

The goal of the project is to obtain composite materials containing palladium nanoparticles or palladium oxide, using MOF materials as supports for the catalytically active catalyst phase. The project also aims the development of techniques for the synthesis of nanoparticle catalysts with strictly defined morphology that are stabilized by immobilization in appropriately designed MOF materials (Fig. 1).

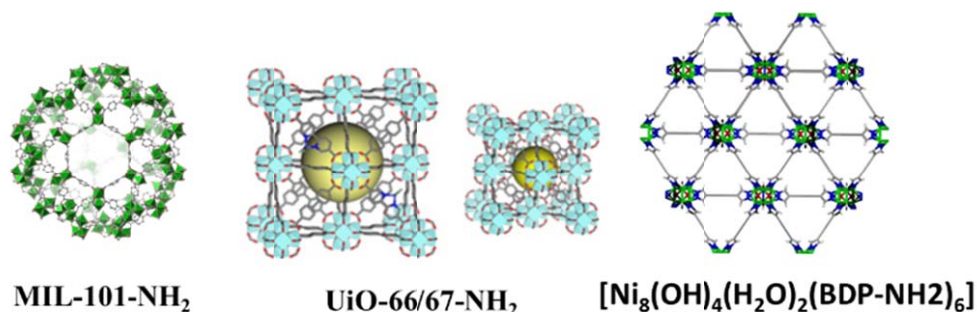


Fig. 1. Examples of the MOF compounds considered in this research.

By designing the appropriate shape and size of nanopores of MOF materials, it will be possible to control the size of palladium nanoparticles immobilized on their surface, which should be reflected in the selectivity of the reactions. One possibility to control the nanoparticle morphology in the Pd@MOF composites is the introduction of additives during synthesis to direct nanocluster crystallization towards desirable forms. Such additives may be halogen compounds, alcohols, aldehydes, ketones or carboxylic acids (Fig. 2).

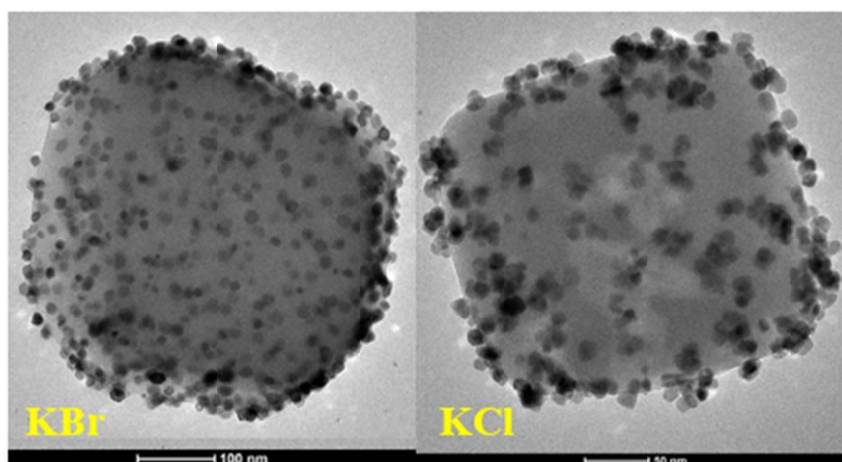


Fig. 2. Morphology of Pd nanoparticles obtained on the MOF compound MIL-125-Ti-NH₂ in the presence of KBr and KCl salts.

In the frame of this project we plan to investigate the catalytic activity of both, Pd nanoparticles and PdO. The obtained nanocomposites will be tested as the catalysts of the hydrogenation and isomerization reactions of unsaturated compounds, mainly alcohols and functionalized compounds.