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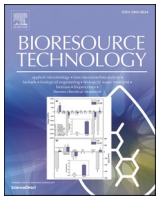


Application of high shear-assisted liquid biphasic system for protein extraction from *Chlorella sp*

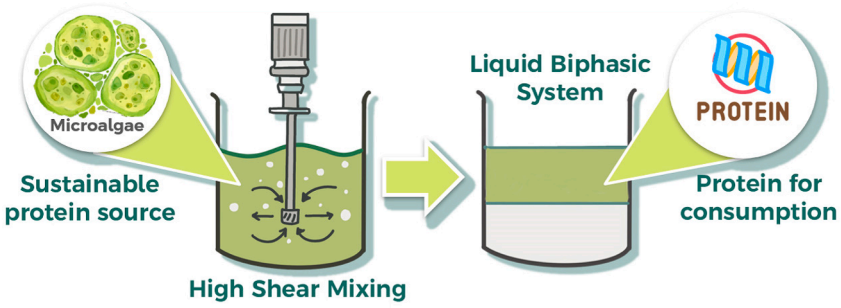
Silvanir [a], Sin Yuan Lai [a,b], Azren Aida Asmawi [c], Kit Wayne Chew [d], Cheng Loong Ngan [a,b,*]

[a] School of Energy and Chemical Engineering, Xiamen University Malaysia, Sepang, Selangor Darul Ehsan 43900, Malaysia
[b] College of Chemistry and Chemical Engineering, Xiamen University, Xiamen 361005, Fujian, China
[c] Faculty of Chemical and Process Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah, Gambang 26300, Pahang Darul Makmur, Malaysia
[d] School of Chemistry, Chemical Engineering and Biotechnology, Nanyang Technological University, 637459, Singapore

HIGHLIGHTS

- Protein was extracted using method of salting out in liquid biphasic system.
- Extraction parameters are adjusted using OFAT to maximize protein yield.
- Microalgae subjected to high shearing showed increase in protein yield.
- High shear-assisted liquid biphasic system is scalable and eco-friendly.

GRAPHICAL ABSTRACT



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ABSTRACT

Microalgae is a sustainable alternative source to traditional proteins. Existing pretreatment methods for protein extraction from microalgae still lack scalability, are uneconomical and inefficient. Herein, high shear mixing (HSM) was applied to disrupt the rigid cell walls and was found to assist in protein release from microalgae. This study integrates HSM in liquid biphasic system with seven parameters being investigated on extraction efficiency (EE) and protein yield (Y). The highest EE and Y obtained are 96.83 ± 0.47 % and 40.98 ± 1.27 %, respectively, using 30% w/v K_3PO_4 salt, 60 % v/v alcohol, volume ratio of 1:1 and 0.5 % w/v biomass loading under shearing rate of 16,000 rpm for 1 min.

1. Introduction

For the past years, microalgae have been rapidly gaining topical prominence due to its environmentally benign, long-term sustainable approach, and versatile application in multiple industries, including food, aquaculture, bioenergy, biochemicals, high-value products, and pharmaceuticals (Ratnapuram et al., 2018; Vu et al., 2018). Microalgae exhibits rapid growth with only the use of light and nutrients, and it can be cultivated efficiently using wastewater. The deliberate incorporation of waste minimization and nutrient recycling mechanisms enhances resource reuse, thereby fostering the principles of a circular economy. Furthermore, microalgae actively contribute to carbon dioxide

* Corresponding author.
E-mail address: clngan@xmu.edu.my (C.L. Ngan).

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