
SyncMOF

Company Info.

Company Name : SyncMOF Inc.
Foundation : June 20th, 2019
Founder : Junichi Hataoka（CEO), Akihiro Hori（CTO）

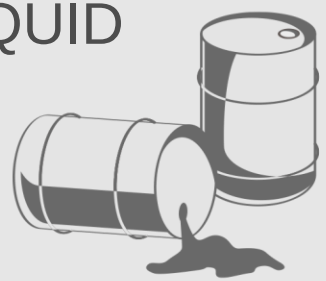
Future Trends in Energy Resources

GAS as an Energy Resource

19c
SOLID

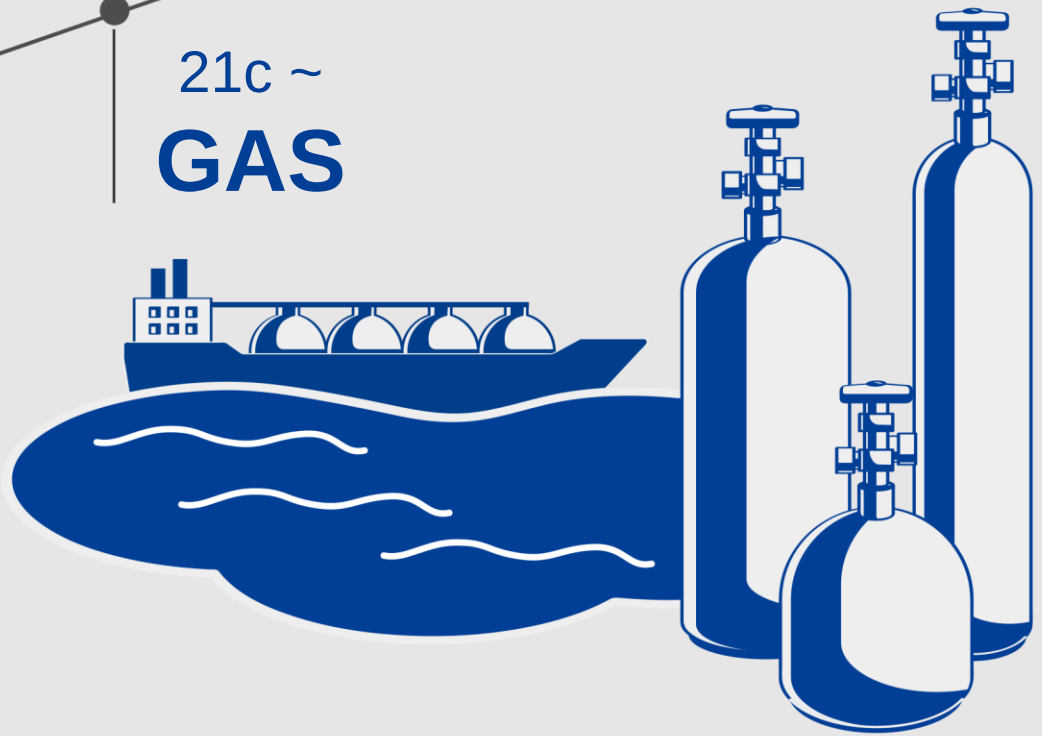
Coal

20c
LIQUID



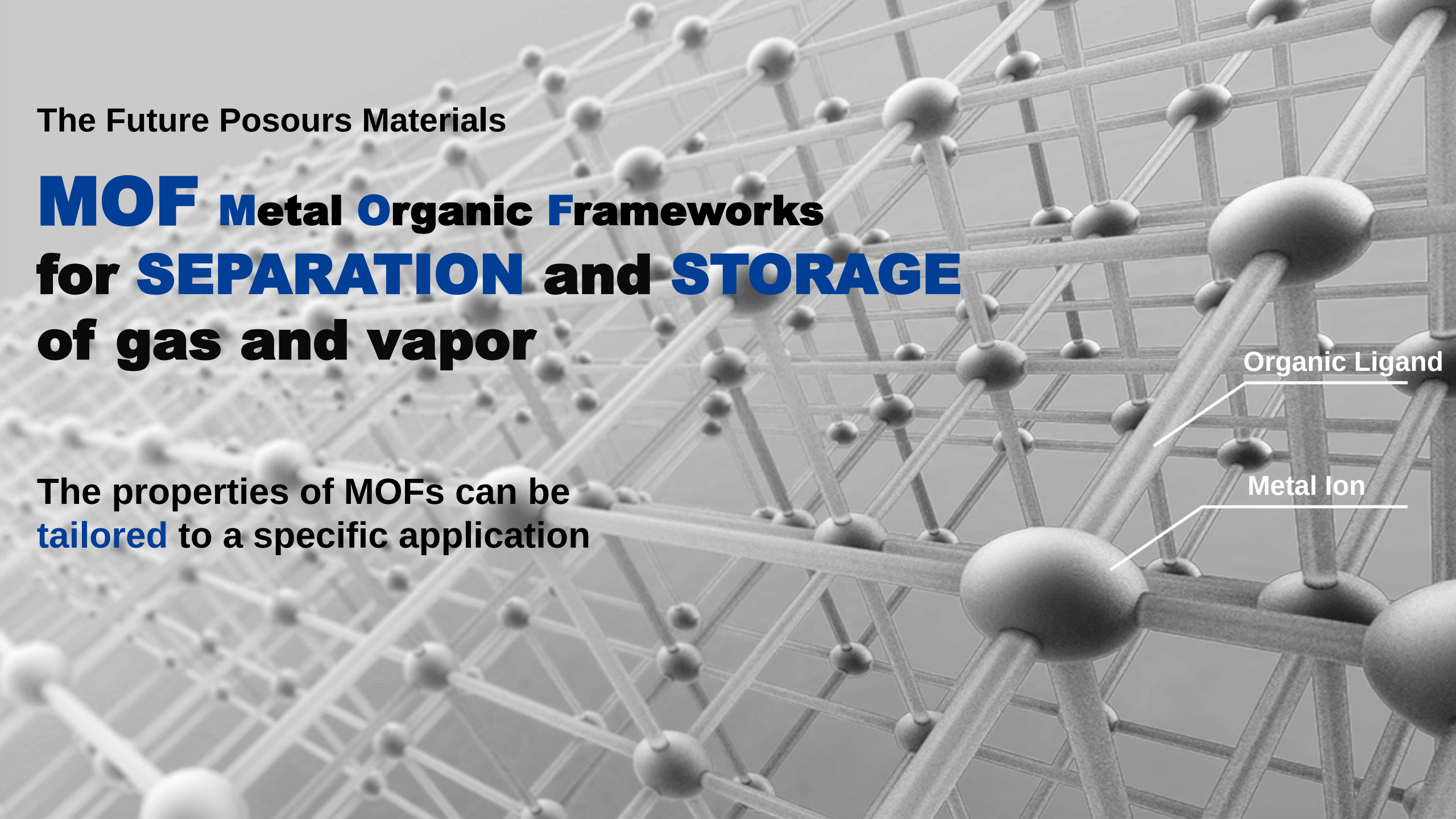
Oil

21c ~
GAS



The Future Posours Materials

MOF Metal Organic Frameworks for SEPARATION and STORAGE of gas and vapor



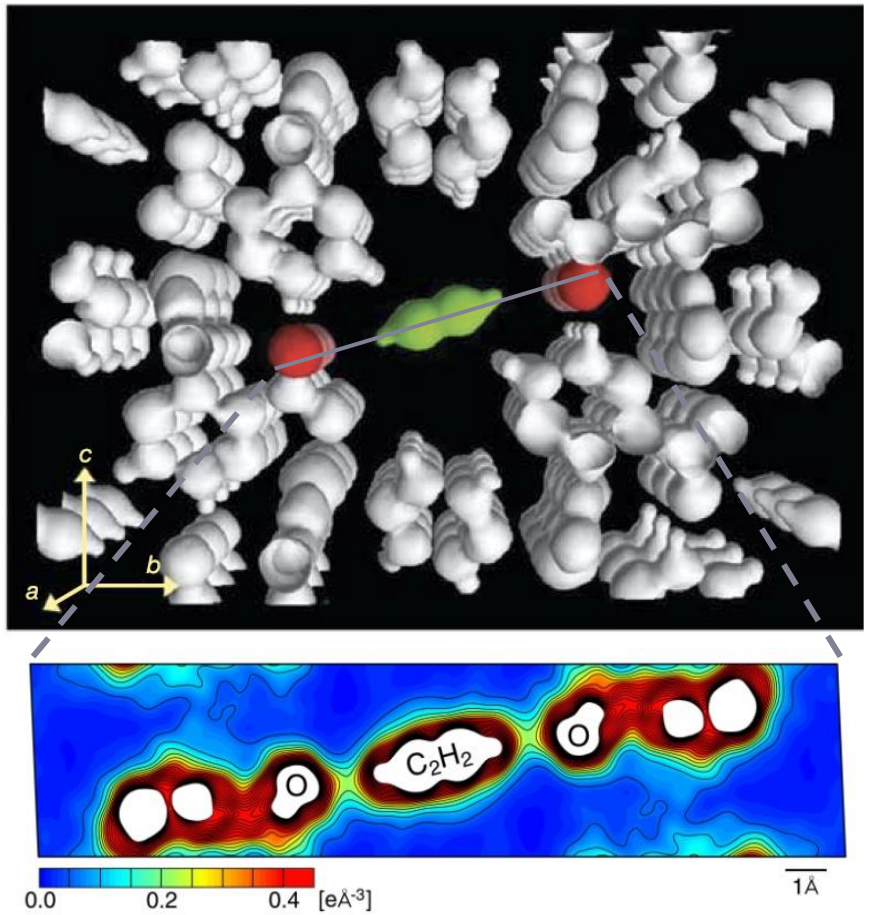
The properties of MOFs can be tailored to a specific application

Functional Nano-pores

SyncMOF

CPL-1 Acetylene Storage

Cu-pyrazine-2,3-dicarbxylate-pyrazine

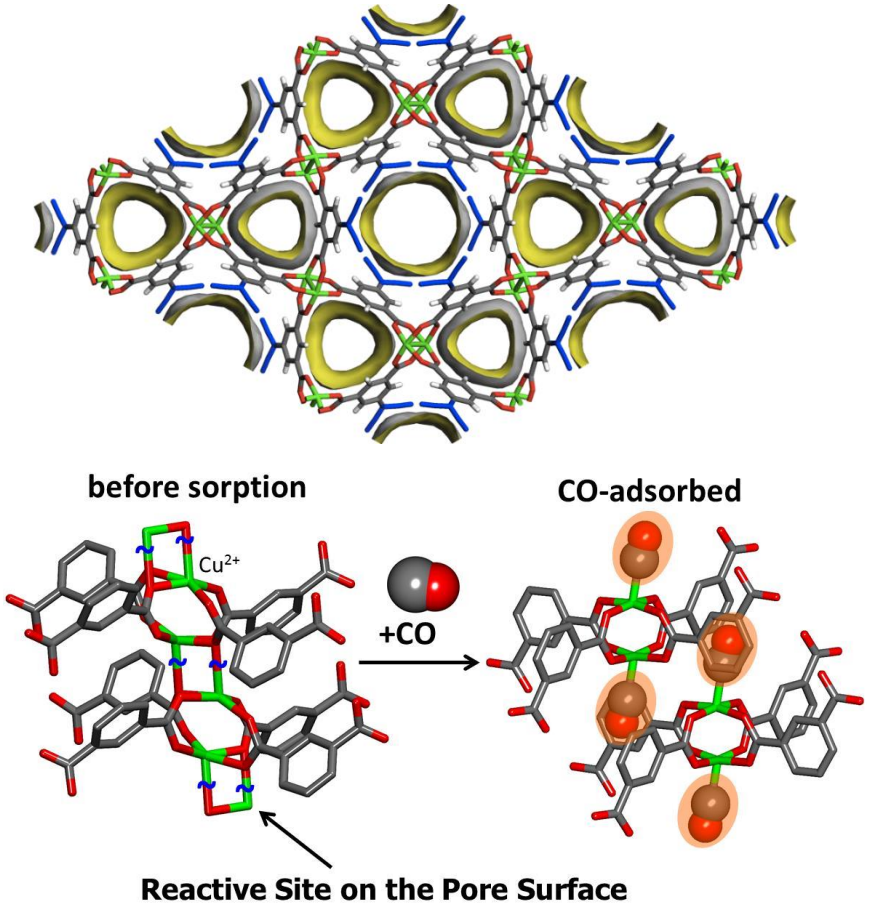


Concentration of acetylene gas with a compression limit of 0.2 MPa at 200 times higher density.

R. Matsuda et al., *Nature*. 2005, 436, 238

KGM-1 Selective Adsorption of CO

$[Cu_2(N_3\text{-ipa})_2]$



Separation of CO and N_2 with a lower energy cost

R. Matsuda, H. Sato, A. Hori et. al., *Science* 2014, 343, 167

カーボンニュートラルな未来へ。

カーボンニュートラルへの挑戦こそが、
日本に次の成長をもたらす原動力。

今こそ、技術大国・日本の出番です。
新しいグリーンイノベーションを、次々と。

そして、ひとりひとりの力を合わせて、
カーボンニュートラルな未来へ。
2050年。そこには、新しい日本が待っています。

Where are the huge markets?

SyncMOF

①Cost Reductions for Offshore Wind Power Generation
