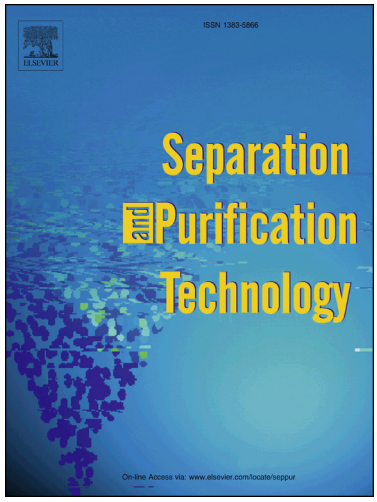

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Rubisco separation using biocompatible aqueous two-phase systems

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Abstract

Mild and efficient separation processes have to be developed to convert microalgal biomass into high valuable products. Aqueous two-phase system (ATPS) was adopted as a new approach in microalgae to separate hydrophilic from hydrophobic components. In this work, three biocompatible ATPSs polyethylene glycol (PEG) 400-Potassium citrate, Iolilyte 221PG-potassium citrate and PEG 400- Cholinium dihydrogen phosphate ATPS were selected based on their interaction with Ribulose-1,5-biphosphate carboxylase/oxygenase (Rubisco), a protein predominantly present in microalgae and used as ingredient in human and animal food. Binodal curves were constructed for each system and the parameters influencing phase formation were investigated. Iolilyte 221PG-potassium citrate has a stronger ability to form ATPS compared with the PEG-based systems. This stronger ability was attributed to hydrophobic and electrostatic interactions between the phase-forming components. After characterization, we investigated the performance of the ATPSs in the partitioning of Rubisco. In this study, the effect of the tie-line length (TLL), pH and type of phase-forming components on Rubisco extraction efficiency (%) was analysed. In a single step, the appropriate parameters lead to extraction efficiencies between 80-100%. Additionally, stability studies were performed to see if ATPS retain the native protein structure. Iolilyte