ICARUS
Isolated Cultivation of Algal Resources Utilizing Selectivity
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Motivation for Innovation

Large-scale algae cultivation has been a topic of research and commercialization for decades but has had minimal commercial breakthrough. Production costs of algal biofuel cannot compete with fossil fuels. Two main barriers are to blame:

1. Dewatering. Removing the excess water from the algae crop is a very energy and chemical intensive process and accounts for 70-80% of operational energy needs1.

2. Crop protection. Algae grown in open pond systems are highly susceptible to contamination and crop loss2-4.

Paradigm Shift

Alternative Growth Media

Treatment of polluted water bodies from removal (getting rid of the bad) to recovery (turning the bad into good)

Potential Sources:
- Polluted waterways
- Municipal wastewater
- Agricultural and stormwater runoffs

Challenges

Alternative growth media may result in5,6:
- High Turbidity
- Undesirable chemical species
- Zooplankton grazing
- Bacterial contamination

Drivers for Innovation

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The ICARUS Concept

ICARUS is a Membrane Photobioreactor that floats on the surface of a body of water. The membrane bottom allows for the passage of nutrients and dissolved constituents, while protecting the algae crop from potential threats. This entire process is passively powered by the sun. The purpose of ICARUS is to generate an algal biomass crop as well as to passively clean up impaired waters.

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Promising Results

Dewatering. So far, results demonstrate roughly 10x increase in culture density versus suspended culture. This results in decreased water content in the algae, hence less harvesting costs7.

Crop protection. ICARUS employs the use of a fine pore membrane to maintain separation of the algae crop from possible contaminants in the background water and is able to maintain a monoculture.

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References