MOF Chemical Biology

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MOFs have been used in diverse applications including bio-sensing, biomass, and catalysis. This study was introducing a new concept in material biology (MOF Chemical Biology) by studying the change in biological functions of biomolecules such as protein enzymes when they are contained within synthetic MOF biocomposites (termed enzyme@MOFs) obtained by the *de novo* biomineralization synthesis route, performed under mild and aqueous conditions. Those biocomposites are with apertures that allow substrates to move freely and while embedded enzymes or bacterium are confined inside the framework where they are shielded against most structural changes. Moreover, we also demonstrated the first example of encapsulating enzymes into robust metal-organic frameworks (MOFs)-UiO-66 via a solid-state mechanochemical process. The mechanochemically encapsulated enzymes retain the desired functionality and show resistance to proteases even under acidic conditions. Those new approaches will provide an alternative system, i.e., structural confinement effect, for broadening MOF applications on the study of biochemistry functionalities to prokaryotes, eukaryotes or mammalian cells etc.

References

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