Metal Derived Metal-Organic Frameworks

A synthesis method of metal derived metal-organic frameworks that can capture and store gases

Georgia Tech inventors have developed a synthesis route for the directed growth of MOFs from metal components, such as aluminum. These MOFs can be grown on already fabricated items, removing the need for separate filter components. In this synthesis, metals are used as the precursor for MOF crystal growth under high temperature solvent chemical reaction. A well-dispersed needle-like framework morphology is achieved, creating a topography that exhibits unique water vaper adsorption behavior while remaining stable in humid environments. Synthesized MOF crystals can absorb and trap gases; upon sufficient heating, the trapped gases can be released and properly disposed of.

Summary Bullets

- **Water stable** – unique morphology provided distinct water-stable MOFs compared to previous synthesis techniques
- **High yield** – MOF crystals are attained after a 12 hour reaction period
- **Reusable** – captured gas can be removed and MOF can be reused

Solution Advantages

- **Water stable** – unique morphology provided distinct water-stable MOFs compared to previous synthesis techniques
- **High yield** – MOF crystals are attained after a 12 hour reaction period
- **Reusable** – captured gas can be removed and MOF can be reused
- **Simple fabrication** – can be designed using commercially available materials

Potential Commercial Applications

- Carbon capture
- Methane storage
- Semiconductors
- Drug delivery systems
- Biological imaging and sensing

Background and More Information

Metal-organic frameworks (MOFs) are porous structures made of metal ions and organic ligands. MOFs are of interest because of their porous properties, and are especially of interest for environmental protection. The pores have the ability to absorb and trap molecules, such as carbon dioxide. In some cases, the pores remain stable during elimination of the guest molecules and can be refilled with other compounds.

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IP Status

The following patent application has published<o:p></o:p> : US20190270760A1

Publications

Structured Growth of Metal–Organic Framework MIL-53(Al) from Solid Aluminum Carbide Precursor, Journal of the American Chemical Society - June 19, 2018

Images

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