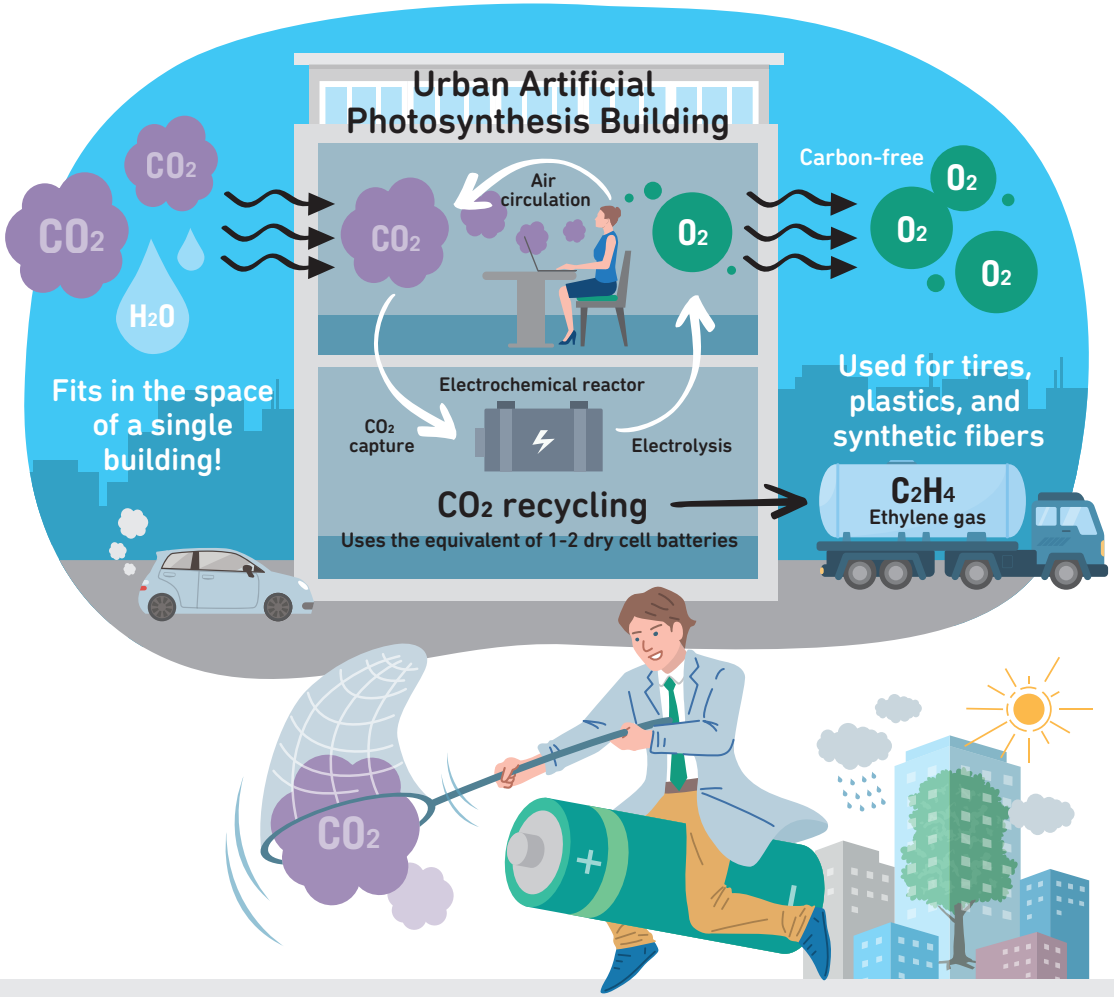
02 PROJECT

Forests of High-Rises in the City Absorb and Reuse CO_2: The Future Is Urban Artificial Photosynthesis

Integrated Electrochemical Systems for Large-Scale CO_2 Recycling

Global warming is a result of humanity's continual pursuit of convenience while ignoring global sustainability. As one step toward solving this problem, we are working on the development of a system that captures CO_2 and converts it into a resource. At its heart is a filter that captures CO_2 using minimal electricity with a compact reactor that converts the CO_2 into ***ethylene*** and other useful resources. We are contributing to carbon neutrality through the creation of cities using this system based on our core electrochemical technologies.



