Metal Oxide Framework (MOF) Research

https://www.micromeritics.com/Product-Showcase/Characterizing-MOFs.aspx

Cutting Edge Gas Adsorption for a New Generation of Materials

First synthesized around the turn of the century, metal-organic frameworks (MOFs) are crystalline solids made up of single or clustered metal ions connected by organic struts or linkers. With controllable, periodic, nano-scaled structure and the largest specific surface areas of any materials known, MOFs show exciting potential for addressing some pressing societal concerns - for fresh water recovery (from air), for example, for highly efficient gas storage, and low energy gas separation. Surface area and porosity are performance-defining in such applications.

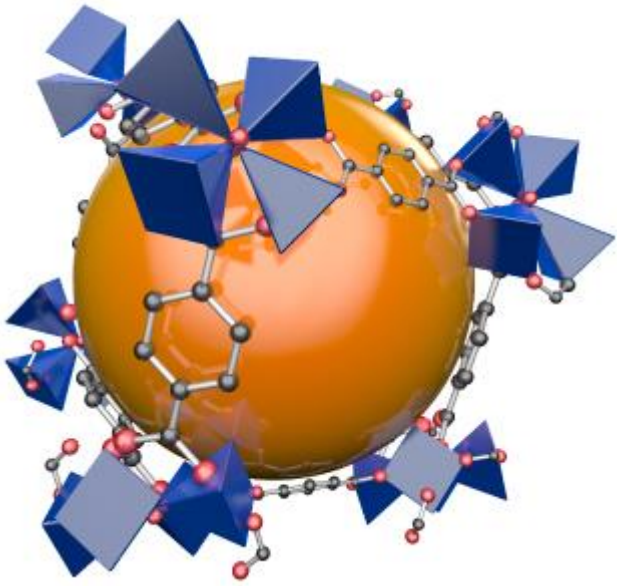
Micromeritics is leading the way in shaping the classic techniques of physisorption and chemisorption to generate the data needed to drive the development of MOFs. State-of-the-art technology measures:

Surface area: to quantify capacity for applications such as gas storage. Increasing surface area maximizes storage capacity enabling the development of low pressure, high volume solutions for toxic gases and/or energy storage.

The strength of surface/molecular interactions: to tailor functionality such as hydrophobicity/hydrophilicity to improve gas separation or catalytic performance.

Porosity: to optimize pore size to control molecular transport by retaining or excluding specific molecules, to separate one gas from another, for example, or to strip out an impurity.

Commercial interest in MOFs stems from their diversity and tunability, the ability to stitch metals and ligands together to exert control at a molecular level. Gas adsorption is the ‘gold standard’ technique for surface area characterization and is uniquely well-suited to pore characterization for microporous materials such as MOFs. Micromeritics’ systems combine market-leading performance and dependability with the flexibility to switch between physisorption and chemisorption for efficient, advanced MOF characterization.



Listen to Prof. Omar Farha, Associate Professor, Dept. of Chemistry, Northwestern University, describe his research group's work on MOFs, their use in storage and separation of gases, current commercialization efforts and the bright future of MOFs in a 4 part series below.

Metal Organic FrameworksEpisode 1 - What are MOFs:\

https://www.youtube.com/watch?v=m91P-R3kxOs

Metal Organic Frameworks Episode 2: Storing and Separating Gases with MOFs

https://www.youtube.com/watch?v=kxoeD8vBmZY

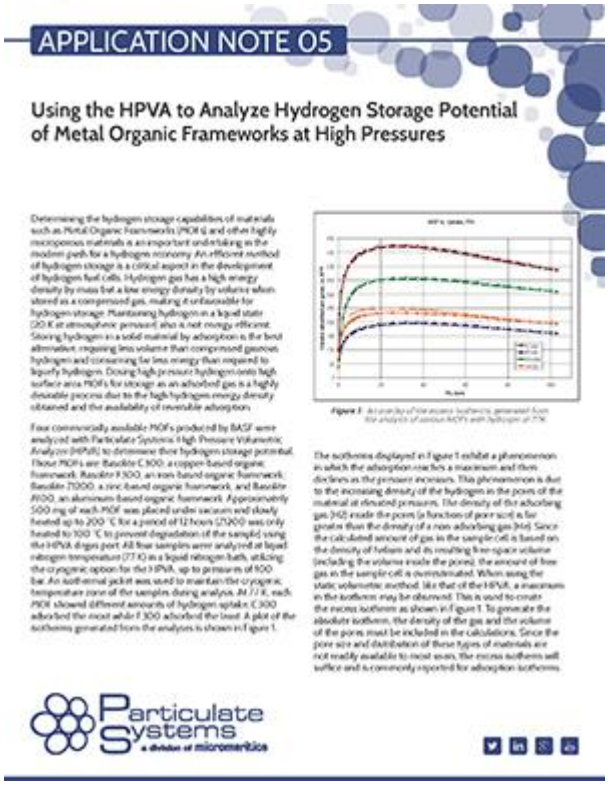
Metal Organic Frameworks Episode 3: Commercialization

