

Ubiquitous CO₂ capture directly from air by nanometer-thick membranes

Guest lecture

Professor Shigenori Fujikawa

Kyushu University, Japan

On the occasion of celebrating Sweden-Japan Foundation 50 years, the Japan Society for the Promotion of Science Stockholm Office 20 years, and the establishment of the Kyushu University Stockholm Office, KTH Climate Action Center welcomes you to this guest lecture by Professor Shigenori Fujikawa of Kyushu University.

Professor Shigenori Fujikawa, and his multi-disciplinary team of researchers at Kyushu University's International Institute for Carbon-Neutral Energy Research (I2CNER), are working to go beyond being 'carbon neutral' to the goal of capturing carbon from the air.



Date: 29 October 2021

Time: 09.00 - 11.00 am CET

Place: F1, Lindstedtsvägen 22, Stockholm and digital through Zoom.

Registration:

[Registration on this link \(kth.se\)](https://www.kth.se)

The KTH Climate Action Centre organises this guest lecture. The host is Director Assoc. Prof. Francesco Fuso-Nerini, in cooperation with the Embassy of Japan to Sweden, IVA, Sweden-Japan Foundation, Kyushu University Stockholm Liaison Office and the Japan Society for the Promotion of Science Stockholm Office. After the lecture, there will be a discussion with the help of a panel with representatives from academia and industry.

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Abstract

In order to solve the problem of climate change caused by anthropogenic global warming, carbon dioxide (CO₂) that has been emitted into the atmosphere must be captured directly from the atmosphere. This Direct Air Capture (DAC), which directly captures CO₂ from the atmosphere, is one of the negative emission technologies that are expected to keep global warming below 1.5 degrees Celsius.

Since the atmosphere exists everywhere on the planet, CO₂ capture from the atmosphere must be achieved anywhere, independent of location. Membrane separation processes have the advantage over chemical solutions in that they are small, simple, and can be installed anywhere. For this purpose, we are developing thinner separation membranes made of highly

CO₂-permeable polymeric materials and attempting to realize CO₂ capture from the atmosphere by separation membranes.

Recently, we have succeeded in developing a defect-free, free-standing CO₂ separation nanomembrane that has the highest CO₂ permeability reported so far, with no gas leakage through pinholes, even though it is only about 30 nm thick (about 1/1500 of a hair). The nanomembrane has succeeded in selectively recovering CO₂ from a gas mixture of only 1,000 ppm, which is comparable to the concentration of CO₂ in the atmosphere. The advantage of the extremely efficient separation of CO₂ demonstrated in this study shows the feasibility of direct air capture by membranes, which had not been considered before

Professor Shigenori Fujikawa

Professor Fujikawa is the Director of Research Center for Negative Emissions Technologies, and Distinguished Professor of International Institute for Carbon-Neutral Energy Research, which has been funded under Japan's World Premier International Research Center Initiative. At the institute, he has the central role in leading a multidisciplinary team of world-class researchers.

Professor Fujikawa is a project manager of the Moonshot Research and Development Program, which was launched by the Cabinet Office of Japanese Government. His project team is advancing the cutting-edge research, themed "Research and Development of CO₂ Circulation System for Realization of a "Beyond Zero" Society."

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