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Microbial lipid extraction from Lipomyces starkeyi using irreversible electroporation (Article)

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Abstract

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The aim of the study was to investigate the feasibility of using irreversible electroporation (EP) as a microbial cell disruption technique to extract intracellular lipid within short time and in an eco-friendly manner. An EP circuit was designed and fabricated to obtain 4 kV with frequency of 100 Hz of square waves. The yeast cells of Lipomyces starkeyi (L. starkeyi) were treated by EP for 2-10 min where the distance between electrodes was maintained at 2, 4, and 6 cm. Colony forming units (CFU) were counted to observe the cell viability under the high voltage electric field. The forces of the pulsing electric field caused significant damage to the cell wall of L. starkeyi and the disruption of microbial cells was visualized by field emission scanning electron microscopic (FESEM) image. After breaking the cell wall, lipid was extracted and measured to assess the efficiency of EP over other techniques. The extent of cell inactivation was up to 95% when the electrodes were placed at the distance of 2 cm, which provided high treatment intensity (36.7 kWh m^{-3}). At this condition, maximum lipid (63 mg g^{-1}) was extracted when the biomass was treated for 10 min. During the comparison, EP could extract 31.88% lipid while the amount was 11.89% for ultrasonic and 16.8% for Fenton's reagent. The results recommend that the EP is a promising technique for lowering the time and solvent usage for lipid extraction from microbial biomass. © 2018 American Institute of Chemical Engineers Biotechnol. Prog., 34:838–845, 2018. © 2018 American Institute of Chemical Engineers

SciVal Topic Prominence

Topic: Microalgae | Algae | microalgae harvesting

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cell disruption | electroporation | lipid composition | lipid extraction | Lipomyces starkeyi

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