News Release

February 27, 2024
Taikisha Ltd.

Taikisha, Together with Ushio Inc., Participates in Tokyo Metropolitan University's Direct Air Capture (DAC) R&D

We are pleased to announce that Taikisha Ltd. (Head Office: Shinjuku-ku, Tokyo; Representative Director: Masashi Osada; hereinafter referred to as Taikisha), together with Ushio Inc. (hereinafter referred to as Ushio), participates in Tokyo Metropolitan University's joint R&D initiative on direct air capture (hereinafter referred to as DAC). It is designed to directly capture carbon dioxide (CO_2) from the atmosphere with high efficiency for the use in plant factories, etc.

As pointed by the IPCC[*1], one factor contributing to climate change is the increasing CO_2 concentration in the atmosphere caused by digging up carbon, such as coal, petroleum, and natural gas, from underground. As the development of social infrastructure and technologies independent from underground carbon progresses toward carbon neutrality by 2050, DAC technology that directly captures CO_2 from the atmosphere and utilizes it, is proposed to completely reduce CO_2 emissions to zero. There is room for improvement in the efficiency and cost of this technology for capturing low-concentration CO_2 (400 ppm) from the atmosphere, and highly efficient materials and systems are currently required.

Against this backdrop, the research group led by Professor Seiji Yamazoe et al. at the Department of Chemistry of the Graduate School of Science, Tokyo Metropolitan University, has identified isophoronediamine as an ideal material for DAC due to its extremely high CO_2 absorption property that greatly surpasses existing technologies.[*2]

We will work on systematization of DAC equipment capable of capturing CO_2 with higher efficiency than conventional technologies by combining Taikisha's high

efficiency gas circulation and heat exchange system technology to Ushio's absorbent material that help improve the efficiency of CO_2 absorption inspired by this isophoronediamine and light and heat collection technology that realize energy-saving CO_2 desorption.

The CO_2 captured by the DAC equipment will be available for use in plant factories and greenhouse cultivation, to accelerate the growth of crops and factory-grown algae, etc., and for synthesizing fuels and chemicals.

Taikisha, Tokyo Metropolitan University, and Ushio have named the creation of a world with net zero emissions by transforming CO_2 in the atmosphere into various substances the SkyCarbon® Initiative. Toward the realization of the SkyCarbon® Initiative, we will first introduce DAC equipment to the plant factories owned by the Taikisha Group and start R&D and demonstration experiments with the aim of introducing the equipment to society by 2030.

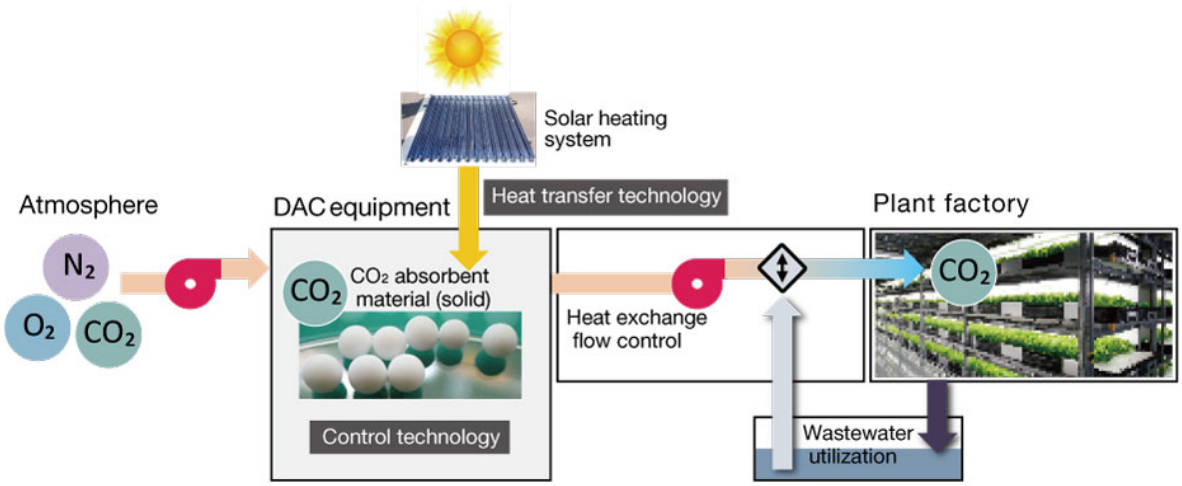

Figure 1: DAC equipment introduced in a plant factory

Figure 2: Conceptual diagram of the SkyCarbon® Initiative

An initiative that captures and transforms carbon dioxide in the atmosphere into familiar and useful substances, thereby contributing to carbon neutrality and carbon negativity in the atmosphere

With Challenge to create new value declared as one of the basic policies in our Mid-Term Business Plan (FY2022 to FY2024), Taikisha has been considering the capture, utilization, and application of CO_2, including the use of DAC for plant growth as a new business area. We are determined to further accelerate the challenge to create new value through this joint R&D with Ushio and Tokyo Metropolitan University.

*1 Abbreviation of Intergovernmental Panel on Climate Change. Called 気候変動に関する政府間パネル (kikou hendou ni kansuru seifu-kan paneru) in Japanese, the IPCC is an intergovernmental organization established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988.

*2 S. Kikkawa, K. Amamoto, Y. Fujiki, J. Hirayama, G. Kato, H. Miura, T. Shishido, S. Yamazoe Direct Air Capture of CO_2 Using a Liquid Amine-Solid Carbamic Acid Phase-Separation System Using Diamines Bearing an Aminocyclohexyl Group , ACS Environ. Au, 2, 354-362 (2022).

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