Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M15-138L
Published: 2/19/2016

Inventors

Bruce Rittmann
Klaus Lackner
Justin Flory
Megha Patel
Allen Wright

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Atmospheric CO2 Enrichment and Delivery (ACED)

Microalgae are very useful biological systems for capturing carbon dioxide (CO2) and generating biomass and many useful products. Increasing the CO2 concentration in gas supplied to a microalgae growth system can improve its productivity many fold over using atmospheric air. Flue gas could be a good source of CO2 -enriched gas; however, its usefulness is compromised by transportation costs and toxic contaminants that can introduce impurities into fuel or other high value products.

Researchers at Arizona State University have developed systems and methods for capturing and concentrating CO2 from the atmosphere and delivering the concentrated CO2 to microalgae growth systems. This system is highly efficient and delivers CO2 at a rate that is great enough to promote high biomass-production rates in closed or open systems. This system creates a concentrated stream of CO2 similar to flue gas, but is located at the site of microalgae growth (eliminating transportation costs and risks) and it doesn't contain contaminants.

This system can enable the high microalgae productivity needed to meet the significant global demand for high-density liquid transportation fuels and lower production costs.

Potential Applications

- CO2 capture and concentration for delivery into microalgae growth systems
  - Production of renewable biofuels
  - Production of animal and fish feed
  - Production of bioplastics/biopolymers
  - Production of fine chemicals (agrochemicals, specialty chemicals, etc.)
  - Production of human and animal supplements & therapeutics
  - Production of recombinant proteins
  - Production of cosmetics

Benefits and Advantages

- Produced on site – significantly expands the number of feasible growing sites
- Eliminate CO2 transport costs and risks associated with building pipelines

- Carbon neutral – CO_2 removed from atmosphere, not from burning fossil fuels
- Pure and concentrated CO_2 stream without the drawbacks of flue gas
- Versatile - can be used in open microalgae systems (open ponds) or closed systems (photobioreactors)
- Minimizes CO_2 loss – 90% or more CO_2 uptake efficiency
- More precise control over the pH and inorganic-C (Ci) levels
- Eliminates the input of undesired microorganisms from gas delivery

Dowload Original PDF

For more information about the inventor(s) and their research, please see Dr. Rittmann's laboratory webpage Dr. Lackner's laboratory webpage Dr. Wright's laboratory webpage Dr. Flory's directory webpage