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Licensing Opportunity

TTO – Technology Transfer Office

Method for synthesis of metal organic framework composites (MOFs)

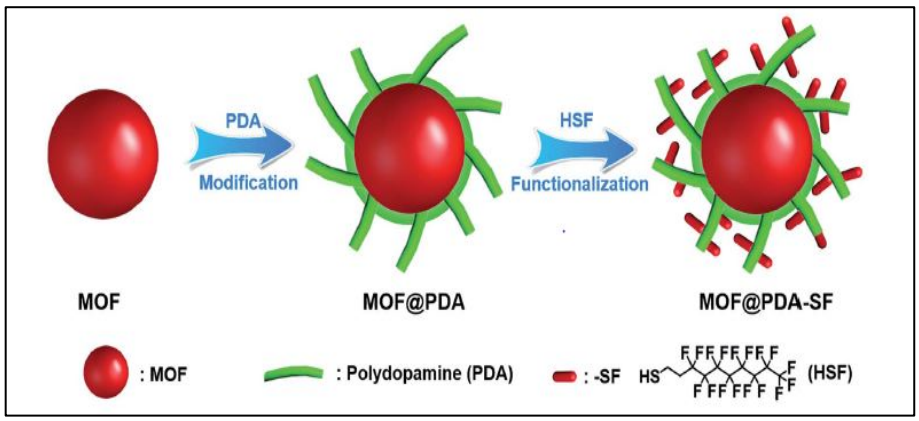

Figure 1: The modification process used to prepare hydrophobic MOF@PDA-SF composites

Ref. Nr

6.1852

Keywords

stability, polymers, hydrophobic coatings, aqueous

Intellectual Property

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Publication

"A new post-synthetic polymerization strategy makes metal-organic frameworks more stable", Chem. Sci., 10 (2019) 4542-4549.

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Description

MOFs (metal-organic frameworks)are highly porous sponge-like structures. Their extraordinary internal surface areas allows the adsorption of large quantities of guest species. Further, the materials can be used to carry out reactions inside for catalysis. However, many MOFs are unstable in aqueous and highly acidic or basic environments due to their weak coordination bonding. Even the presence of moisture can render them defunct. This challenge limits their potential applications across various industries. The method covered by this patent application is a fast procedure of developing MOF composites that can withstand adverse pH and other external conditions like humidity. The method consists of growing polymer coatings on the external surface of MOFs. These hydrophobic coatings protect the materials against degradation in water at elevated temperatures (even boiling), and also in acidic or basic media. This method was applied to s structurally diverse group of MOFs, such as HKUST-1, demonstrating that the coating method is versatile, enhancing the stability of very unstable materials.

The MOFs are synthetized and available on the gram scale.

Advantages

- Improved pH and water stability
- Resistance to degradation on exposure to moisture over months
- Coating is easily applied to many materials
- Can improve MOFs ability to adsorb guests in humid environments, like CO2 from humid gas mixtures.
- Wider applicability than current methods

Applications

- Heterogeneous catalysis
- Selective gas separation
- Energy storage
- Drug delivery
- Separation of metal and organic species from water (water decontamination)