

March 14, 2024

JX Nippon Oil & Gas Exploration Corporation

Establishment of the Social Cooperation Program **"Creation of CCS Monitoring Center by Innovative Digital Technology"**

JX Nippon Oil & Gas Exploration Corporation (JX; President & CEO: Toshiya Nakahara) and Graduate School of Engineering, The University of Tokyo (Dean: Yasuhiro Kato) are pleased to announce that establishment of Social Cooperation Program "Creation of CCS Monitoring Center by Innovative Digital Technology" on April 1, 2024. This program aims to develop new monitoring and modeling technologies for CCS (Note 1), which is considered essential for achieving carbon neutrality. We will also develop human resources to lead the future development of CCS technology.

CCS is positioned as a near-future technology for CO₂ reduction, carbon neutrality, and even negative CO₂ emissions. The Ministry of Economy, Trade and Industry (METI) has set a goal of reducing CO₂ emissions by 120 to 240 million tons through CCS by 2050. To achieve this goal, a number of wells will be drilled around Japan. Given this context, modeling technology to predict the behavior of stored CO₂ and monitoring technology to track the spatiotemporal changes of stored CO₂ are essential to ensure the safety of CCS operations.

In this program, we will use "Digital Rock physics" (Note 2), which predicts the behavior of CO₂ inside digitized rocks using high-performance computers, to reveal the mechanisms of dynamic CO₂ behavior. We will also develop and implement long-term and continuous monitoring technologies using minimal seismic source (Note 3) and Distributed Acoustic Sensing (DAS), which uses optical fibers as receivers. Additionally, through research on automation and optimizing monitoring data processing and analysis using digital transformation technology, we aim to establish an integrated monitoring system for CCS implementation.

Due to the diverse range of expertise required for CCS implementation including exploration engineering, hydrology, geochemistry, and seismology, there is a strong demand for specialized human resources. By having future CCS leaders conduct research in this program and handle practical data, we will foster expert personnel and accumulate knowledge for the implementation of CCS.

General Administration Department, JX Nippon Oil & Gas Exploration Corporation,
1-2 Otemachi 1-chome, Chiyoda-ku, Tokyo 100-8163 Japan TEL +81-3-6257-6000



<Outline of the Social Collaboration Program >

Title: Establishment of CCS Monitoring Center by Innovative Digital Technology

Representative faculty member: Takeshi Tsuji (Professor, Department of Systems Innovation, Graduate School of Engineering, The University of Tokyo)

Establishment period: FY2024 - FY2028 (5 years)

< Tsuji Laboratory, Graduate School of Engineering, The University of Tokyo>

Tsuji Laboratory has been conducting research toward the development of a continuous monitoring system for stored CO₂ and the creation of "digital rock physical chemistry," which is numerical modeling of CO₂ behavior in digitized rocks. In addition to CCS, Tsuji Laboratory is also developing monitoring technologies for earthquake faults and volcanoes, and exploration technologies in space, etc. The advanced technologies and knowledge obtained in these various projects will be used for safe CCS implementation. In this program, we aim to implement the results of basic research obtained so far in Tsuji Laboratory into actual CCS.

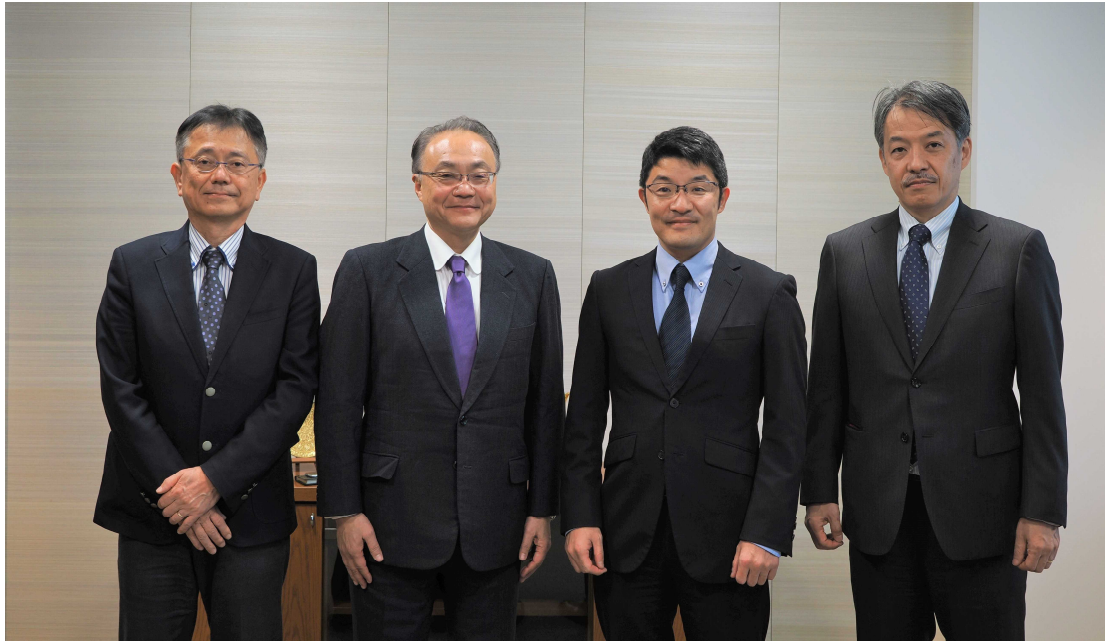
URL: <https://tsuji-lab.jp/>

<JX Nippon Oil & Gas Exploration Corporation>

JX Nippon Oil & Gas Exploration Corporation, a major operating company in the ENEOS Group, advocates "Two-Pronged" approach in which, in addition to the conventional oil and natural gas development business, environmentally friendly businesses centered on CCS/CCUS are another prong of the company's operations to achieve carbon neutrality by 2050. Based on this policy, we are currently focusing on early implementation of CCS projects in Japan and overseas. In cooperation with The University of Tokyo, this program aims to establish an integrated CCS monitoring system and to support development of human resources capable of leading CCS projects in the future.

URL: [JX Nippon Oil & Gas Exploration \(jx-group.co.jp\)](https://www.jx-group.co.jp)





from left Yoshihide Kira, Senior Vice President & CTO (JX), Toshiya Nakahara, President & CEO (JX), Prof. Takeshi Tsuji (The University of Tokyo), Jotaro Tomoeda, General Manager of Technical Strategy Dept. (JX)

- (Note 1) CCS: Carbon dioxide Capture and Storage. Technology that captures CO₂ and stores it underground permanently.
- (Note 2) Digital Rock Physics: A method of applying numerical simulations to digitalized rock models to calculate the ease of CO₂ flow. It also incorporates molecular-scale physical and chemical reactions into digital rocks, known as “Digital Rock physics”.
- (Note 3) Minimal seismic source: Portable Active Seismic Source (PASS) is an ultra-compact vibration generation device. Even if the vibration energy of PASS is weak, it continuously generates vibrations, and increases the vibration energy by adding them together. The PASS is expected to enable continuous reservoir monitoring.

<https://www.t.u-tokyo.ac.jp/en/press/pr2022-09-15-001>