②Development of Next-Generation Solar Cells
③Large-scale **Hydrogen** Supply Chain Establishment
④**Hydrogen** Production through Water Electrolysis Using Power from Renewables
⑤**Hydrogen** Utilization in Iron and Steelmaking Processes
⑥Fuel **Ammonia** Supply Chain Establishment
⑦Development of Technology for Producing Raw Materials for Plastics Using **CO_2** and Other Sources
⑧Development of Technology for Producing Fuel Using **CO2**, etc.
⑨Development of Technology for Producing Concrete and Cement Using **CO_2**
⑩Development of Technology for **CO_2** Separation, Capture, etc.
⑪Promotion of Carbon Recycling Using **CO_2** from Biomanufacturing Technology as a Direct Raw Material
⑫Next-generation Storage Battery and Motor Development
⑬Development of In-vehicle Computing and Simulation Technology for Energy Saving in Electric Vehicles
⑭Smart Mobility Society Construction
⑮Next-generation Digital Infrastructure Construction
⑯Next-generation Aircraft Development：development of **hydrogen** aircraft
⑰Next-generation Ship Development：**hydrogen** and **ammonia** fuels
⑱Development of **Negative Emissions Technologies** in Agriculture, Forestry, and Fisheries Industries

14 out of 18 themes are related to GAS

H_2、CO_2、NH_3

Development of Technology for CO_2 Separation, Capture, etc.

