



April 16, 2026

Kobe Steel, Ltd.

Atomis Inc.

Nagase & Co., Ltd.

Kobelco, Atomis, and Nagase & Co.

Demonstration Completed on CO₂ Capture With MOFs at Scale of 30 kg per Day

—Examining Next Step of Japan's first Test at Metric Ton Scale

Kobe Steel, Ltd. (Head Office: Kobe, Hyogo; President and CEO Yoshihiko Katsukawa), Atomis Inc. (Head Office: Kobe, Hyogo; CEO: Daisuke Asari), and Nagase & Co., Ltd. (Head Office: Chiyoda-ku, Tokyo; Representative Director, President and CEO: Hiroyuki Ueshima), as part of their development of a CO₂ capture device (MOF-PSA*²) using metal-organic framework (MOF*¹) technology, for which the 2025 Nobel Prize in Chemistry was awarded, have succeeded in a demonstration test on the scale of 30 kg of capture per day. This successful test has shown the technological effectiveness of implementing CO₂ capture technology using MOFs, and as the next step the three companies have begun examining and discussing a demonstration test on the metric ton scale in fiscal 2026. This is the first initiative in Japan to expand CO₂ capture technology using MOFs to a practical scale for potential industrial use.

This initiative aims to bring about practical use of a new solution for a carbon neutral society, with Atomis (where Professor Susumu Kitagawa, Distinguished Professor at Kyoto University who received the 2025 Nobel Prize in Chemistry, serves as Scientific Advisor) developing MOF adsorbents, Kobe Steel developing the CO₂ capture device, and Nagase & Co. playing a central role by arranging marketing, sales, and the demonstration test flow.

■ CO₂ Capture Device With MOFs Making It Possible to Save Energy and Space

The gas emitted by boilers and industrial furnaces in factories includes not only CO₂, but also moisture and nitrogen. CO₂ capture technology using existing adsorbents such as zeolites*³ requires preprocessing equipment to remove moisture, leading to the equipment becoming larger and costing more energy. At the same time, companies are being urged to reduce their Scope 1–3 greenhouse gas emissions, with a growing need in particular for capture technology that can be introduced with reduced energy and space requirements to capture Scope 1 CO₂ directly released from companies' own facilities.

The MOF-PSA CO₂ capture device the three companies demonstrated has MOFs that can selectively adsorb CO₂ installed in the device. This greatly simplifies the preprocessing required, allowing the device to use less energy and to be smaller in size. Another feature is that since it can be used even with gas emissions with a low concentration of CO₂, it can be installed in a variety of factories.

CO₂ capture device concept image and MOFs developed by Atomis



■ About the Demonstration Test on the Scale of 30 kg of Capture per Day

This demonstration test started in November 2025 at Kobe Steel's Takasago Works, which is designated as Takasago GX Try Field*⁴ (location: Takasago, Hyogo). The test focused on the gas emitted from burning city gas to assess whether the target performance (purity, amount captured, etc.) could be reached. Based on the results of this demonstration test, as the next step the three companies have begun examining a demonstration test on the metric ton scale for a CO₂ capture device with MOFs installed. This is the first attempt in Japan for carbon capture with the PSA method using MOFs at the ton level with an eye towards potential industrial use.

■ Future Outlook

On-site usage of the captured CO₂ is being considered, as well as using it as dry ice. By converting CO₂, which has been partially dependent on overseas sourcing, into a resource circulated domestically, we aim to achieve both economic and environmental value. The three companies will accelerate efforts for practical application and commercialization and contribute to the creation of a carbon neutral society.

*1: Porous materials made up of metallic ions and organic ligands. Over 120,000 structural patterns exist, and they are noted for the freedom of their molecular design. With fine pores at the nano level, there is high anticipation for a variety of applications such as separating and storing specific substances.

*2: PSA (pressure swing adsorption) is a technique used to separate and refine high-purity gases (such as nitrogen or oxygen) by cycling between adsorbing specific gases into an adsorbent and lowering the pressure to release the gases. Normally adsorbents such as zeolites are used, but in this case, MOFs were used as the adsorbent.

*3: Inorganic, porous materials primarily composed of aluminum, silicon, and oxygen. Used in many industries as dehumidifying agents or catalyst carriers.

*4: Kobe Steel's Takasago Works has been designated as Takasago GX Try Field, serving as a demonstration and implementation site aimed at achieving carbon neutrality. At this site, Kobe Steel will move forward with various initiatives focused on green transformation (GX) technologies, such as hydrogen, biomass, and CCUS. The Try Field contributed to this demonstration test by providing its infrastructure, technology, and know-how.

Kobe Steel Profile

- Company Name: Kobe Steel, Ltd.
- Head Office: Kobe, Hyogo
- Representative: President and CEO Yoshihiko Katsukawa
- Business Overview: Manufacture and sales of steel, non-ferrous metals, cast iron, cast and forged steel, non-ferrous alloys, industrial machinery, and machinery for transport vehicles; electricity supply business; plant engineering and construction, etc.
- URL: <https://www.kobelco.co.jp/english/>

Atomis Profile

- Company Name: Atomis Inc.
- Head Office: Kobe, Hyogo
- Representative: CEO Daisuke Asari
- Business Overview: Design evaluation, manufacturing and sales of PCP/MOFs, proposal of distributed logistic system for gas and of distributed carbon recycling system
- URL: <https://www.atomis.co.jp/en/>

Nagase & Co. Profile

- Company Name: Nagase & Co., Ltd.
- Head Office: Chiyoda-ku, Tokyo
- Representative: Representative Director, President and CEO Hiroyuki Ueshima
- Business Overview: Import/export and domestic sales of chemicals, plastics, electronics materials, cosmetics and health foods
- URL: <https://www.nagase.co.jp/english/>

■ Contact Information

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About the project, including the demonstration plan

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