IMPROVING EXTRACTION OF BIOMOLECULES FROM COELASTRELLA SP BIOMASS USING OHMIC HEATING

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Coelastrella sp is recognized by its double-layered cell wall and ability to produce high levels of pigments and interesting amounts of proteins and lipids. These molecules have potential to be applied in functional food and feed arena, but also in other biotechnological fields (e.g. nutraceuticals and cosmetics). However, most of the metabolites resulting from microalgae's metabolism are intracellular, which limits their accessibility during physical or biological processes. Currently, there are several traditional downstream processing methodologies aiming cells' disruption to extract compounds of interest to the extracellular environment, envisaging production of bioactive-rich extracts. An emerging and sustainable extraction approach consists in the utilization of Ohmic Heating (OH). OH brings an unique synergy between thermal and electric field effects as a way to permeabilize microalgae cell wall and thus increase aqueous extraction yield. In this work Coelastrella sp was pre-treated using OH by applying electro-thermal protocols of different electrical field intensities (from 12 to 217 V/cm), treatment temperatures (50 to 100 ºC) and total treatment times (from 7 seconds to 10 minutes). OH and its moderate electric fields (MEF) contributed to an increased aqueous extraction of macronutrients with bioactive properties, allowing a recovery of 50 % and 20 % of the total chlorophylls and proteins, respectively, that were initially enclosed in the cells. Cytometry analysis confirmed disruption effects induced by OH treatments, while fluorescence measurements confirmed the presence of chlorophyl a and aromatic amino acids (such as tryptophan) in the obtained extracts. OH can be used to weaken microalgae cell wall structure facilitating subsequent aqueous and solvent extraction. These results also bring new insights regarding bioaccessibility of important biocompounds during gastrointestinal digestion of microalgae biomass.

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