SyncMOF

Project Summary

- This project aims to establish a low-concentration CO2 separation and recovery technology to create and expand CO2 separation and recovery plant research as well as separation agent research. In addition, this project aims to create a business model for carbon recycling, including chemical process that utilize CO2 and are not dependent on petrochemical raw materials.
- This project will develop and verify a CO_2 separation and recovery system using a physical adsorption method with innovative separation agents for low-concentration CO_2 emissions. The separation agents will be improved for low-concentration CO2 by utilizing the characteristics of flexible PCPs (Porous Coordination Polymers, also known as MOFs). This project will establish a production-scale manufacturing method for the separation agents and develop a process that matches the material characteristics and factory exhaust conditions to establish an energy-saving technology for low-concentration CO_2 separation and recovery.
- The project will conduct a comprehensive technical verification of the chemical manufacturing technology that utilizes the CO_2 recovered by this technology as a raw material.

Execution Framework

※太字：幹事企業

Showa Denko, Nippon Steel

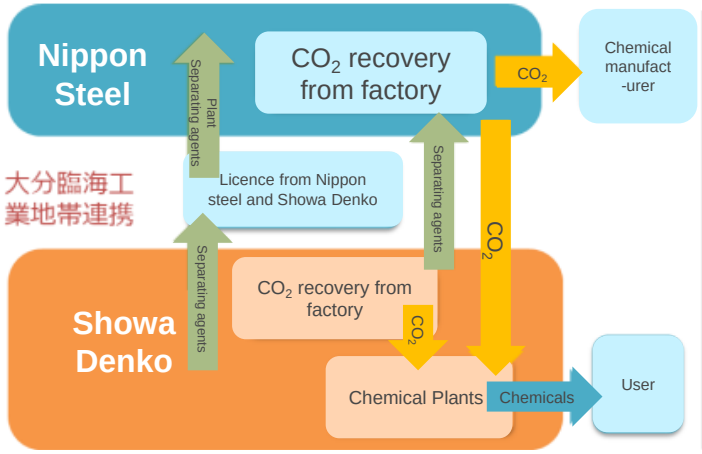
Project Period

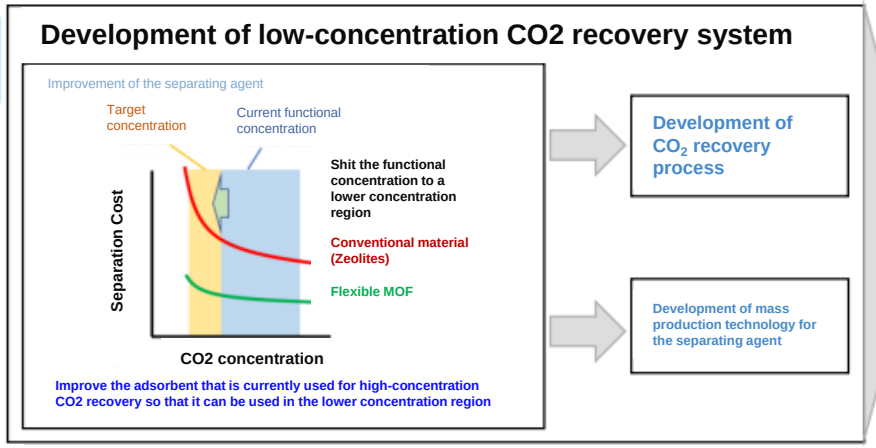
2022~2030

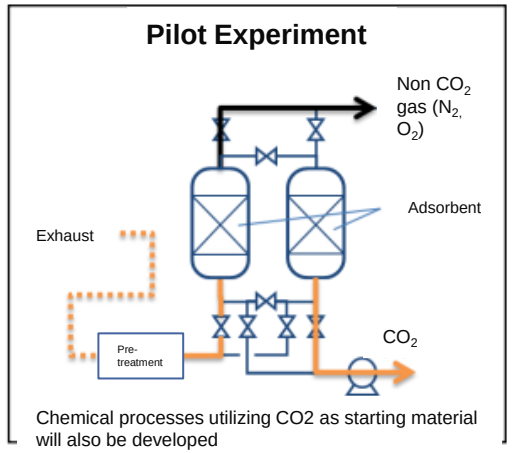
Project Scale

- Project scale: Approximately 8.44 billion yen
- Support scale*: Approximately 7.20 billion yen *Including incentive amount. The support scale may change depending on the business progress in the stage gate process.
- Subsidy rate, etc.: 9/10 entrusted -> 2/3 subsidy (with 10% incentive rate)

Project Concept







Showa Denko, Nippon Steel

CO_2分離回収貯留及び有効利用技術
～脱炭素社会での企業対応/CCS・CCUS/排出量計算

情報機構

Chapter 3　CO_2 Separation and Storage Technology
Section 2 CO_2 Recovery Technology
Section 2.5　CO_2 separation with PCP/MOF
Nippon Steel Inc. Hiroshi Kajiro Ph.D

Due to the increasing interest in PCPs (MOFs) as a promising material, many MOF-related start-ups have been established. However, there are also many companies that mainly focus on manufacturing and supplying already-known PCPs, without any clear differentiation factor. In this chapter, we will introduce four start-ups that possess special technologies and are expected to play an active role in the future.

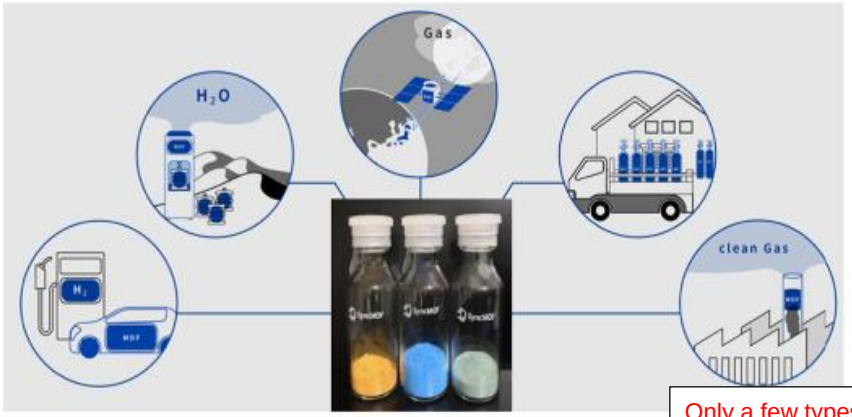
（1）MOF Technologies
（2）Mosaic Materials
（3）NuMat Technologies
（4）SyncMOF

