Synthesis of biomineral encapsulated metal-organic framework hybrid materials for enhanced drug delivery applications

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Metal-organic frameworks (MOFs) are known as an emerging class of porous materials composed of metal ions or clusters connected by organic linker molecules. There have been growing interests of MOFs because of their superior properties, such as exceptionally high surface area. It makes them promising candidates as efficient drug delivery host materials as long as they exhibit biocompatibility. Herein, we developed solvothermal methods to synthesize iron-based NH_2-MIL-88B MOF as a form of nanocrystals of narrow size distribution. We developed means to functionalize the MOF nanocrystals with specific functional groups such as carboxylic acids. We envision that suitable chemical functionalization may enhance the growth of biominerals such as calcium phosphate. We are in the process of optimizing the conditions to control the encapsulation of functionalized MOF nanocrystals in calcium phosphate. Structural and spectroscopic studies of NH_2-MIL-88B MOF nanocrystals, their functionalized and calcium phosphate encapsulated forms as well as the comparisons of their drug loading and delivery efficiencies will be discussed.