Ramachandran Sivaramakrishnan et al., J Fundam Renewable Energy Appl 2018, Volume 8
DOI: 10.4172/2090-4541-C4-059

11th World Bioenergy Congress and Expo

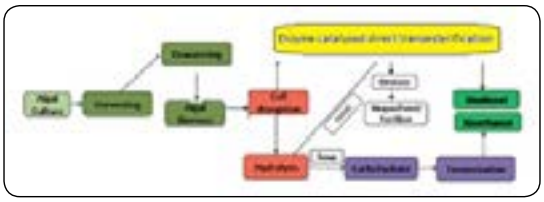
July 02-04, 2018 | Berlin, Germany

Biorefinery approach of microalgae feedstock for the production of bioethanol and biodiesel

Ramachandran Sivaramakrishnan and **Aran Incharoensakdi**
Chulalongkorn University, Thailand

Problem: The continued use of fossil fuels depletes the reserves, more than 75% of petroleum based fuels are burnt in the transportation sector. The utilization of global energy is expected to be increased in the future due to increase population and demand. Therefore, there is a need for alternative fuel, which is not only satisfying the need, but also solve the environmental problems. Microalgae feedstocks, a reliable biofuel source, has drawn much attention as an alternative and renewable. This is due to the microalgal species have the excellent photosynthetic efficiencies and the biomass reproducibility potential than any other terrestrial crops. In this study, the integrated approach of ethanol and biodiesel production from algal biomass. This integrated method is to develop the microalgae based biorefinery model.

Abstract: The present study focuses on the biorefinery approach of integrated production of bioethanol and biodiesel from microalgae feedstock. Various pretreatment methods were used to determine the maximum recovery of sugars from Botryococcus sp. The total sugar yield of 84 % was obtained when pretreated by acid hydrolysis. The hydrolysate produced 90 % of ethanol (theoretical yield) after the fermentation using Saccharomyces cerevisiae. Enzyme catalyzed direct transesterification of biomass was performed using dimethyl carbonate as a solvent and the maximum of yield of 87 % methyl ester yield, 2.6 % glycerol carbonate and 5.6% glycerol dicarbonate was obtained. In the integrated process, the acid hydrolysis was done first, and the sugar extracted biomass was used for the enzyme catalyzed direct transesterification. The obtained hydrolysate was further fermented with S. cerevisiae and at the optimized conditions of fermentation 90 % of ethanol (theoretical yield) was obtained. The direct transesterification of spent biomass produces 92 % of methyl ester yield with 2.1% glycerol carbonate and 4.9% of glycerol decarbonate. Thus, the biorefinery approach of integrated production of ethanol and biodiesel may offer a suitable alternative way to current methods and has the potential application to replace petroleum-based fuels in the future.



Recent Publications:

1. Sivaramakrishnan R and Aran I (2017) Direct transesterification of *Botryococcus sp*. catalysed by immobilized lipase: ultrasound treatment can reduce reaction time with high yield of methyl ester. Fuel. 191:363-370.
2. Sivaramakrishnan R and Aran I (2016) Purification and characterization of solvent tolerant lipase from *Bacillus sp*. for methyl ester production from algal oil. Journal of Bioscience and Bioengineering. 121:517-522.
3. Sivaramakrishnan R and Muthukumar K (2013) Direct transesterification of *Oedogonium* sp. oil be using immobilized isolated novel *Bacillus sp*. lipase. Journal of Bioscience and Bioengineering. 117(1):86-91.
4. Sivaramakrishnan R and Muthukumar K (2012) Production of methyl ester from *Oedogonium* sp. oil using immobilized isolated novel *Bacillus sp*. Lipase. Energy and Fuels. 26(10):6387-6392.
5. Sivaramakrishnan R and Muthukumar K (2012) Isolation of thermo-stable and solvent-tolerant *Bacillus sp*. lipase for the production of biodiesel. Applied Biochemistry and Biotechnology. 166:1095-1111.

Biography

Ramachandran Sivaramakrishnan has been working in the production of biofuels from microalgae. He is working as a Senior Postdoctroral Researcher in the Department of Biochemistry, Chulalongkorn University, Thailand. His doctoral studies focuses on methyl ester production from macroalgae using lipase catalyst. He has been awarded as Junior Research Fellow by Department of Science and Technology, India. He has published 10 research articles in international journals.

rsrkbiol@gmail.com