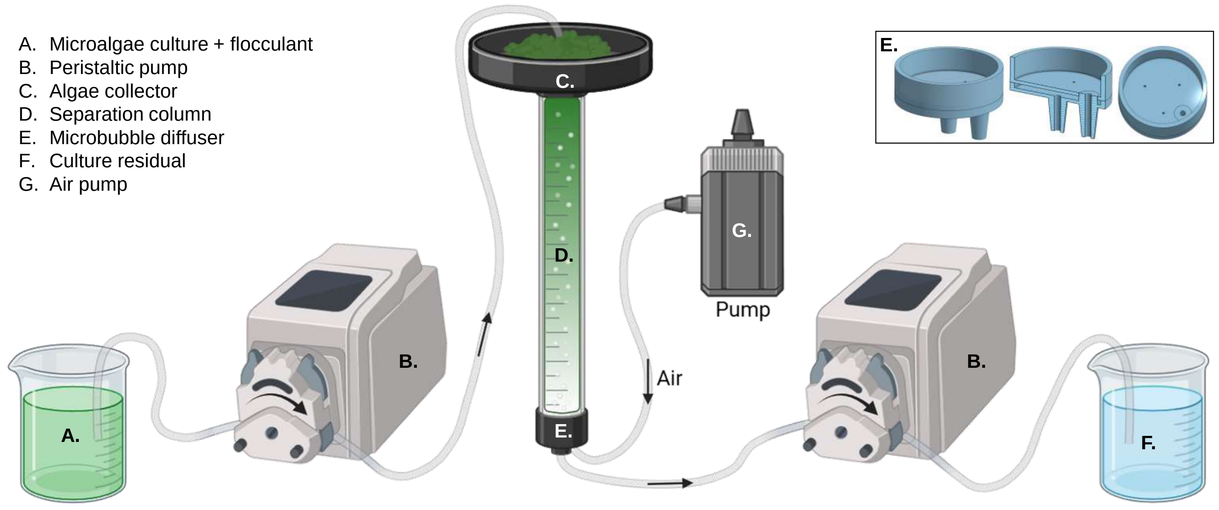


2. Dose-response analysis



3. Continuous-flow flotation with flocculant F5

	Flocculant F5
Flocculant concentration	30 mg/L
Flocculant concentration	0.24 mg/mg biomass
Flow rate	1.1 cm^3/sec
Throughput	3.9 L/h
Separation efficiency	95.2%
Concentration factor of the biomass	~600



Future perspective

pH working range

Culture age

Microalgae species

Flocculant production

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