

# Doping of Metal-Organic Frameworks with Functional Guest Molecules and Nanoparticles

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## **Abstract**

Nanoparticle synthesis in metal-organic frameworks (MOFs) is performed by the adsorption of suitable precursor molecules for the metal component and subsequent decomposition to the composite materials nanoparticles@MOF. This chapter will review different approaches of loading metal-organic frameworks with more complex organic molecules and metal-organic precursor molecules. The related reactions inside MOFs are discussed with a focus on stabilizing reactive intermediates in the corresponding cavities. The syntheses of metal and metal oxide nanoparticles inside MOFs are reviewed, comparing different synthetic routes. Emphasis is given on the micro structural characterization of the materials nanoparticles@MOF with a particular focus on the location of embedded nanoparticles using TEM methods. Some first examples of applications of the doped MOFs in heterogeneous catalysis and hydrogen storage are mentioned.