

Changing waste to energy by using CO₂ (carbon dioxide) from power plant off gas to produce biofuel from microalgae

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Abstract

There is a major challenge in energy requirements and environmental change. The burning of fossil fuels to produce electricity impacts on the effects of "greenhouse gasses" and global warming. This study reviews a gas powered electricity plant and looks at how carbon can be captured and utilized by using CO2 from offgas to increase the percentage CO2 in the air provided to grow microalgae. These algae can then be used to produce biofuel. The effects of enhanced CO2 on the growth of algae was investigated in a photobioreactor system. Algal growth rates and yields were measured additions of 0, 6, 12, 24 and 50% CO2 (v/v in air). The study found that algae grown in 6-12% CO2 (v/v) gave the highest yield at 0.98-1.25 gL-1d-1 with the highest specific growth rate of 1.04-2.21 d-1. Bicarbonate additions of 0.1, 0.01, and 0.001 M were investigated. The study found that 0.001 M is the maximum amount that could be added without having a deleterious effect. In harvesting the algae, it was found that metallic salts added at 0.6-1.0 g/L have the ability to flocculate and sediment algae with a removal efficiency of more than 90% in 1 to 12 hr. In addition, crutacea biowaste, crab shell and medium molecular weight chitosan), were able to achieve 95% removal of algae in 24 hr. Although metallic salts have a high efficiency of removal in a shorter time compared to biopolymers, biopolymers have advantages of being non toxic, inert and low cost.

Biography:

Supatchalee Sophonthammaphat graduated in Environmental Science (B.Sc.) from Silpakorn University, Thailand in 1996 and completed a bachelor of Law at Thammasat University in 2003 and M.Sc. in Environmental Management at The National Institute of Development Administration (NIDA) in 2006 where she attained the highest grade point averages in this field. In 2015, she completed the E-Future Programme from The Doctoral Training Centre, The University of Sheffield and graduated PhD in The Department of Chemical and Biological Engineering in the same university in 2018. Presently, she work at Bureau of Biofuel Development, Dept of Alternative Energy Development and Efficiency, Ministry of Energy, Thailand.

Speaker Publications:

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