Metal-Organic Frameworks for the encapsulation of biological entites: potential as vaccine formulation

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Bio-entities benefit from unparalleled activities of high interest in many applications such as environmental and medical field. However, these are fragile entities, easily degraded under non-native conditions. Encapsulation, i.e. inclusion within a host matrix, is particularly interesting for bio-entities stabilization and protection, and Metal-Organic Frameworks (MOFs) have arisen as a host matrix of choice, resulting in the design of novel functional materials.[1] However, the number of MOF/bio-entities couples is limited either due to size matching constraints or to a narrow window of compatible synthetic conditions.
In this presentation, we will present our efforts to expand synthetic routes and processing methods to explore new compositions and hierarchical structures of bio-entities-MOFs hybrids. We will describe the synthesis and characterization of MOFs-based living materials, using the mesoporous iron polycarboxylate MIL-100(Fe).[2] We will also present our latest finding on the design of bio-entities@Al-MOF.[3] We will show that the bio-entities@Al-MOF act as a potent vaccine formulation as it demonstrated *in-vivo* a stronger adjuvant effect than the benchmark Al-adjuvant, was fully resorbable, disappearing from the injection site, was not exhibiting any toxicity, and was stable for two years.

References:

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