SyncMOF

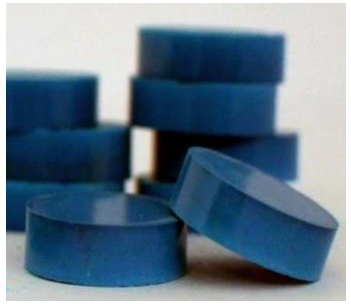
SyncMOF is a MOF start-up launched by Nagoya University in 2019. While many domestic and foreign MOF ventures are focused on "manufacturing new MOFs," “production of known MOFs using manufacturing capabilities," or “production by exploring the needs of known MOFs," SyncMOF has a unique technology that enables it to evaluate characteristics through adsorption measurements, X-ray crystallography, and in-situ analysis of gas adsorption states using Raman spectroscopy, which cannot be analysed with commercially available equipment. Based on the evaluation and understanding of the adsorption phenomenon and MOF structure, SyncMOF also conducts precise measurements tailored to the needs of research institutions and companies and designs and manufactures gas separation devices using MOFs. While basic evaluation equipment such as adsorption isotherm measurements is commercially available, practical evaluation equipment for mixed gas and flow-type devices is not yet commercially available. Thus, new start-ups like SyncMOF are expected to play a significant role in the practical application of MOFs.

SyncMOF

1：Selection of MOF



2：Large scale synthesis



3: Design of the device

Only a few types of MOF production and simple molding such as pellets

Other SU coverage

- Advanced molding
- The only one in SU that can synthesize a ton level.

MOF selection according to the situation

Deviceization and instrumentation requiring a variety of specialized know-how

Only possible with us in the world!

SyncMOF coverage

DAC system

MOF Filter

Development of Technology for CO_2 Separation, Capture, etc.

SyncMOF

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※Bold: Executive companies

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Showa Denko, Nippon Steel

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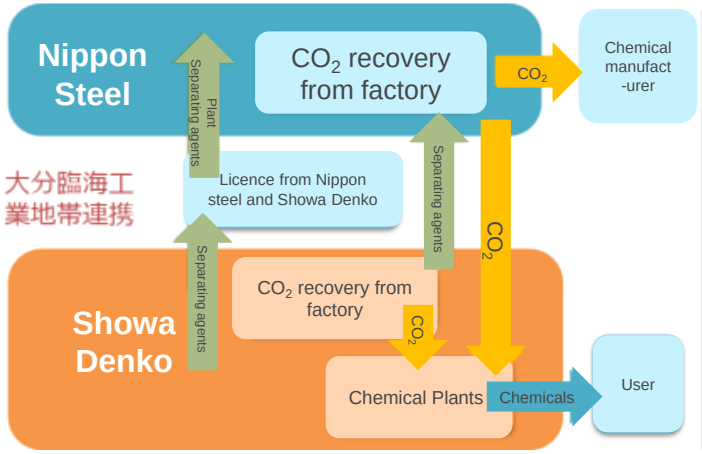
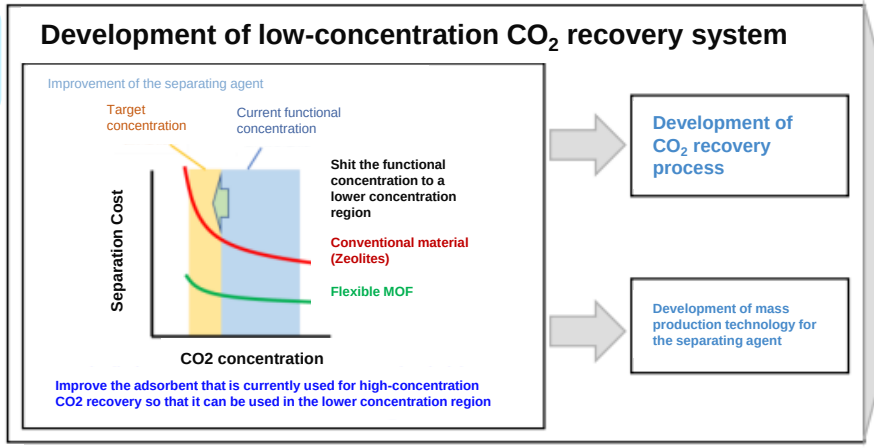
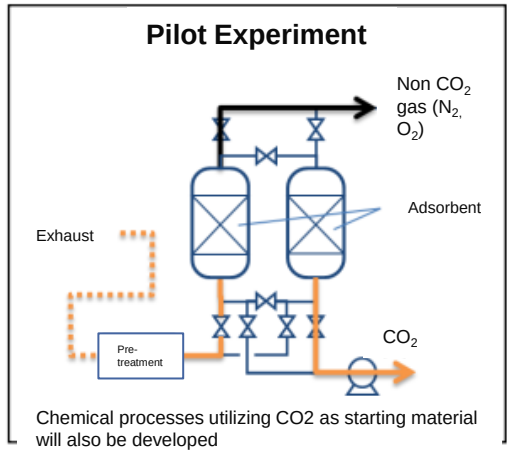
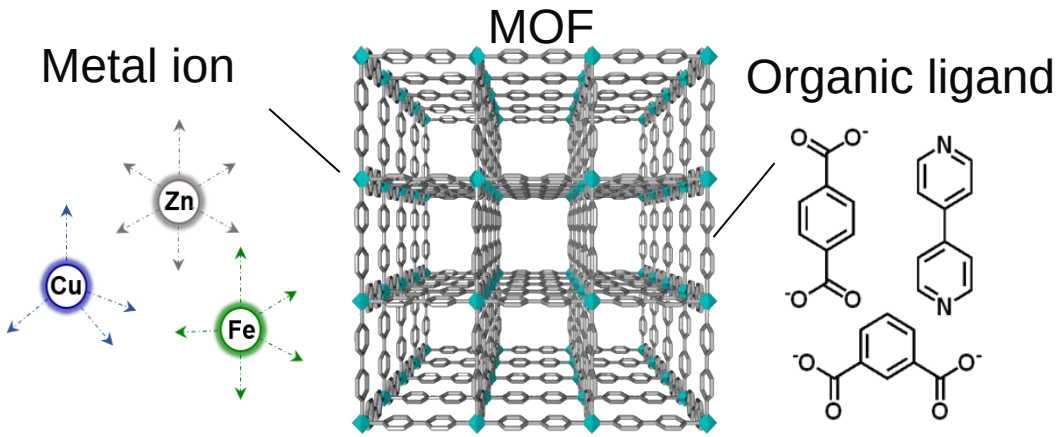
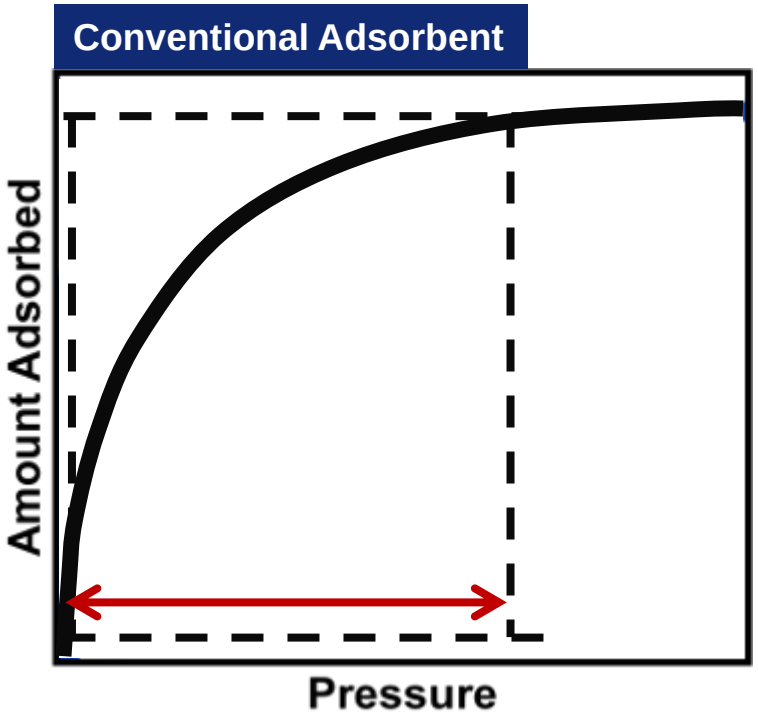


