

A Photo-Bioreactor for Micro-Algal Biofuel Production

Applications

Applications for this technique are found in biomass and biofuel production from micro-algae, and water treatment plants

Problem addressed

Microalgae cultivation for energy production has gained a great interest in the past few decades in view of the increase in Green House Gas (GHG) emission and the global climate changes. The main challenge of producing micro-algal based biofuels is to produce sufficient amount of biomass at minimal costs and at high efficiencies. This is the reason why engineers have examined and developed recently new technologies for the production of micro-algal biomass.

Technology

This invention consists of designing and implementing a low cost scalable photo-bioreactor to produce micro-algal biofuels using solar energy. The design is inspired by the structure of tree leaves, taking into consideration the following critical key parameters: reactor surface over volume (S/V) ratio, geometry, orientation, and inclination of reactor, material and thickness of reactor walls, culture depth and density, and mixing. The device operates using multi LED light sources powered by solar panels. It is considered as a simultaneous system of electro-coagulation and electro-flotation solar powered for microalgae harvest with high recovery efficiency.

Advantages

Make the production of biodiesel from Lebanese strains of microalgae efficient from cost perspective by:

- Designing low cost scalable reactor
- Using the brine from waste water treatment as a growth medium
- Using solar panels to collect solar radiation from the sunlight, converting it into usable electricity to power multi LED light sources to reduce the energy costs
- Developing a low cost biomass harvesting technology based on electrocoagulation and electro flotation also solar powered

Inventors

- Rayane Hijazi, CINET, Saint-Joseph University of Beirut, Lebanon
- Jihane Rahbani, CREEN, Saint-Joseph University of Beirut, Lebanon
- Hadi Kanaan, CINET, Saint-Joseph University of Beirut, Lebanon