https://www.youtube.com/watch?v=9BQGsyHFKGE

Metal Organic Frameworks Episode 4: Future of MOFs

HPVA High Pressure Volumetric Analyzer

The HPVA II Series of adsorption analyzers from Particulate Systems uses the static volumetric method to obtain high-pressure adsorption and desorption isotherms utilizing gases such as hydrogen, methane, and carbon dioxide.



APPLICATION NOTE 05

Using the HPVA to Analyze Hydrogen Storage Potential of Metal Organic Frameworks at High Pressures

Particulate Systems
a division of micromeritics

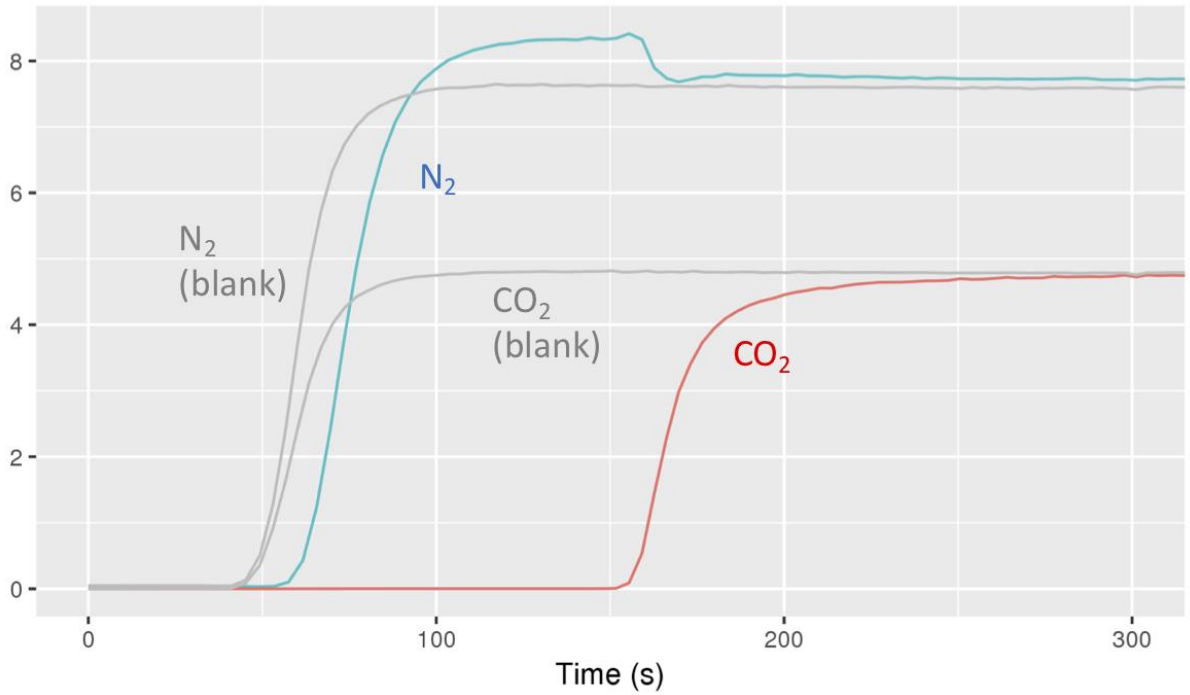
Click on picture to view the Application Note

https://www.youtube.com/watch?v=MXjhcJrNVfI

The Selective Adsorption Analyzer SAA 8100

The Selective Adsorption Analyzer SAA 8100 is a gas delivery system based upon the technology of PID Engineering and Technology, a Micromeritics company. The primary components of the system include mass flow controllers, blending valves, vapor sources, temperature control, and a simple column for evaluating adsorbents. The basic procedure for evaluating an adsorbent candidate includes: activation (degassing) of the adsorbent, flow a mixture of gases (or vapors) through the column containing

the adsorbent, and monitor the composition of the effluent gas from the column containing the adsorbent. The quantity of gases adsorbed may be determined from a simple mass balance using the mass flow entering the column minus the mass flow of components exiting the column. This difference is the accumulation (adsorption) of components from the gas phase. The Selective Adsorption Analyzer is also often referred to as a Breakthrough Analyzer because of its ability to generate breakthrough curves.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