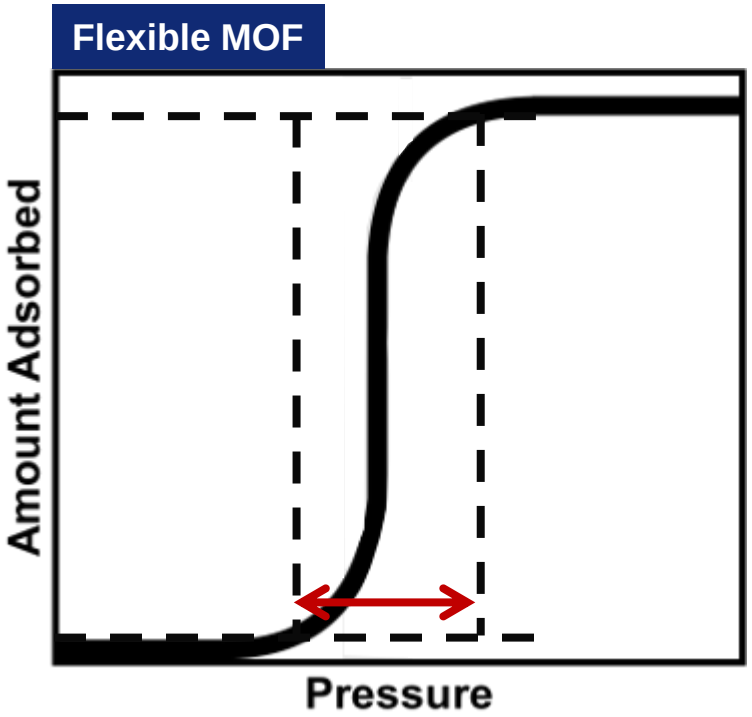




Showa Denko, Nippon Steel





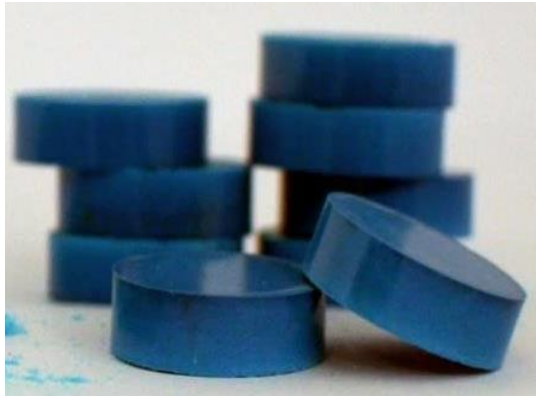


Flexible MOFs are energetically efficient

Shaping of MOFs

SyncMOF

Pellet

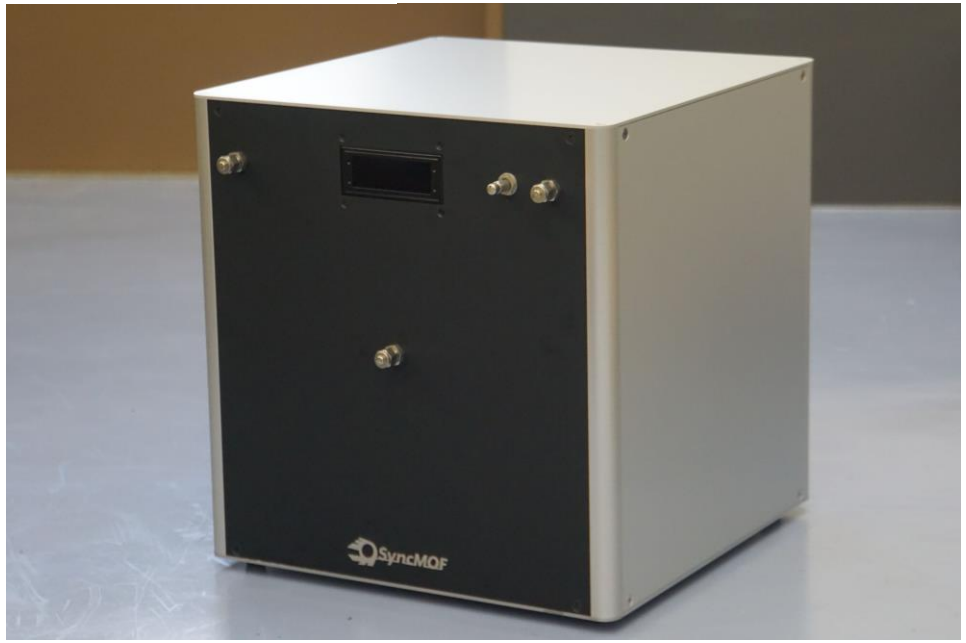


Filters

Palletisation inhibits adsorption capacity of flexible MOF

SyncMOF

PSA device

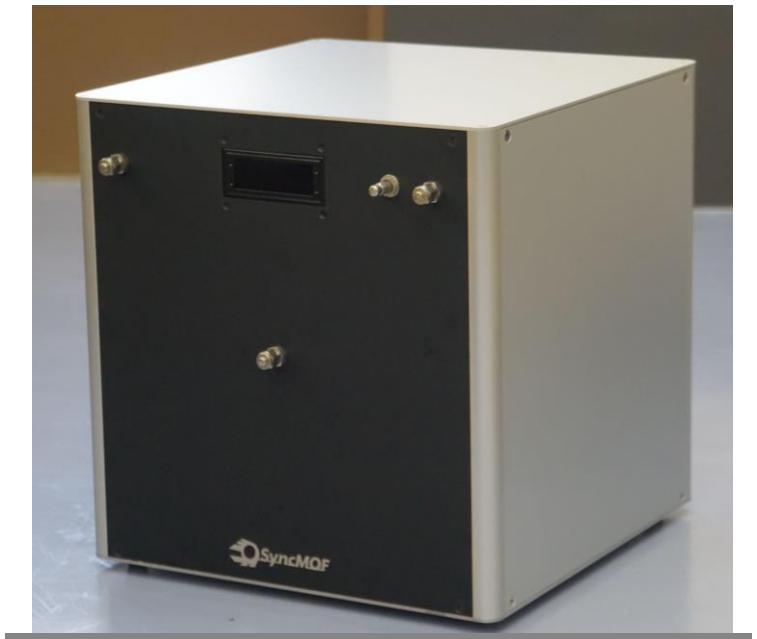


Sample Stage

Dr. Hirotoshi Sakamoto

AichiSR

Gas inlet temperature control sample holder



Automatic pressure swing device

Ditector

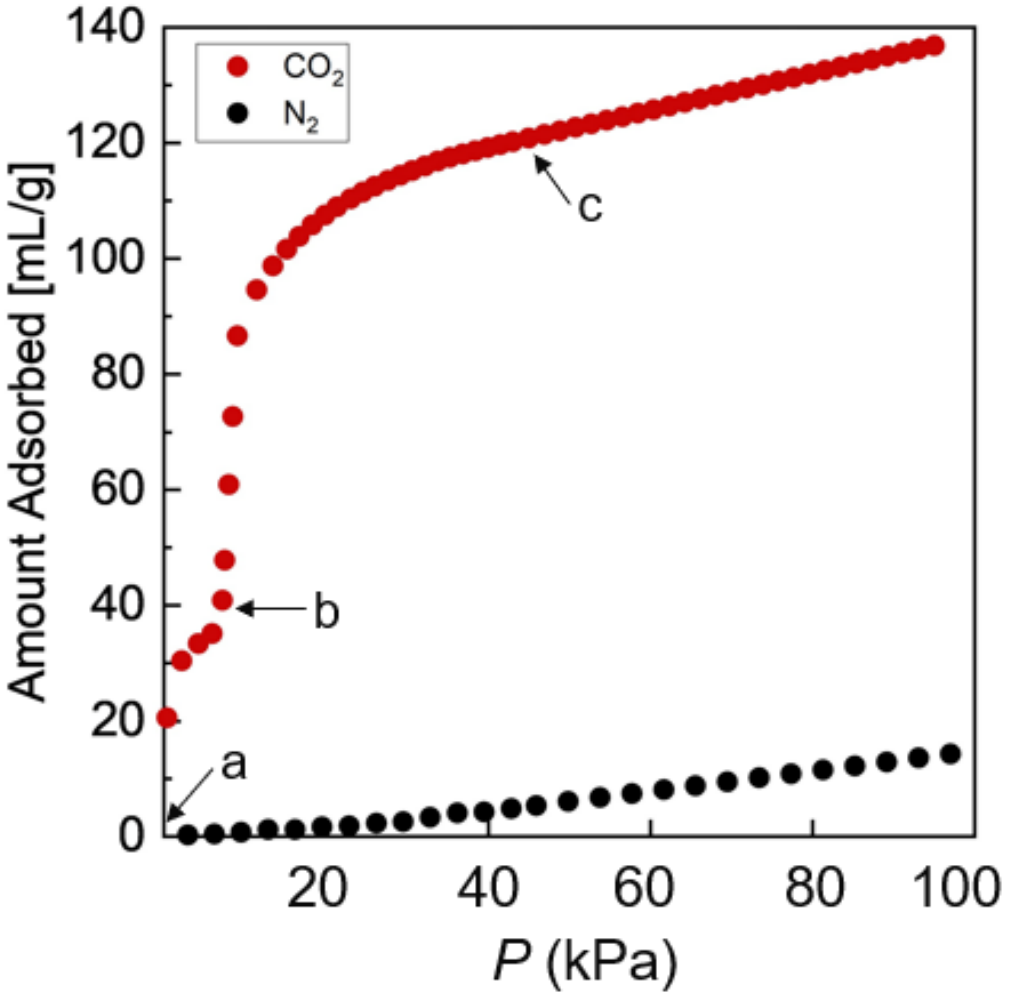
Gas

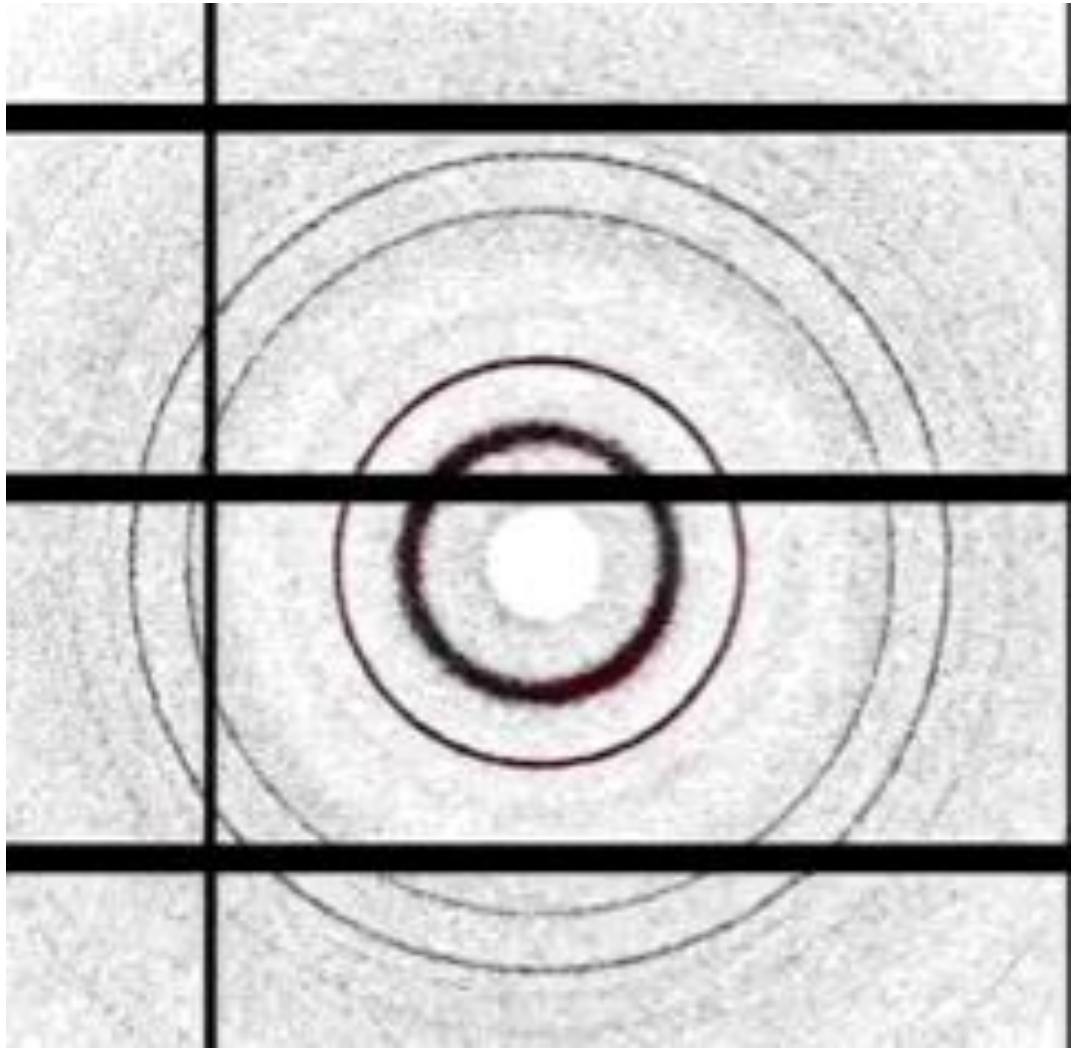
X-ray

MOF that selectively adsorbs CO_2 while flexibly transforming its structure

SyncMOF

CO_2 and N_2 adsorption isotherm in MOF filter





No inhibition in uptake capacity

SyncMOF

TOYOTA TSUSHO CORPORATION

カーボンニュートラル商品・サービス

カーボンニュートラルに向けての取り組み

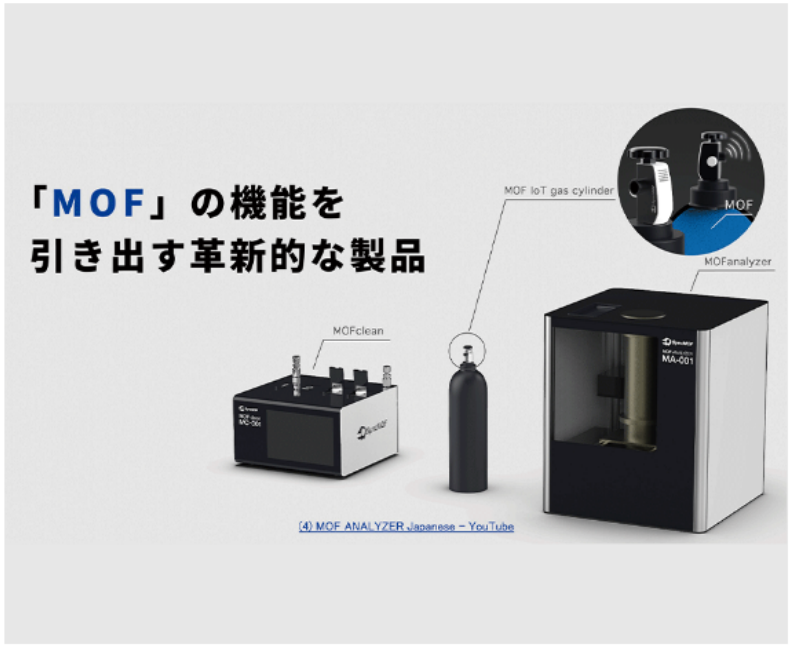
商品・サービス一覧

MOFs capable of adsorbing, separating, and storing gases and vapors with high efficiency

Storage and separation of gasses like CO_2

By utilizing a new porous material *MOF*, it is possible to extract and store large quantities of the target gas from the mixture. For example, it is easy to selective recovery of CO_2 from the air or exhaust gases, or storage of large amounts of hydrogen or volatile gases.

Scope1 Scope2 Scope3



非鉄事業部

電話で相談する
070-2465-1409

メールで相談する

大気からCO2回収急拡大

米オキシデンタル、100万トン処理70基　石炭回帰で需要高まる

2022年9月2日 2:00 [有料会員限定]

国内外の主な取り組み