Taking on the Issue at Multiple Scales, From Conducting Studies to Changing the Structure of Society

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Everyone emits CO_2 when they breathe. CO_2 can return as oxygen and be converted into useful resources and used as a material for chemical products. It's not magic.
This is an example of the carbon cycle that will soon be incorporated into our own living environments. Daily personal carbon cycles will prompt behavioral change, which will in turn change habits and lead to better conservation of the environment. I feel that working toward such a society is one of science's missions.

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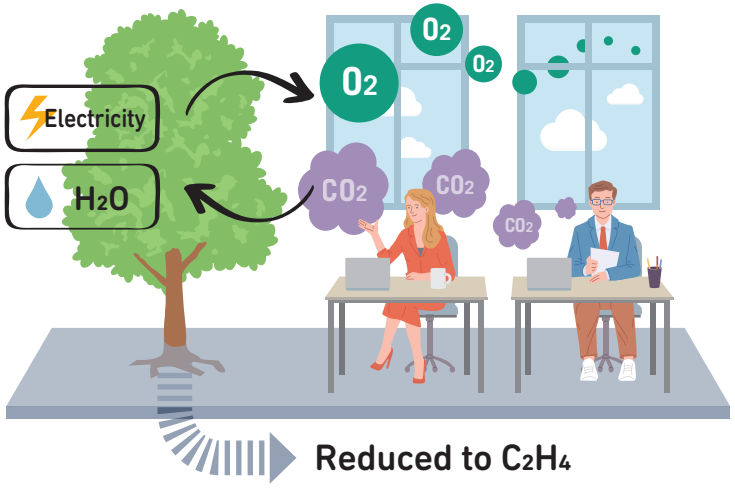
>> Buildings...Performing Photosynthesis?

The advantage of our system lies in its ability to continuously capture CO_2 using the air flow created by HVAC systems. CO_2 reacts with water and is converted into ethylene and other materials for chemical products used in daily life. Oxygen is derived as a by-product. The building's HVAC system circulates this oxygen throughout the building for us to breathe. A complete system works just like photosynthesis, with the building itself functioning as a living tree does. It covers all processes from CO_2 capture to resource conversion and use of the oxygen by-product within the building.

>> Daily Life Becomes Ecofriendly

Our system uses a building's existing HVAC system to reduce the concentration of CO_2 while maintaining the concentration of oxygen. In contrast with conventional systems, there is no need for intake of outside air, significantly reducing the electricity required to regulate air temperature. These advantages



essentially allow the building to perform photosynthesis, covering all processes from CO_2 capture to recycling, without wasting energy or materials. The offices we commute to every day, the department stores where we shop, even hotels in resort areas can all become bases for cutting-edge carbon circulation systems that can support urban artificial photosynthesis in the future.

KEYWORD

Ethylene

Ethylene is a raw material for many familiar chemical products, such as plastics and synthetic fibers. Our system produces ethylene through the direct reaction of CO_2 with water and does not require hydrogen produced by water electrolysis.

FUTURE VISION

2025

Create a Carbon Circulation System

We will construct a compact device that applies electrochemistry to achieve highly efficient conversion of CO_2 to ethylene, laying the foundation for personal carbon circulation.

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2027

Blueprint to Real-World Social Implementation

We will collaborate with businesses to integrate building HVAC systems with units that capture CO_2 and convert it into ethylene.

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2029

Debut the Personal Carbon Cycle

We will complete a demonstration space and allow the general public to experience converting the CO_2 that they exhale into ethylene.

Implementation The University of Tokyo, Osaka University, Institute of Physical and Chemical Research (RIKEN), UBE Corporation, Shimizu Corporation, Chiyoda Corporation, Furukawa Electric Co., Ltd.

Project Introduction Video https://www.youtube.com/watch?v=EGunSE1MOMc&list=PLZH3AKTCrVsVm3UN1x40WW_QK-cEXaoo3&