ISOTHERMAL CARBON CAPTURE AND RELEASE OF CARBON DIOXIDE WITH MOLECULAR POLYAMINES

Tech ID: 34014 / UC Case 2025-125-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

The problem of carbon dioxide (CO2) emissions from industrial processes and mixed gas streams presents a significant global challenge, often addressed by energy-intensive and costly technologies. UC Berkeley researchers have developed an innovative solution for capturing and removing CO2 in an energy-efficient, isothermal manner. The invention is a novel composition that uses a porous organic framework of solid molecular hexamine, specifically 2,3,6,7,14,15-hexakis(aminomethyl)triptycene, that assembles into a three-dimensional ammonium carbamate network. This unique network possesses two one-dimensional pores that selectively capture CO2 upon exposure. This technology enables the capture and subsequent release of CO2 without the large temperature or pressure swings required by conventional methods, offering a more sustainable and economically viable approach to carbon management.

ADVANTAGES

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Isothermal Process: Both the capture and release of CO2 occur at a constant temperature, which significantly reduces the energy consumption and costs associated with regeneration.

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Reusability: The solid molecular framework is designed to be highly stable and reusable for multiple cycles without degradation.

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High Selectivity: The unique pore structure of the material allows for the preferential binding of CO2 over other gases in a mixed stream.

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Scalability: The robust nature of the porous solid material is well-suited for integration into large-scale industrial capture systems.

RELATED MATERIALS

SUGGESTED USES

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Next-Generation Metal-Organic Frameworks With High Deliverable Capacities For Gas Storage Applications
- Porous Polymer Networks For Per- And Poly-Fluoroalkyl Substance Separations
- Structures and Apparatus using Three-Dimensional Linked Networks
- Gas Separations With Redox-Active Metal-Organic Frameworks
- Metal-Organic Frameworks For Aromatic Hydrocarbon Separations

CONTACT

Michael Cohen
mcohen@berkeley.edu
tel: 510-643-4218.

INVENTORS

» Long, Jeffrey R.

OTHER INFORMATION

CATEGORIZED AS

» **Energy**

» Other

» **Environment**

» Remediation

» **Materials & Chemicals**

» Chemicals

RELATED CASES

2025-125-0

- Novel Porous Organic Polymers for Ammonia Adsorption
- Selective Nitrogen Adsorption Using a Vanadium Metal-Organic Framework
- Metal-Organic Frameworks for H2 Adsorption and Drug Delivery
- Redox-Active Metal-Organic Frameworks for the Catalytic Oxidation of Hydrocarbons

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University of California, Berkeley Office of Technology Licensing
2150 Shattuck Avenue, Suite 510, Berkeley,CA 94704
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