METAL-ORGANIC FRAMEWORKS FOR H2 ADSORPTION AND DRUG DELIVERY

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PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,065,264	07/20/2021	2016-125

BRIEF DESCRIPTION

Metal–organic frameworks (MOFs) are an important class of materials with high internal surface areas and tunable pore environments that make them of interest for a wide variety of potential applications, including gas adsorption and drug delivery. One of the most ubiquitous MOF materials is of the type M2(dobdc) (2,5-dioxido-1,4-benzenedicarboxylate), sometimes referred to as M-MOF-74. The pores of these frameworks can be expanded while preserving the parent framework structure by using ligands and other analogues with multiple phenylene groups.

With an interest in exploring new ligands for expanded MOF-74 architectures, UC Berkeley researschers created a new family of expanded MOF-74 materials using the anti-inflammatory olsalazine acid as a ligand to form M2(olz), where M = Mg, Fe, Co, Ni, and Zn. Upon activation, these materials exhibit the highest Langmuir surface areas among bioactive frameworks. The M2(olz) frameworks contain pore apertures of approximately 27 Å, corresponding to the mesoporous range (≥20 Å). Strong H2 adsorption was observed by gas adsorption studies and in situ infrared spectroscopy, confirming the presence of open metal sites for all but the Zn analogue. The Mg2(olz) framework, which disassembles under physiological conditions to release olsalazine, represents an unprecedented level of loading in a bioactive metal–organic framework of 86 wt % drug. In addition to delivery of olsalazine, the large pores of Mg2(olz) were used to encapsulate a second drug, illustrating the potential of this platform to deliver multiple therapeutic components.

SUGGESTED USES

- Drug Formulation and delivery
- Encapsulation and delivery of imaging agents

ADVANTAGES

- High biocompatibility and large pore dimensions
- Highest loadings of a therapeutic molecule by MOFs
- Exhibits gradual release of drugs

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

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OTHER INFORMATION

KEYWORDS

MOF, drug delivery, gas adsorption, dihydrogen, ligands

CATEGORIZED AS

- **Materials & Chemicals**
  - Chemicals
- **Medical**
  - Delivery Systems
  - Imaging

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