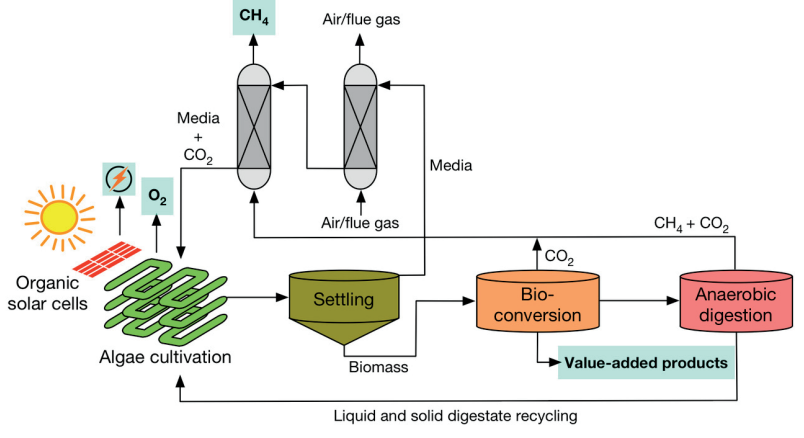
UNIVERSITY OF CALGARY | Start something.

Cost Effective Bioenergy For CO_2 Conversion

Harnessing the power of microbial mat communities for industrial bioenergy

University of Calgary researchers are developing an industrial scale carbon capture and conversion technology designed to achieve negative CO_2 emissions — a critical requirement to keep global warming within safe limits.

The Bioenergy team uses growing insights about the remarkable productivity and resilience of a signature soda lake microbial community to develop a process for capture and bioconversion of CO_2 from air. Development of a sustainable, technically and economically feasible process to do just that, has been unsuccessful so far within prevailing biotechnology paradigms. We are exploring a suite of innovations, such as applying high pH and alkalinity, using a natural microbial community instead of an engineered or bioprospected single strain of microalgae, and using aggregated cells (essentially circulating chunks of microbial mats) instead of suspended cells. The outcome of these innovations is promising, with both a spin off company (Synergia Biotech) and a 10 m^2 pilot plant established within five years of starting this research.



The team is also making progress on:

- Identifying unique capabilities for printing of large-scale organic solar cells
- Applying machine learning to enable discovery of new molecules for organic solar cells with improved optical properties
- Developing new options for downstream conversion of biomass into value-added products, to streamline commercialization
- Performing both Techno-Economic Analysis (TEA) and a Life Cycle Assessment (LCA)

Principal Investigator: Dr. Marc Strous

The pilot plant displayed over 140 days of crash free operation in a production environment.

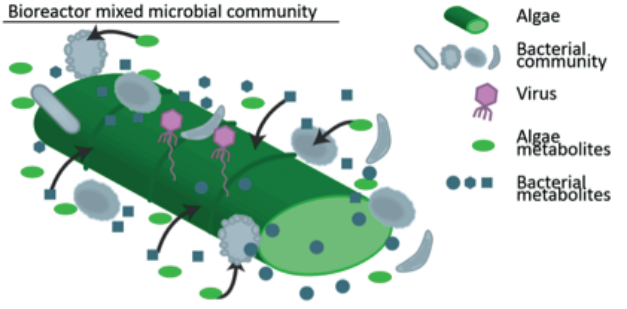
This research has been conducted, in part, thanks to the Canada FIrst Research Excellence Fund

ucalgary.ca/energy

PURE, CLEAN, AND INFINITELY MORE COST-EFFECTIVE FOR A NATURALLY VIBRANT BLUE

SYNERGIA BIOTECH

Synergia Biotech is a cleantech venture that uses a community of microbes to remove CO_2 from the atmosphere and produce a natural, vibrant blue pigment (phycocyanin) that can replace chemical coloring additives in food and cosmetic industries. Our technology eliminates energy and cost intensive steps compared to the current state of the art technology.



Key innovations for phycocyanin production and extraction

Cultivation → **Harvesting** → **Phycocyanin Extraction**

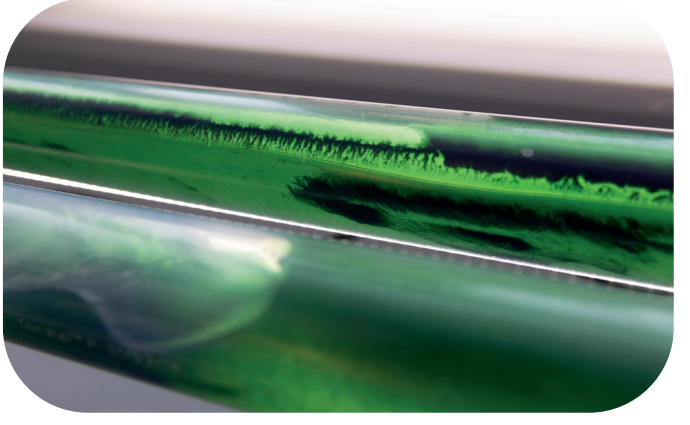
Cultivation of microbial community with direct capture of CO_2 from air

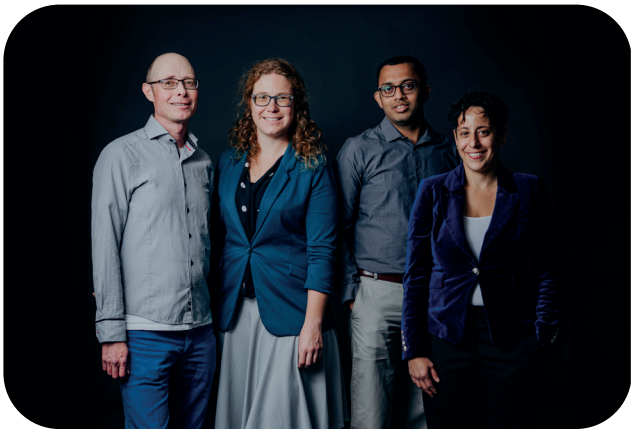
Involves an effective settling process that is neither capital nor energy intensive

Self-digestion of biomass via a patent-pending bioprocess to passively release phycocyanin

Federally incorporated in 2019

US $1.6 billion dollar global phycocyanin market





The Founders *(from right to left)*

Angela Kouris, CEO
Agastewar Vadlamani, CTO
Christine Sharp, Director
Marc Strous, Director

CREATIVE DESTRUCTION LAB ROCKIES

INNOVATE CALGARY