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## Intellectual Property Status:

*Patent Pending*

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## Atmospheric CO<sub>2</sub> Enrichment and Delivery (ACED)

AzTE Cases: M15-138L

### Invention Description

Microalgae are very useful biological systems for capturing carbon dioxide (CO<sub>2</sub>) and generating biomass and many useful products. Increasing the CO<sub>2</sub> 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 CO<sub>2</sub>-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 CO<sub>2</sub> from the atmosphere and delivering the concentrated CO<sub>2</sub> to microalgae growth systems. This system is highly efficient and delivers CO<sub>2</sub> 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 CO<sub>2</sub> 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

- CO<sub>2</sub> 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 CO<sub>2</sub> transport costs and risks associated with building pipelines
- Carbon neutral – CO<sub>2</sub> removed from atmosphere, not from burning fossil fuels
- Pure and concentrated CO<sub>2</sub> stream without the drawbacks of flue gas
- Versatile - can be used in open microalgae systems (open ponds) or closed systems (photobioreactors)
- Minimizes CO<sub>2</sub> loss – 90% or more CO<sub>2</sub> uptake efficiency
- More precise control over the pH and inorganic-C (C<sub>i</sub>) levels
- Eliminates the input of undesired microorganisms from gas delivery