NEDO Moonshot R&D Program Symposium

Development of a bioprocess that uses electrical energy to fix atmospheric CO_2

Project Manager: Souichiro Kato

Participating Institutions:
National Institute of Advanced Industrial Science and Technology (AIST)
Tokyo Institute of Technology
Nagoya University
Kobe University
Osaka University

Project Manager

Souichiro Kato

2006: Ph. D. in Agriculture from University of Tokyo, Japan

2006~2008: Researcher, Marine Biotechnology Institute, Japan

2008~2011: Researcher, JST ERATO Hashimoto Light Energy Conversion System Project

2011~: Senior researcher, National Institute of Advanced Industrial Science and Technology

Research Area: Applied Microbiology, Microbial Ecology

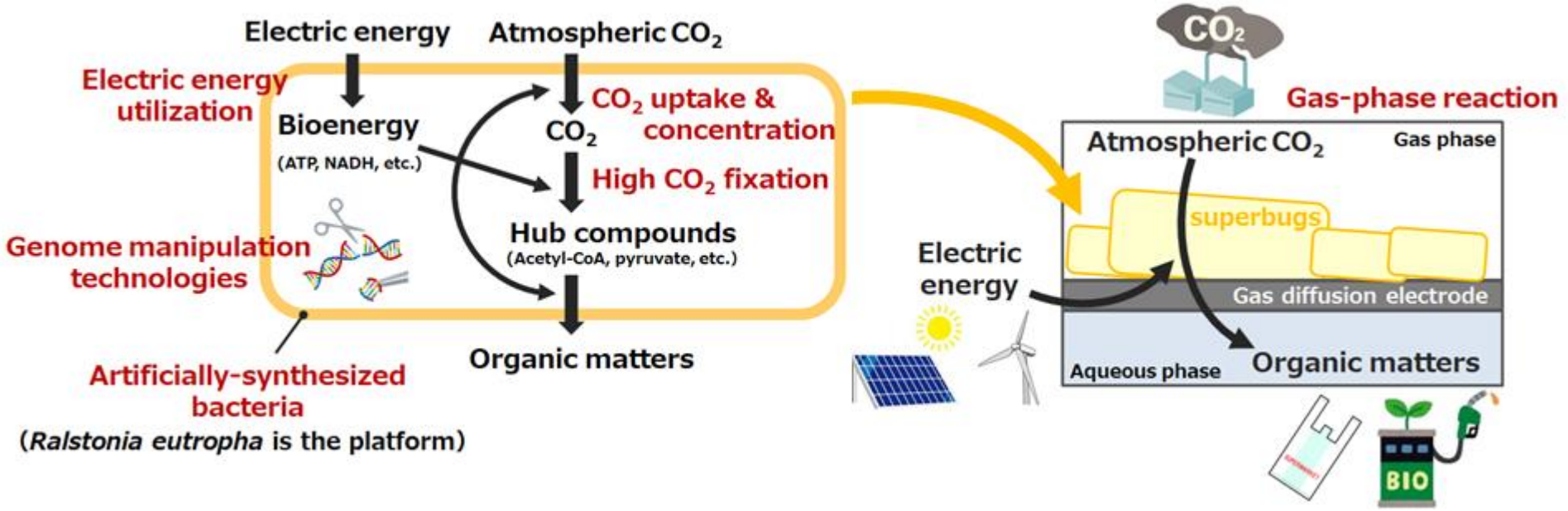
Research Interests:

Microbial energy metabolisms (electro-microbiology, microbial methane production/degradation, etc.)

Application of microbial activities to environmental purification, bioproduction, etc.

Summary of our project

- Development of an innovative biotechnology for negative emission
- Utilizing electric energy to convert atmospheric CO_2 into useful organic matters
- More than 50 times more efficiently than plants (>50 kg-CO_2/m^2/year)



To synthesize **"superbugs"**
that use electric energy, uptake & concentrate atmospheric CO_2, and fix CO_2 with high efficiency.

To develop a **"gas-phase reaction process"**
that can effectively supply electricity, nutrients and CO_2 to superbugs.