米オキシデンタルなど	2035年までに年100万トンを回収できるプラントを70基建設する計画を発表
スイス・クライムワークス	年4000トンを回収する施設を稼働中。年3万6000トンを回収する施設を建設中
IHI	23年度にも装置を実用化
三菱重工	22年4～6月に実証試験を実施
川崎重工	25年にも1日500～1000キロの装置を実用化
三菱ガス化学	従来手法の3分の1のエネルギーで回収したCO_2を取り出せる物質を開発
シンクモフ（名古屋市）	MOFを使った回収装置を実証中
双日と九州大学	CO_2を室温で回収できる薄膜を開発

Secret Activities at SyncMOF

『 Profits are generated by social contributions. 』

Good Design Award 2021
「GREEN WORK HAKUBA」

We donated the CO_2 trraping MOF to ***Hakuba village***

温暖化の原因ガスとされるCO2は、大気中に僅か0.04%しか含まれていませんが、このMOF活用により、そのようなごく微量のCO2のみを回収することが可能です。

また、このMOFは、日本政府において本年採択された「CO2の分離回収技術開発プロジェクト」で用いられる最先端材料で、日本のCO2回収はMOFを用いて行われます。

同社技術は、本年9月2日の日本経済新聞でもノーベル化学賞受賞候補の新素材MOFを使ったCO2回収技術として紹介されています。

▶日本経済新聞 旗手たちの原点(6) 工業ガス 10万種から自在 SyncMOF 大企業50社の注文相次ぐ

We donated the CO_2 trraping MOF to ***Hakuba village***

to main text

白馬村 HAKUBA VILLAGE

Change font size あ あ　Change background color 黒 青 白　英語

Google 提供

Living/Procedures | Health and welfare | Parenting/Education | Agriculture, commercial and industrial | construction bidding | Landscape/environmental | Administrative information | Hometown tax | migration settlement

home > Administrative site > Search by organization > General Affairs Division > Announcements, events, radio announcements, etc.
> Unveiling of "MOF" capable of recovering CO2 from the atmosphere

Unveiling of "MOF" capable of recovering CO2 from the atmosphere

New items using "MOF" will be introduced at the event!

