One-step Postsynthetic Modification of Metal-Organic Frameworks

Metal-organic frameworks (MOFs) are among the most attractive porous materials known today. Their high surface-to-mass ratio makes them extremely useful in many processes, from gas sorption, storage and separation, to catalysis, drug delivery and heat exchange. Typically, they are modified post-synthesis (PSM) to optimise their chemical functionality and/or pore surface to a specific application.

One of the most commonly studied methods of PSM of MOFs involves a condensation reaction between an amine and aldehyde to form an imine group. This reaction is known as the Schiff-base condensation, and it has been used to functionalise MOFs for use as catalysts, gas sorption and more. In general, the methods of PSM require long reaction time (up to days) and high temperatures and are difficult to scale-up for production.

An innovative process was developed to overcome these issues. Through the use of spray drying, the MOF and a reagent is able to react in a short span of time under mild conditions to undergo PSM of the MOFs. The process is scalable, continuous and has a higher conversion efficiency, making it ideal for large scale industrial production.

**Technology Features & Specifications**

This technology comprises of:

- A process of using the spray drying of metal-organic frameworks (MOFs), reagents and solvents to perform the postsynthetic modification (PSM) of MOFs
- The use of spray-drying makes the process highly fast, scalable and continuous

**Market Trends and Opportunities**

Metal-organic frameworks (MOFs) belongs to a group of microporous and mesoporous material that has a high internal surface to volume ratio and a wide structural diversity. As such it has a wide range of possible applications ranging from gas storage, ion-exchange, sensing, catalysis, molecular separation etc. According to market reports, the MOFs market grew from about $3.5 m in 2013 to $41 m in 2016 and $69m in 2017. It is expected to grow to $260 m by 2021. The CAGR of the global MOFs tonnage sales is predicted to be about 36% between 2017 to 2024. The majority of MOFs needs to be PSM.

For more information on technologies we have to offer, please visit our website at [https://www.ipi-singapore.org](https://www.ipi-singapore.org) or enquire at techscout@www.ipi-singapore.org