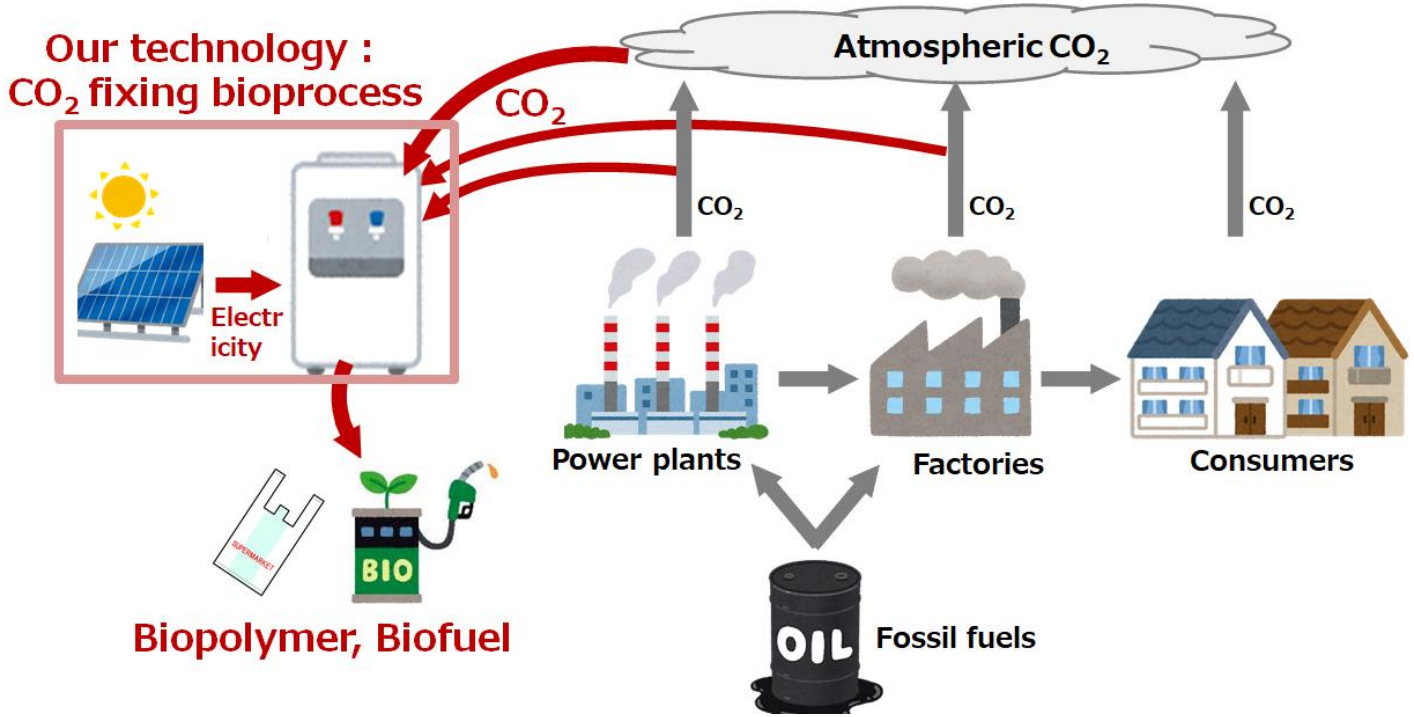
Plans for social implementation

■ Image of social implementation

* Use CO_2 from atmosphere (also from power plants, factories, etc.)

* Use electricity from renewable sources (e.g., solar cells) and surplus electricity at night

* Produce useful organics (e.g., biopolymers, biofuels)



■ Timeline for social implementation

By 2022: Proof of concept

By 2025: Demonstration using lab-scale reactors

By 2030: Demonstration using pilot-scale reactors

~2040, 2050: Social implementation

*Contribute to 2% of the target value of negative emission (500 kt-CO_2/year)

*Contribute to 10% of biopolymer/fuel produced in Japan (200 kt/year)