A new item that utilizes **"MOF (Metal Organic Framework)", a cutting-edge material that is attracting attention as a CO2 recovery agent in the atmosphere,** donated to Hakuba Village by SyncMOF Co., Ltd. in December last year. It will be introduced in the Happo-one event. An unveiling party will be held as an event for kids technology selection "The power of technology, the potential of MOF donated to Hakuba". On the day of the event, Akihiro Hori, the founder of SyncMOF Co., Ltd., will participate in a talk session on the inheritance of ski and snowboard culture, environmental preservation, and the potential of the "MOF"

Announcements, events, radio announcements, etc.

- Shinshu fire brigade member support shop registration store recruitment
- Please help spread the word about the Ordinance for Protecting Beautiful Villages and Comfortable Living Environments (commonly known as the Ordinance on Manners).


スキーで二酸化炭素回収
名大発スタートアップ 白馬であす実演
イベント当日に向けて滑走役のスキーヤーとゲレンデで話すシンクモフの堀さん(右)

We donated the CO_2 trraping MOF to ***Hakuba village***

SyncMOF

CO_2 recovery by Hakuba village citizens
「技術のチカラ presented by SyncMOF」Sponcers：Nagoya University COI-NEXT etc.

CO_2 Capture System with MOF

Syllego（シレーゴ）：ギリシャ語で「取る」
SyncMOFのMOFで走りながらGo、CO2を取る

CO_2 recovery by Hakuba village citizens
「技術のチカラ presented by SyncMOF」Sponcers：Nagoya University COI-NEXT etc.

SyncMOF

楽しく二酸化炭素回収

資源循環へ活用「ＭＯＦ」紹介

（CTO）

会場でＭＯＦを紹介する堀彰宏博士（中央）と、ヘルメットに付けてデモ滑走した丸山淳也さん（右）

Important point

Enjoy

with *no Pressure*!

Secret Activities at SyncMOF

SyncMOF

カーボン・サーキュラー・エコノミーの
実現に向けて
技術開発や社会実装に挑戦する皆さまを
広島県は応援します。

YouTube

SyncMOF

NEX工業

LEEP SUMMIT

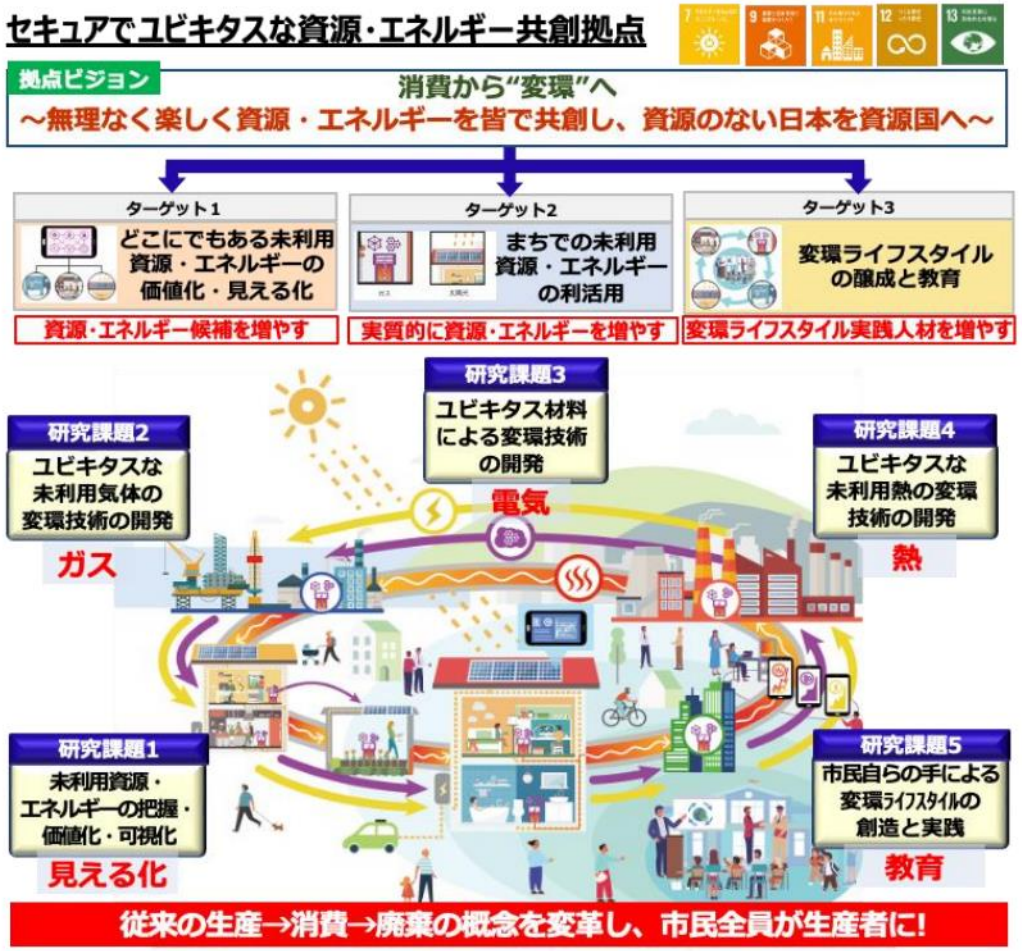
SyncMOF

Secret Activities at SyncMOF

Promoting entrepreneurship educations at several sites (University of Tokyo, Nagoya University, Toyohashi University of Technology, Nada High School, Seifu Nankai High School, Mishima Kita High School, Kawaijuku, etc.)

JST COI-NEXT

SyncMOF



【共創分野　本格型】

セキュアでユビキタスな資源・エネルギー共創拠点

ビジョン：消費から“変環”へ～無理なく楽しく、資源・エネルギーを皆で共創し、資源のない日本を資源国に～

代表機関：東海国立大学機構名古屋大学

参画機関：（**大学等**）関西学院大学、電気通信大学、名古屋工業大学

（**企業等**）株式会社アドマテックス、株式会社エヌ・ピー・シー、株式会社大阪ソーダ、有限会社オービタルエンジニアリング、株式会社キャタラー、株式会社クリアライズ、SyncMOF 株式会社、ゼネラルヒートポンプ工業株式会社、中部電力ミライズ株式会社、帝国通信工業株式会社、東邦ガス株式会社、東洋アルミニウム株式会社、トヨタ自動車株式会社、NU-Rei 株式会社、株式会社フルヤ金属、ポーライト株式会社、株式会社名城ナノカーボン、リンナイ株式会社、名古屋市

Global activites-1： Lectured at "GLOBAL START_UP CONNECTION" hosted by METI

SyncMOF

The only selection from J-STARTUP CENTRAL

経済産業省
Ministry of Economy, Trade and Industry

JETRO
Japan External Trade Organization

GLOBAL START_UP CONNECTION
– J-Startups for NET ZERO –

JP
EN

Global activites-2： Speaker at "The Energy Crisis: Decarbonization and Geopolitics" organized by the MOFA

概　要

ロシアによるウクライナ侵略に伴って生じたエネルギー危機により、地政学がエネルギー情勢に及ぼす影響が注目されています。また、様々なエネルギー源を活用して、現在の危機を乗り切る必要性が強く認識されており、世界は脱炭素化を進めていくという課題に対応していく必要があります。本セミナーではティム・グルド国際エネルギー機関(IEA)チーフエコノミストが来日する機会を捉えて、これらの危機や課題に対して、第一線で活躍する学術関係者、メディア関係者、ビジネス関係者をお招きして議論し、聴衆の皆様と一緒に考える機会にしたいと考えております。エネルギー問題、経済安全保障などに関心のある皆様の幅広い参加をお待ちしています。

外務省
Ministry of Foreign Affairs of Japan

プログラム　　日英同時通訳

1　開会
2　キーノート　スピーチ
ティム・グルド　IEA　チーフエコノミスト
田中 浩一郎　慶應義塾大学大学院
政策・メディア研究科　教授
3　パネルディスカッション・質疑応答
ディスカッション・ポイント
「ロシアのウクライナ侵攻とエネルギー」
「脱炭素とエネルギー危機」

【参加パネリスト】
ティム・グルド　IEA　チーフエコノミスト
田中　浩一郎　慶應義塾大学大学院
政策・メディア研究科教授
小谷　哲男氏　明海大学教授
杉田　弘毅　共同通信特別編集委員兼論説委員
須永　耕太郎　ENEOSホールディングス株式会社
/ENEOS株式会社 常務執行役員
畠岡　潤一　SyncMOF株式会社代表取締役社長

Global activites-3： Introducing Gas Separation and Storage Systems Using MOF at the G7 Hiroshima Summit

HP： G7 HIROSHIMA SUMMIT 2023 (g7imc.jp)

Global activites-4： Global Internship Event at Hakuba

Students came from all over the world (the University of Washington, Johns Hopkins University, and the University of Tokyo)